SEVERN TRENT WATER

Drought Plan 2014

Our plan for managing water supply and demand during drought

Executive Summary

This is Severn Trent Water's statutory drought plan and is an update to the plan published in February 2010. We produce drought plans to explain how we will effectively manage both supplies and demand for water during a drought in our region. Our plan aims to reconcile the competing interests of customers, the environment and the wider economy. The plan helps us and our stakeholders to make the right decisions at the right time and shows how we will provide a continuous supply of water to our customers during a drought.

For the purposes of this plan we define a drought as a period when there is significantly less water available than normal[1]. Whether the effects of any particular drought are focused primarily on the environment, on public water supply or on other water users in the wider economy will depend on the individual characteristics of each drought. All droughts differ in severity, extent and duration. Droughts are also different depending on whether the majority of the water sources affected are rivers, reservoirs or groundwater. Droughts are naturally occurring events and we can not plan to prevent them from happening. Instead, we plan to minimise the impacts of droughts when they do occur.

Between 2010 and early 2012, parts of our region were affected by an exceptional lack of rainfall. During this time we implemented many of the measures described in our 2010 drought plan. We also learned more about the flexibility of our water supply network and our strategic grid and we were able to avoid the more extreme drought response measures described in the 2010 plan. Our updated plan reflects what we have learned whilst managing the dry conditions that affected parts of our region from 2010 to early 2012.

The main differences between this drought plan and our 2010 plan are:

- Revisions to reflect the latest Environment Agency drought planning guidelines issued in June 2011;
- Updated drought management actions which build on our dry weather experiences during 2011 and 2012;
- Updates to the environmental reports and ongoing monitoring that would support any future drought permit or drought order applications at the sites identified within the plan; and
- Revisions to our demand management activities to take account of the changes in legislation around the use of temporary usage restrictions and the Defra guidance on drought permits and orders published in May 2011.

[1] We consider that there is less water available than 'normal' when any of our drought triggers, such as reservoir storage, are in trigger zone C or below – we explain our drought triggers, drought trigger zones and associated actions further in section 2.1

Table of Contents

1. Introduction

1.1 Overview of process

Under Sections 39B and 39C of the Water Industry Act 1991, as amended by the Water Act 2003, we are legally required to prepare and maintain a drought plan. This drought plan sets out how Severn Trent Water will "continue, during a period of drought, to discharge its duties to supply adequate quantities of wholesome water, with as little recourse as reasonably possible to drought orders or drought permits." This definition is consistent with the Water Industry Act 1991.

We are also required to consult with the public on the content of the plan, assess the representations we receive and prepare our statement of response within 15 weeks of the draft plan publication date.

We have prepared this drought plan in line with the '*water company drought plan guideline'* issued by the Environment Agency (EA) in June 2011. For example, we have based the structure of this plan on the suggested structure provided in appendix C of the EA guideline. During the production of this plan, we have contacted our statutory stakeholders and neighbouring water undertakers. We recognise the need to maintain these links to ensure that we make the optimum use of water resources for both customers and the environment during a drought.

The EA drought planning guideline states that "Drought plans should show how a company would operate in a range of droughts and present enough information to customers and partners to show what decision making processes a company will make in a drought event." Our drought plan balances the need to meet the EA's requirements with the requirement to retain operational flexibility. One of the lessons that we have learned whilst implementing drought management actions in recent years is that our drought plan needs flexibility to allow timely decision making and implementation of the appropriate actions. The fact that we have met our customers' demands without restrictions since 1996 indicates that our current drought management processes are robust. This is especially true considering that the 12 month period to February 2012 was the driest in the Midlands region since records began in 1910 (source: EA water situation report, Feb 2012). Despite this we are constantly challenging ourselves to improve where possible (see annual review in section 5.1).

As part of our pre draft plan consultation (stage 2 in figure 1 of the EA guidelines) we wrote to our statutory stakeholders on 5 April 2012 to inform them that were starting to prepare our draft drought plan. We have received helpful responses from Ofwat, the EA and the Consumer Council for Water (CCWater) and have reflected these comments in this plan (see how we have incorporated these in section 7.4). We discuss consultation further in section 1.5.

1.2 About Severn Trent Water

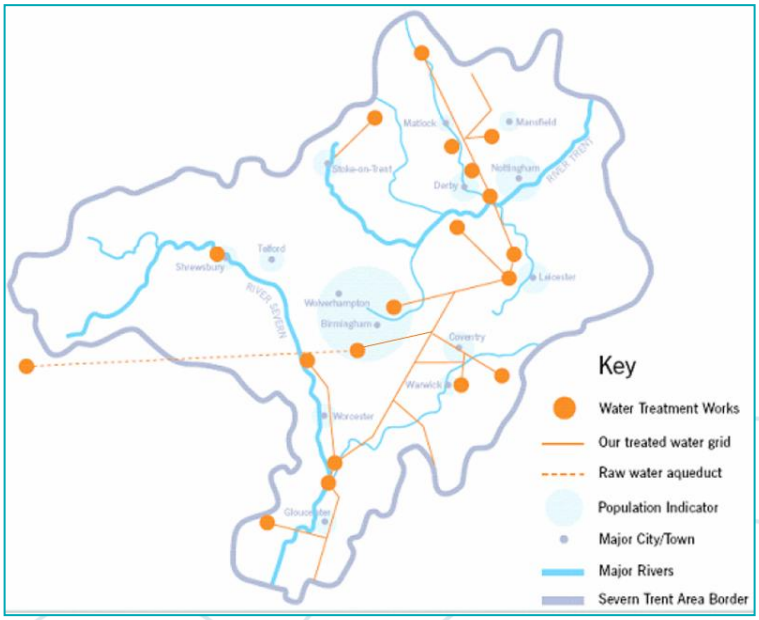
Severn Trent Water provides water to 7.7 million people, and sewerage services to 8.7 million people in an area covering 21,000 square kilometres in the Midlands and mid-Wales. We are one of the largest water companies in England and Wales, supplying around 1,800 million litres of water per day. Of this supply approximately:

- One third of our water comes from river abstractions
- One third comes from reservoirs and
- One third comes from groundwater (such as boreholes).

We have a significant impact on our communities and regional economy, through the services we deliver, as a major employer and as a purchaser of goods and services. We also have a significant impact on the local environment through abstraction of water and discharge of waste water and through our management of our public access recreational sites. We recognise our responsibility to take full account of our impact on the local community and environment in everything we do. The following map shows our major demand centres, water treatment works and a simplification of the treated water grid.

For further information on the business, please visit www.stwater.co.uk.

Figure 1 - Map showing a simplified version of our supply network



1.3 Baseline water resources situation and levels of service

We have described our baseline water resources situation in our 2009 Water Resources Management Plan (WRMP09), our revised draft WRMP and in the annual review information that we publish on our website (see section 7.6). For example, one of the key performance indicators (KPIs) shown for the 2012-13 reporting year (April until March) is our Security of Supply Index (SoSI). This index, used across the industry, is a measure that shows regulators and other interested stakeholders whether we are complying with our duty to safeguard the security of our water supplies. The SoSI does this by assessing the extent to which we can guarantee our planned level of service. Our SoSI for 2012-13 was 100. A SoSI of 100 is the maximum score possible.

Our stated levels of service set out the standard of service that our customers can expect. The levels of service stated for this drought plan are consistent with those recognised by Ofwat at the Price Review of 2009 (PR09). These stated levels of service are that:

- We will need to restrict customers' use of water, on average, no more than three times every 100 years
- We consider that rota cuts/ standpipes for our customers are unacceptable as a response to drought.

These stated levels of service are consistent with those we have quoted in previous Severn Trent publications, such as our WRMP09 and consistent with those that we quote when we carry out customer engagement. One example of customer engagement to inform PR14 is the work of our Water Forum. This is a multi stakeholder panel created to challenge Severn Trent Water on behalf of customers and stakeholders (we have provided a link to this part of our website in section 7.8). When consulting with the Water Forum on the question of restrictions we do not distinguish between the different types of restrictions that we could apply. Our most recent research shows that our customers support a frequency of restrictions of once every 38 years. This is so close to our existing level of service that we do not propose making any changes to it. We note that, across England and Wales, most companies plan to restrict their customers' use more frequently than three times in every century.

Although we provide a higher level of service than most companies we do this at the lowest possible cost to our customers. If we planned on the basis that we will never impose restrictions even during times of drought, it would not be economically or environmentally feasible to meet unrestrained consumer demand in all possible circumstances. If we planned never to restrict the use of water, customers' bills would have to be higher. Conversely there are potential savings if we planned to restrict customers more frequently. The draft WRMP that we submitted in spring 2013 looked at the sensitivity of our system to different levels of service.

Our company wide levels of service are based on water resources modelling that we have carried out using flow series which extend from 1920 to 2010.We have provided more detail on how we use this flow record in section 2.4. This drought plan makes no explicit allowance for the impacts of future climate change. This is consistent with the 2011 EA drought plan guidelines. However, we have produced a climate change Adaptation Reporting Powers (ARP) report which describes the adaptation work we are doing in response to climate change. This report is available on our website (see full reference in section 7.6).

In addition we published our revised draft WRMP on our website in November 2013 and we published our business plan for the periodic review in 2014 (PR14) on 2 December 2013. As part of our WRMP work we are considering the vulnerability of our water resources to climate change. We are reviewing our 'deployable output' (DO) and assessing the sensitivity of these results to climate change. The Environment Agency defined deployable output in the drought planning guidelines as:

"The output of a commissioned source or group of sources or of bulk supply as constrained by:

Environment
Licence, if applicable
Pumping plant and/or well or aquifer properties
Raw water mains and/or aquifers
Transfer and/or output main
Treatment
Water quality"

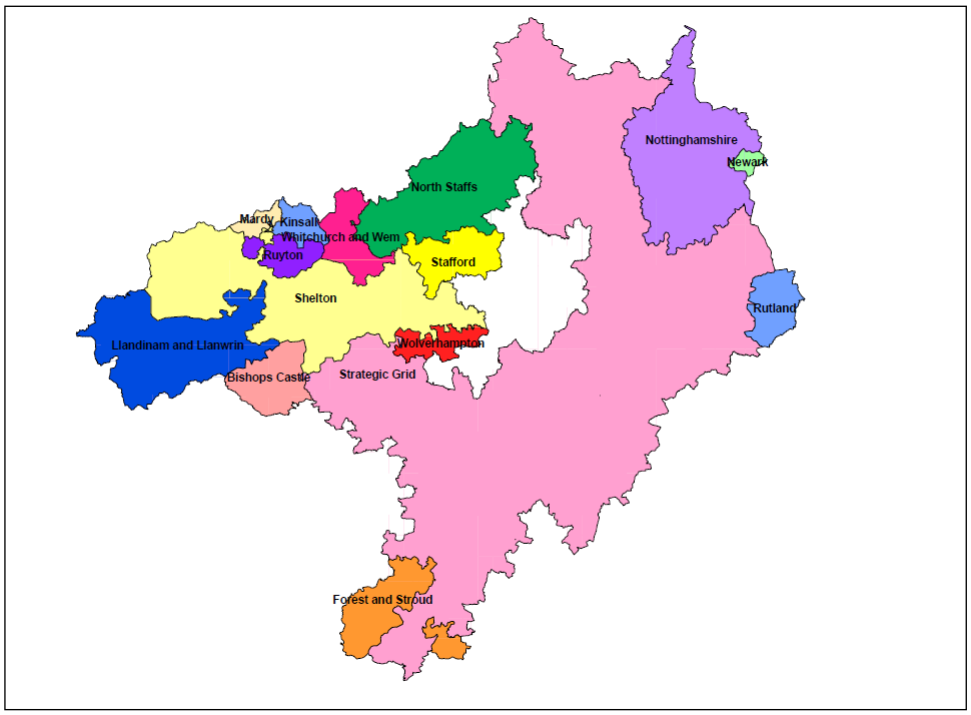
During the preparation of our PR14 submission we assessed what investment we require to maintain our current levels of service. We have shown what investment we need by producing the business plan which we recently submitted to Ofwat. As a company we produce other plans that overlap to some extent with drought management. In order to give readers a more holistic view of the work we do in this area we have included a table in section 7.4 to show why we produce these other plans and to summarise what they contain.

1.4 Our revised water resource zones

Following the WRMP09, we informed Defra of our plan to review the structure of our six water resources zones in time for the 2014 WRMP. The purpose of the review was to ensure that we comply with the EA definition of a water resource zone being the "largest possible zone in which customers share the same risk of a resource shortfall".

We completed our initial review of resource zones in 2009-10 and reported the results to Defra in June 2010. Our review took into consideration the supply and distribution enhancements we are undertaking during AMP5 and resulted in 15 water resource zones, as illustrated in Figure 2 below. The new zones provide a more accurate representation of how customers will be served by our network at the end of AMP5, and meet the EA's resource zone definition. Our WRMP annual reviews have included a summary of the outturn water supply and demand position for each of these new zones.

Figure 2 Severn Trent Water's new Water Resource Zones



Defining our Water Resource Zones

Our review of water resource zones used a combination of the best available company asset configuration records along with operational expert judgement. Following this review, we have also reconfigured the water demand and supply models we use for our water resources planning.

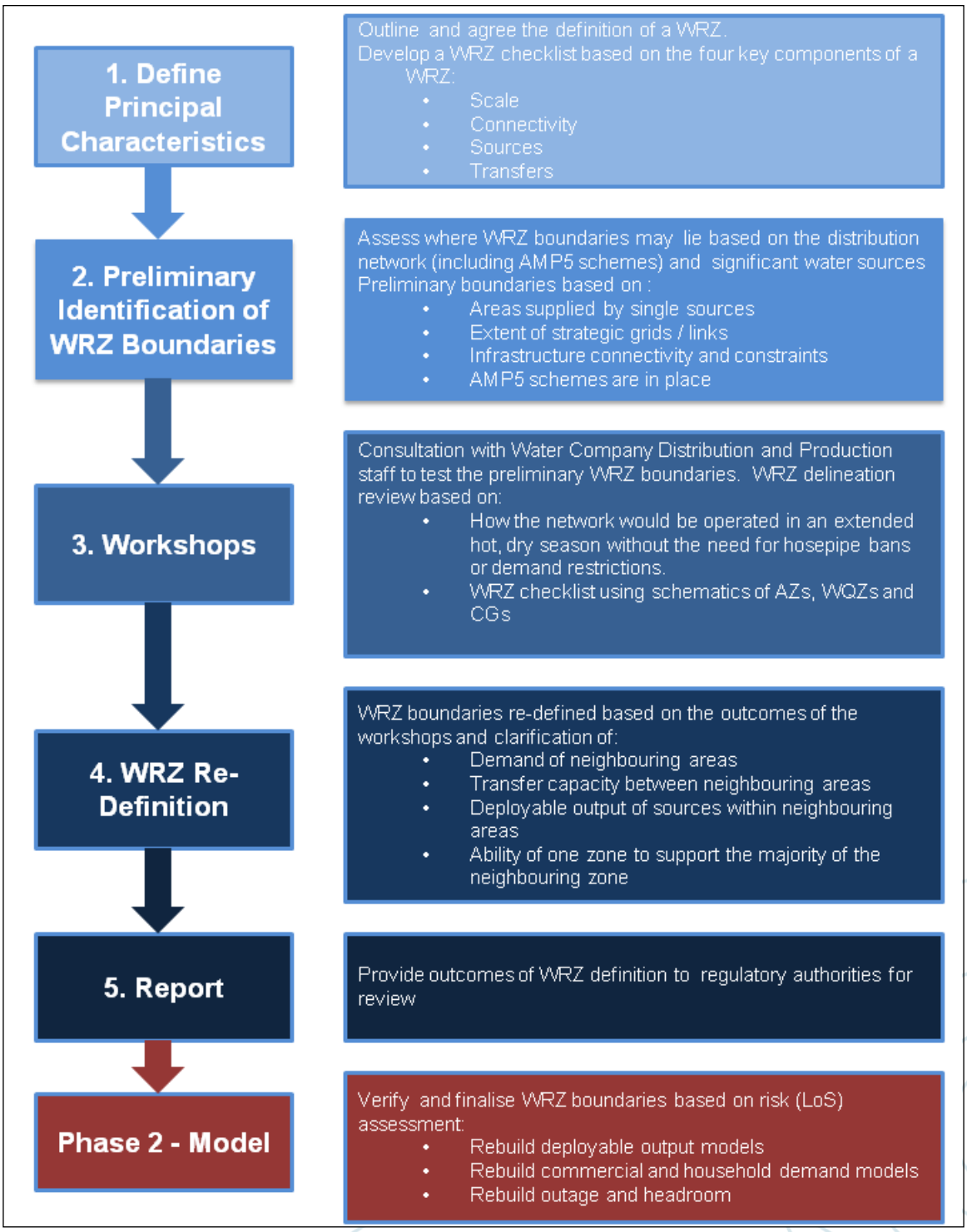
The EA agreed our approach to reviewing the structure of our existing water resource zones in January 2010. The approach can be summarised as follows:

- We have reviewed our major strategic sources and assessed how the connectivity of our supply system allows them to support our smaller sources of water.

- For supply / demand investment planning, our scenario is an extended hot, dry season (e.g. summer / autumn 2003).
- We have considered to what extent the conjunctive supply system can meet demand without the need for hosepipe bans / restrictions.
- Where the distribution network constrains our ability to share water to meet demand, this forms a “cleavage line” between zones.
- Our assessment is based on delivery of the AMP5 supply resilience schemes.
- Our assessment did not include short term emergency risks due to engineering failure or ‘peak day’ demands as these are not relevant to the definition of a water resource zone. They are covered by our resilience and isolated communities investment plans and our local distribution investment plans.

The key steps in our approach to reviewing our Water Resource Zones are summarised in Figure 3 below.

Figure 3 - The process of defining Water Resource Zones



Characteristics of our Water Resource Zones

The new zones vary widely in scale, from the Strategic Grid zone which supplies around 5,000,000 people, to the small zones of Mardy and Bishops Castle which supply only around 8,000 people. These zones have very different water resources concerns, with some requiring significant investment in the long term to ensure secure supplies, while others require minimal investment other than to maintain the current assets and infrastructure. These future pressures are explained throughout our latest draft WRMP.

The 2011-12 characteristics of our 15 water resource zones are summarised in Table 1.

Table 1 - Water Resource Zone 2011-12 characteristics

Name	Deployable output (Ml/d)*	Number of households	Population served	Distribution Input (Ml/d)*
Bishops Castle	5Ml/d	3,260	7,533	2Ml/d
Forest & Stroud	45Ml/d	59,298	130,387	41Ml/d
Kinsall	5Ml/d	5,507	11,938	5Ml/d
Llandinam & Llanwrin	20Ml/d	20,414	42,309	14Ml/d
Mardy	4Ml/d	3,528	8,119	3Ml/d
Newark	16Ml/d	21,544	46,080	11Ml/d
North Staffordshire	150Ml/d	245,295	523,241	123Ml/d
Nottinghamshire	270Ml/d	469,464	1,048,927	231Ml/d
Rutland	0Ml/d	13,196	32,376	8Ml/d
Ruyton	5Ml/d	5,176	12,428	4Ml/d
Shelton	143Ml/d	208,953	470,743	107Ml/d
Stafford	28Ml/d	41,917	93,567	23Ml/d
Strategic Grid	1470Ml/d	2,227,428	5,061,528	1213Ml/d
Whitchurch & Wem	11Ml/d	13,587	30,398	9Ml/d
Wolverhampton	66Ml/d	106,834	232,280	63Ml/d

* rounded to the nearest Mega litre per day

1.5 How we have consulted and the revisions we have made to our plan

We published our draft drought plan for consultation on 10 May. As well as publishing it on our website we also sent out an ‘e-newsletter’ to hundreds of stakeholders to draw their attention to the fact that we were publishing a draft drought plan and a draft WRMP. The list of stakeholders that we sent this ‘e-newsletter’ includes:

- Regional MPs

- Local authorities
- Drainage authorities
- Relevant NGOs
- Business organisations such as regional Chambers of Commerce and local enterprise partnerships
- Housing associations and
- Professionals in issues concerned with highways.

Our draft drought plan consultation period ran until 5 July 2013. We received representations from the following organisations:

- The Consumer Council for Water (CCWater)
- The Environment Agency
- Natural England
- Natural Resources Wales (NRW)/ Cyfoeth Naturiol Cymru
- Nottingham City Council
- South Staffordshire Council
- Worcestershire County Council

During the consultation period, on the 25th June 2013, we invited numerous stakeholders to a joint WRMP and drought plan workshop held in Coventry. We were pleased that representatives from organisations such as the National Farmers' Union, wildlife trusts, rivers trusts and a sailing club could attend.

In August 2013 we published our statement of response to the comments received during the consultation alongside a revised draft drought plan. This statement of response (SoR) showed how we have addressed the comments and suggestions that we received.

On 6 January 2014 Defra wrote to us giving us permission to publish our final drought plan in accordance with regulation 6 of the 2005 Regulations. This letter asked us to publish within a month of receiving the letter and to clarify a few points. One of these points of clarification relates to:

- Including a commitment in our plan to address the requirement that should the Appropriate Assessments for the River Severn or River Wye drought order/permits conclude that there could be likely significant effects on designated European sites, we will set out the case for over-riding public interest. This will

include the requirement to demonstrate that there are no feasible alternative solutions to reliance on these orders/permits (also refer to Section 4.1).

We have highlighted clarifications such as those listed above by using yellow fill to show where we have made changes to our revised draft plan. We have also made some minor changes such as updating dates and replacing the words 'revised draft' with the word 'final'. We have not highlighted the minor changes.

2. Drought triggers and scenarios

There are a number of indicators that a drought period is developing. The following indicators affect the hydrological conditions within our region:

- Rainfall deficits, particularly comparisons against long term averages. Where appropriate we may estimate the return period of these deficits (we discuss this further in sections 3.4 and 7.7)
- Soil moisture deficit (SMD): Rainfall deficits and high soil moisture deficits are very good indications that drought conditions may be building up
- Low river flows; however, our resource rivers are, with only one exception, supported by impounding or pumped fill reservoirs. It is because of this that our operations can generally survive a short sharp drought, such as the one in 2003, when river flows fell markedly
- Falling groundwater levels
- Falling reservoir storage.

We are grateful to both the EA and NRW for providing us with some of the information listed above. For example, the EA provides us with regular flow data at many locations and NRW provides flows for sites such as the Wye at Redbrook. Should we wish to vary any of these arrangements then we will contact the relevant organisations. It is important to all parties that we continue to share the most accurate and up to date information that is available. This collaborative working helps us to make decisions with the best information possible. An example of this is that NRW recently circulated updated flows for the Wye at Redbrook and Ddol Farm. We describe the collaborative work in relation to the Wye and Usk group more in section 4.1 of this plan.

As part of our normal, weekly operations we monitor the indicators listed above. We also monitor:

- Temperature
- Levels of customer demand
- Leakage and
- The quantities of abstraction at surface and groundwater sources.

2.1 Surface water triggers

We manage droughts by using reservoir drought triggers in the following three water resource zones (WRZs):

- Strategic grid
- Nottinghamshire and
- North Staffordshire

Taken together, these three WRZs make up over 85% of the total population of our region. We have derived drought action triggers for the major reservoirs in our strategic grid and North Staffordshire WRZs. We also include the Nottinghamshire WRZ here as it receives a significant supply from the strategic grid. Therefore the water resources position in the Nottinghamshire zone depends upon the resources position in the strategic grid. We describe the approach that we take in our other WRZs in section 2.1.1.

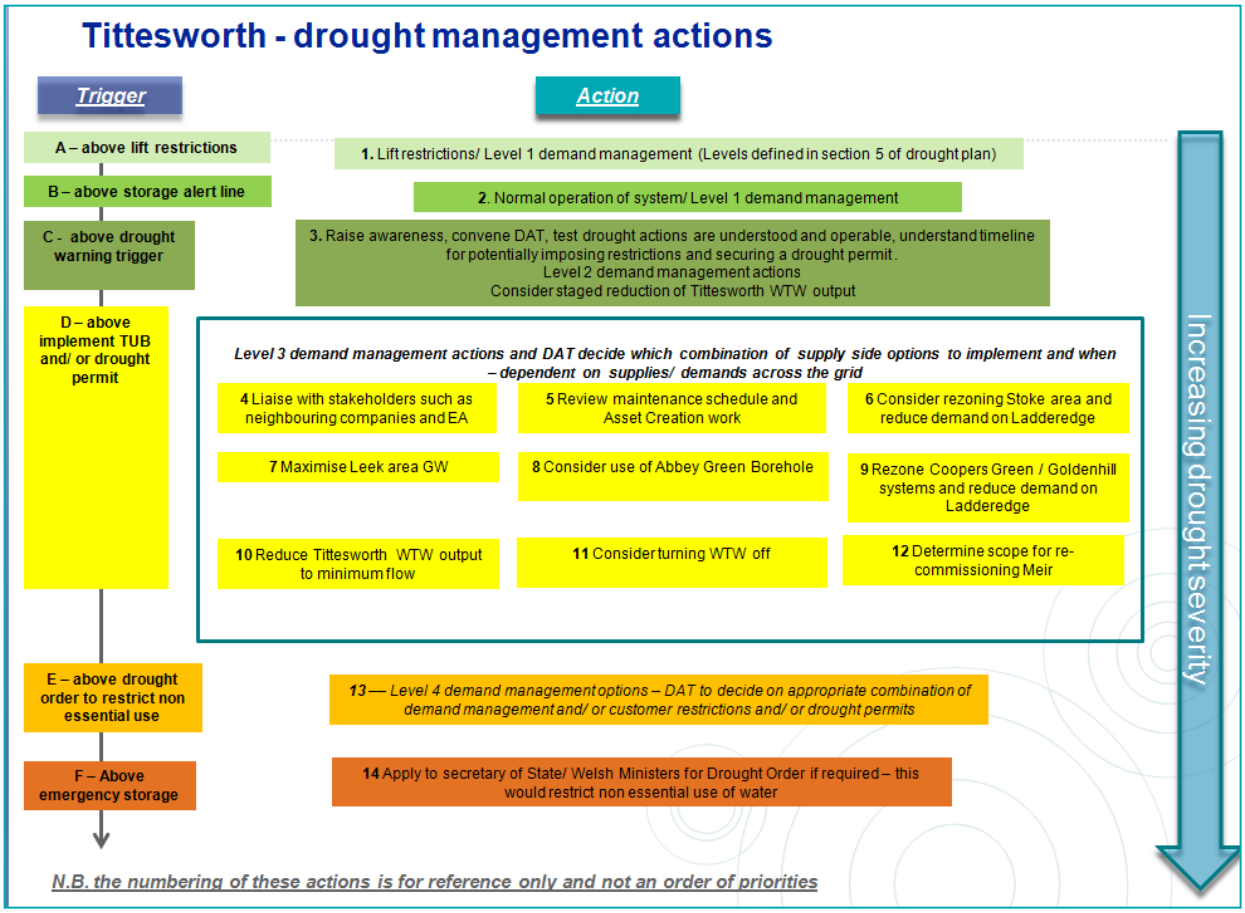
In the three WRZs listed above we regard the variation in reservoir storage as the fundamental, operational measure of any drought situation. We base our drought triggers on this (an example of these drought trigger zones can be seen later in this section and the complete set are presented in section 7.1).

We use surface water sources as drought action triggers only when they are of strategic importance. We consider that our larger raw water reservoirs or reservoir groups are strategic whereas our smaller sources are not. For example, we own and operate numerous service reservoirs which store treated water and provide supply for localised areas. These assets are not strategic in nature and it is not appropriate for us to use them as drought triggers.

In order to take the appropriate drought management action at the correct time we monitor reservoir levels and quickly identify when any of these levels enter into the specified trigger zones. As a drought situation develops and storage falls into the predefined trigger zones, this will instigate a number of operational responses. These responses are both supply side and demand side. This means that they either increase the amount of water that we have available or reduce the amount that we need to supply.

Figure 4 illustrates the operational measures we may take in North Staffordshire as Tittesworth reservoir storage reduces and passes through the trigger zones. We have provided a summary of all surface water data triggers and drought management actions in section 7.

Figure 4 - Decision flowchart showing drought management actions for North Staffordshire



Since we published our 2010 drought plan we have reviewed our reservoir drought trigger curves and converted them into drought trigger zones. Figure 5 shows the revised drought trigger zones for Tittesworth reservoir in North Staffordshire:

Figure 5 - Graph showing revised drought trigger zones for North Staffordshire

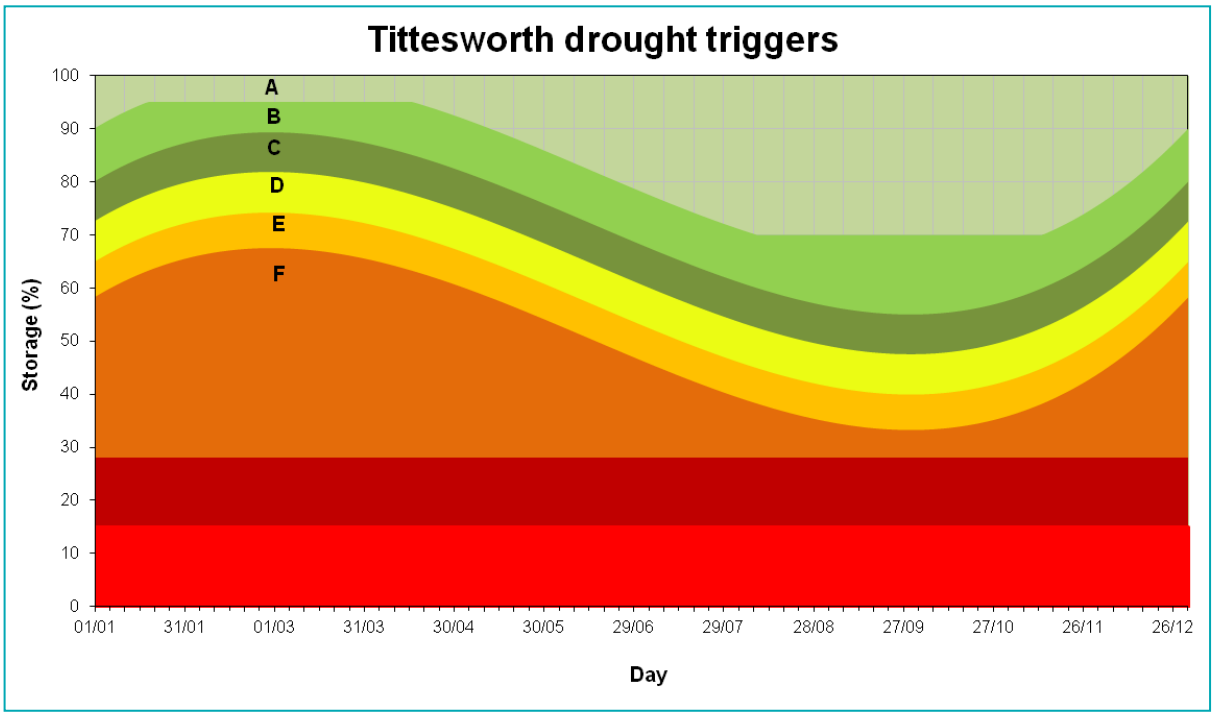


Table 2 - Table showing definitions of the drought trigger zones

Drought trigger zone	Comment
A	*Above normal** - storage is above average for the time of year.
B	*Normal* *- storage is in the average range for the time of year.
C	*Below normal** - storage is below average for the time of year.
D	*Low storage* - storage is low for the time of year.
E	*Notably low storage** – storage is notably low for the time of year. If storage is in this zone for more than 7 days between April and October we expect to implement a TUB. On average, we would not expect more than 3 of these in 100 years. We may also need to implement drought permits in this zone.
F	*Exceptionally low storage** – storage is exceptionally low for the time of year. In this zone we consider, and potentially implement, drought orders to restrict non essential demand.

Emergency storage	If storage ever reached this level we would refer to our emergency contingency plans rather than the drought plan.

**Although these terms are similar to those used in EA water resources situation reports the way that the triggers have been derived and the associated return periods are different.*

The reason for drought trigger zones is to alert the business and our stakeholders when we expect to implement drought management options. In particular we use them to trigger potential implementation of temporary use bans (TUBs), drought permits and/ or drought orders. Since we produced our previous drought plan we have revised the drought triggers that we use.

To review our reservoir drought triggers we used a specialist water resource model called Aquator. This is a computer based model developed by Oxford Scientific Software that simulates the optimal way that water resources should be used to meet customer demands. We are aware that other water companies also use Aquator to model their water resources. The Aquator model that we used for this work simulates the operation of the entire Severn Trent Water resources network. This is one of many improvements and updates that we have made to our water resources planning capability since PR09. Previously we used several different Aquator models, with each separate model representing operations in different parts of our network.

This company-wide Aquator model includes all five of the reservoirs or reservoir groups for which we produced revised trigger curves. These are:

- Carsington and Ogston
- Derwent Valley
- Elan Valley
- Tittesworth and
- Draycote

The scope of the drought trigger project was to review, and update where appropriate, the trigger curves that we use for water resources modelling. This modelling informs not only this drought plan and our internal drought management processes but also our WRMP and business plan submissions which we are preparing for PR14.

The process we followed had three stages:

i. Typical one year behaviour - Analyse the steady state modelled results for the 91 year run with no demand restrictions applied on customers. It was essential for this run not to have demand restrictions in as it would mean that the previous curves would have an effect on the generation of the new, improved curves. We used this model output is used to generate minimum, maximum and various percentiles for the storage across 12 months

ii. Multi- year analysis – Investigate the impact and relevance of droughts of varying durations and sequences of drought from the historic (91 year) record

iii. Compare and verify the curves to take account of:

- modelled crossing frequency of curves, based on single year behaviour,
- target crossing frequency, which is based upon our stated levels of service,
- overall system behaviour (in terms of percentiles) and
- historical records of drawdown, which include the drought that ended in 2012

As part of stage (iii) we undertook an internal 'sense check' of the curves against operational experience and knowledge. We then used these finalised trigger curves to produce the trigger zones as shown in Figure 5. One example of a change to the trigger curves was where we adjusted the Elan Valley curves to ensure that there can not be a scenario where we would restrict EVA flow due to the licence rule curve without having first convened our drought action team (DAT).

This three stage process produced tables showing the frequency that storage crosses different trigger curves. We have provided the tables showing the frequency at which the modelled storage enters zone D in section 7.4. The tables below show when the modelled storage enters zone E or zone F for all of the five reservoir systems, except for Draycote:

Table 3 – Table showing the frequency that modelled storage in Tittesworth reservoir enters trigger zone E

Start Date	End Date	Duration (days)
01/01/1934	10/01/1934	10

Table 4 - Table showing the frequency that modelled storage in Carsington and Ogston reservoir enters trigger zone E

Start Date	End Date	Duration (days)
20/09/1976	23/09/1976	4

Table 5 - Table showing the frequency that modelled storage in the Derwent Valley reservoirs enters trigger zone E

Start Date	End Date	Duration (days)
15/10/1959	25/10/1959	11*
06/11/1959	09/11/1959	4
15/12/1995	21/12/1995	7
02/01/1996	05/01/1996	4

* Although this is between April and October it is unlikely that we would have imposed restrictions in this scenario as storage was in zone E for a shorter period than our TUB lead in period of 14 days and mid October is late in the year to expect a TUB to deliver significant demand reductions.

Table 6 Table showing the frequency that modelled storage in the Elan Valley reservoir group enters trigger zone E

Start Date	End Date	Duration (days)
03/12/1921	26/12/1921	24
27/06/1944	01/07/1944	5
06/08/1944	21/08/1944	16
22/07/1976	25/09/1976	66
15/08/1984	08/09/1984	25

Table 7 – Table showing frequency that modelled storage in the Elan Valley reservoir group enters trigger zone F

Start Date	End Date	Duration (days)
11/12/1921	22/12/1921	12
04/08/1976	24/09/1976	52

The modelled storage at the other strategic storage reservoirs does not enter zone F throughout the modelled period.

These tables provide confidence that we have set our revised triggers appropriately as the modelled summer storage in the Elan Valley group is only in zone E for more than a week three times in the 91 years. The frequency at which the other strategic reservoirs enter zone E during 'summer' is lower than this. We exclude events where the reservoir storage is below the trigger curve for seven days or less as, in reality; it is unlikely that we would restrict customers' use in this scenario. We primarily monitor reservoir storage against trigger curves on a weekly basis. So reservoir storage could temporarily fall below the trigger curve and recover by the following week without automatically triggering restrictions.

We note that we would only restrict our customers' use during the summer. In this context we define summer as the period from April and October. The modelled summer storage in the Elan Valley was in zone E for more than a week three times in the 91 year record (in 1944, 1976 and 1984). This meets our 3 in 100 stated levels of service and is consistent with the baseline DO Aquator run we use for our draft WRMP. We have given more detail on our approach to temporary restrictions of our customers' use of water in section 3.2.

The reason why we have not shown the frequency that the modelled Draycote storage crosses into zone E is that we adopted a different approach for updating Draycote's drought triggers. We initially tried to use the approach described above but concluded that an alternative approach would be needed. The reason for this is that the modelled storage predictions for Draycote did not correspond well to the observed behaviour since 1995. This limited the options available to us and we decided that the only alternative approach was to adjust the previous curves in line with the way we have actually operated the system since 1995.

This required us to adjust the previous Draycote drought trigger curves so that the actual storage crossed them in the 1996 drought but not in the 2011-12 one. This reflects the drought management actions that we actually took during these two droughts. However, we understand that there is greater uncertainty associated with the trigger curves for Draycote reservoir than there is for the other curves. Despite this uncertainty we think that the revised triggers are an improvement on those we previously used but we will review the suitability of these curves prior to the publication of our next drought plan.

The work that we carried out on these drought triggers considered preparing percentile curves for multi-year behaviour. We had envisaged that this would provide a means for dealing with the longer duration droughts such as 1975/76 and 1995/96. Developing multi-year curves brings with it a complication, namely of how far one has progressed in the drought period and more importantly how much longer it may last. We undertook some preliminary analysis of multi-year behaviour and found that there was little difference between the percentile curves for year 1 and year 2. Although initially disappointing this largely reflected the limited number of two-year droughts in the historical record and their limited impact on the percentile curves. For these two reasons we decided not to take this approach any further.

We note that neither our revised trigger curves, nor the previous curves, change our obligations to meet the conditions of our abstraction licences. In a severe drought we will engage with the EA in relation to making the best use of existing resources, managing demand and potential drought permit or drought order applications. We have given more detail on these topics in section three of this plan.

2.1.1 Triggers in water resource zones primarily supplied by river abstractions, bulk imports or groundwater

We use a different approach in the Forest and Stroud water resource zone (WRZ) because it does not rely directly on reservoir storage. The primary supplies for this WRZ are from our River Wye abstraction at Wyelands and from groundwater. We usually refer to this abstraction as Wyelands but some documents refer to it as the Lydbrook abstraction. Both names refer to the same abstraction. During wet or average conditions we abstract up to 55 Ml/d at this site but the maximum abstraction becomes restricted if storage in the Elan reservoirs is low and the flow at the Redbrook gauging station (GS) falls. The table below illustrates the licence conditions at this abstraction:

Table 8 - Rules governing our River Wye abstraction

Redbrook GS flow (Ml/d)	Elan storage	Regulation release for Lydbrook (Ml/d)	Maximum Lydbrook abstraction (Ml/d)	Max transfer to Ross	Max transfer to STW
> 1,400	Independent of storage	Not required	55.0	9.1	45.9
1,209 - 1,400			45.5	9.1	36.4
< 1,209	Zones 1 & 2	27.3	45.5	9.1	36.4
	Zone 3		39.8	9.1	30.7

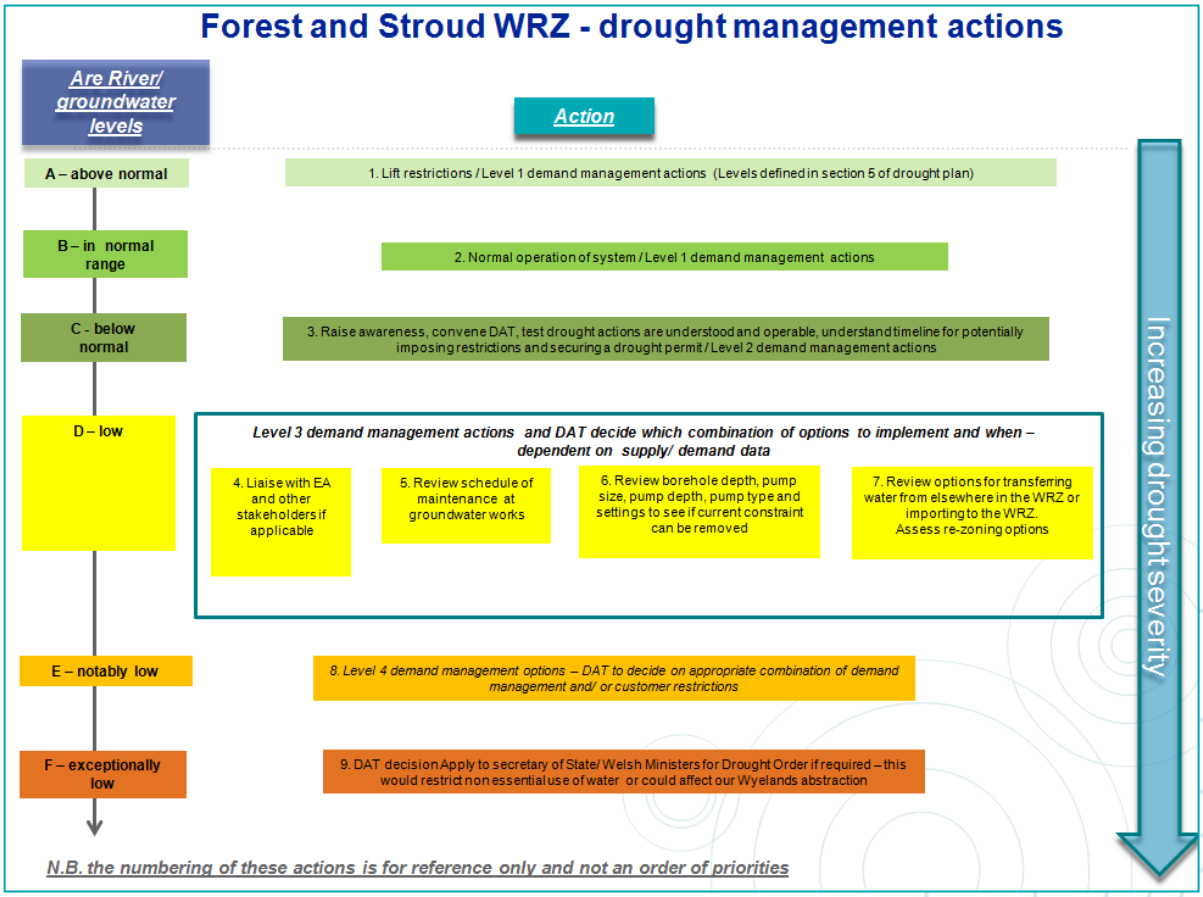
The combined outputs of the groundwater sources in this WRZ are not sufficient to meet demand. If we forecast that there is a high drought risk to the groundwater sources in our Forest and Stroud WRZ, it becomes more important that our Wyelands abstraction is not limited.

This river abstraction is limited when river flows at the Redbrook gauging station are low. Our abstraction licence at Wyelands is also linked to the storage in the Elan Valley reservoirs. However, any decision our drought action team (DAT) makes for this WRZ

will be triggered primarily by the river and groundwater levels. The storage in the Elan Valley reservoirs is only a secondary trigger. By the time we publish our next drought plan the triggers we use for this WRZ may change as we expect to complete an AMP5 scheme linking our Strategic Grid with the Forest and Stroud WRZ. We expect that this scheme will be finished by 2015. As well as providing resilience benefits this link could affect how we manage this WRZ in times of drought.

We have described our 'normal' operation in this WRZ earlier. The following decision flow chart shows our approach to making drought management decisions and the drought triggers that we use in our Forest and Stroud WRZ:

Figure 6 - Decision flowchart showing drought management actions for the Forest and Stroud water resource zone



These drought management options include the Wyelands drought order, which we have described in more detail in section 4 of this plan. We have carried out option implementation assessment and environmental assessments for the nine options shown in the flow chart above. We have included these completed tables in section 7.4. In a WRZ fed from both surface and ground water sources, such as our Shelton WRZ, we abstract from the River Severn and meet the remaining demand by using our groundwater sources. We operate our Shelton river abstraction in line with the licence

conditions. As these considerations do not refer to river flows we can abstract the same quantity regardless of whether we are in a drought. However the amount we take here will vary with factors such as demand, planned maintenance and water quality. These factors also affect how we operate the groundwater sources in the WRZ and in our 'groundwater only' WRZs. We have assessed what the constraints are for all of groundwater sources. For example, the following table shows the constraints on the groundwater sources in the Shelton WRZ:

Table 9 - Number of groundwater sources in each constraint category for the Shelton WRZ

Water Resource Zone	Licence	Infrastructure	Level	Flow	WQ
Shelton	11[1]	6	1	0	3

[1] Three constrained by overarching Group Licence (within Group Licence constrained, at source specific level: one licence, one infrastructure, one WQ constraint).

We have some flexibility in how we operate groundwater sources. Most of our pumps are 'fixed speed' which means that the instantaneous flow is constant but we can vary the number of hours in a day that we operate them for. If demand increases in a dry year or a drought year we would expect to run these pumps for longer to maintain levels in our service reservoirs. We also have some flexibility within WRZs or within individual groundwater sources as we have different boreholes from which we can pump water. We switch between these to meet demand, react to outages and other operational factors such as cost.

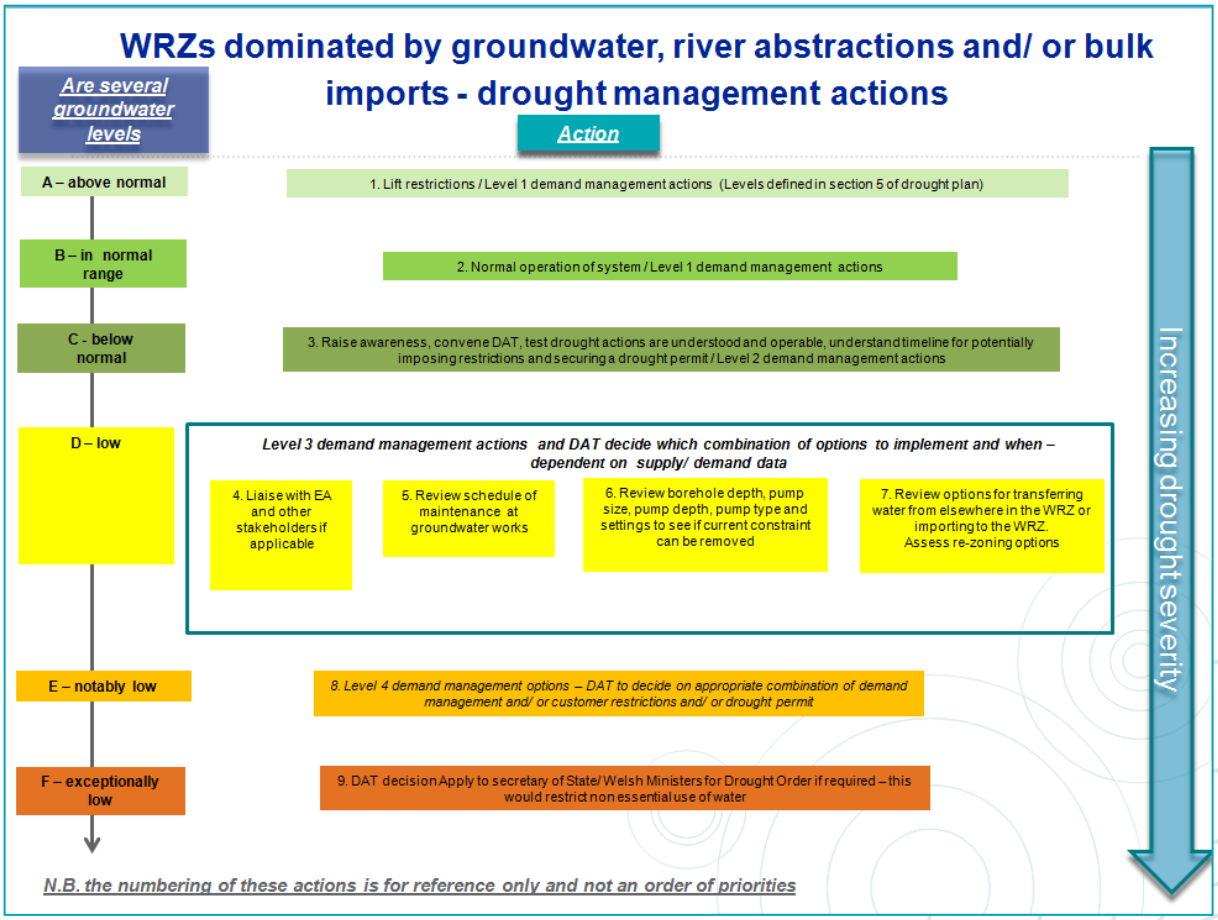
The approach we take to drought triggers is similar in our remaining 11 WRZs to that described for the Forest and Stroud WRZ.

These 11 WRZs are as follows:

- Stafford
- Rutland
- Bishops Castle
- Kinsall
- Llandinam and Llanwrin
- Mardy
- Newark
- Ruyton
- Shelton
- Whitchurch and Wem
- Wolverhampton

These 11 WRZs predominantly receive their supply from either groundwater, bulk imports, river abstractions or a combination of these sources. The only difference between these WRZs and the Forest and Stroud WRZ is that we do not expect to need a drought order to increase supply in any of these WRZs. Our approach to making drought management decisions and the drought triggers in these 11 WRZs is shown in the following flow chart:

Figure 7 - Decision flow chart showing drought management actions for our other water resource zones



We have carried out option implementation and environmental assessments for the nine options shown in the flow chart above. We have included these completed tables in section 7.4.

2.2 Groundwater triggers

Although, we track groundwater levels and consider them to be useful drought indicators, we do not have any explicit groundwater triggers. This is because individual groundwater sources have too localised an impact for us to use them as strategic triggers. The way that groundwater sources respond to droughts is very different to the way that surface water sources respond. So although we still account for drought risk in these sources, we manage the risk in a slightly different way.

The mechanism that we use to manage groundwater drought risk involves a combination of monitoring, judgment and decision making. We consider the present and forecast conditions and how effective any action would be. The decision flow chart in section 2.1.1 illustrates this process. We would not expect a single low level to trigger significant drought management actions. The more severe levels of action in the flow chart (Figure 7) could be triggered by low levels in a small number of sites. However, it is more likely that these actions would be triggered by a high number of low levels. The process for monitoring groundwater and making decisions applies to all of our groundwater sources, including those in our 'groundwater-only' water resource zones.

We use a combination of telemetry and manual dips to monitor our groundwater sources. We also use external sources of information on groundwater levels to monitor approaching drought conditions. For example, we use information from the Centre for Ecology and Hydrology (CEH) or EA websites that show the groundwater picture for the Midlands region. We use data from the observation boreholes, such as Heathlanes, to support our drought indicator monitoring. When levels in the Heathlanes borehole start to cross into "below normal" conditions (as detailed in the Water Situation Report), we will inform our DAT.

Low levels in EA observation boreholes will usually coincide with lower observed groundwater levels in our groundwater sources. This roughly translates to the transition between drought trigger zone C and D (as shown in Figure 7)Figure 1. At this stage we may also increase the level of groundwater monitoring by taking more frequent manual dips and increase our monitoring of groundwater sources that are physically constrained by aquifer parameters (such as Deepest Advisable Water Level) to track the development of the drought and its impacts. When there are low groundwater levels at several of our sites and at EA observation boreholes we will refer to the decision flow chart and may refer management decisions to our Drought Action Team (DAT). The different levels of demand management apply in the same drought trigger zones as for surface water triggers. We describe what these demand management levels mean in section 5.2.

We provide groundwater information to DAT as and when appropriate. At DAT meetings we assess the evidence available, debate the different options and make drought management decisions. We show more information on DAT in section 2.3. During the drought which ended in 2012 we observed record low levels at some groundwater sites.

Some of these groundwater levels fell below the levels they fell to after the 1975-76 drought. As a response to this we have carried out a risk assessment on our potentially drought sensitive groundwater sources which looked at the:

- Severity of the potential impact, and
- Likelihood of the impact.

The assessment of these two factors allowed us to rank the risks to our customers. Where we identified high or medium risks we have refreshed our contingency plans for those sources. These contingency plans allow our operational staff at the sites to keep the supply risks low. As a general rule our sandstone sources are more drought resilient than our limestone sources. We present groundwater level information to our DAT on a map to show where the risks to supply from our groundwater sources are greatest. When our groundwater team notices any drought problems relating to our groundwater they raise these concerns at our DAT.

As part of the PR14 work described in section 1.3 we have validated and updated all of our groundwater DOs and source performance diagrams (SPDs). These SPDs plot operational water levels against site output. They help to inform our decision making process and to provide a qualitative assessment of risk.

We have included an example SPD within Section 7.3. This SPD is for our Llandinam source and it illustrates our qualitative decision making process for determining drought actions based on localised groundwater levels. The transition from zone A to F on the SPD is not absolute as the performance of many groundwater sites is dependant on the operational use of the borehole. The predicted drought curve (and trigger levels) may be influenced by the number of boreholes in operation, the duration of pumping, the pumping rates at that specific time and also regional influences. So the triggers for decisions that we have presented here should not be considered as absolute. We use them to inform the decision making process.

In the context of groundwater dominated zones, low groundwater levels only become potentially problematic if they drop below the source specific drought bounding curve. The drought bounding curve in the Llandinam figure (shown in section 7.3) is the black dashed line. The drought bounding curve for most of our groundwater sources is broadly equivalent to one of our surface water reservoirs entering drought trigger zone E. However, for Llandinam the bounding curve is more equivalent to zone D. In the Llandinam SPD example the Deepest Advisable Pumped Water Level (DAPWL) is

significantly lower than the pump depth. In this example, it may be feasible for us to lower the pumps to prevent any loss in output.

It is important to remember that many of our groundwater sources are not constrained by level. The majority of our groundwater sources are located in Permo-Triassic sandstone and this does not exhibit significant variations in water level. As a result we consider that these sources are resilient to groundwater drought impacts. Generally, the difference in water level between wet and the most severe drought years is in the order of 5m to 7m. Therefore the risk of these groundwater levels falling below the current drought bounding curve (i.e. moving into Drought Management Action Stage D, or below), is minimal.

In most cases, even if groundwater levels fall below the drought bounding curve, the output of the source will not decline. For example, where the source is licence constrained; groundwater levels may fall tens of metres below the drought bounding curve before the constraint changes from being the licence, to being a physical aquifer constraint (such as Deepest Advisable Pumped Water Level). In the example of Llandinam (section 7.3), the output of the source does not become impacted until water levels fall below the pump depth, which is below the current drought bounding curve. Until this occurs, the source is constrained by pump capacity.

Before levels in our groundwater dominated WRZs ever reach drought trigger zone E, we will have implemented level 3 demand management and will be considering temporary use bans to limit demand even further. In the extremely unlikely event of the levels continuing to decline we will follow the decision flow chart and consider a drought order to restrict non essential use. We give more details of these restrictions in sections 3.2.1 and 3.2.2.

Drought scenario testing and modeling historic droughts are a vital part of the process of preparing source performance diagrams. The drought bounding curve is representative of the worst drought recorded as we will not have observed groundwater levels below this curve in our operational records. Due to the way we use this information to calculate our deployable output; we do not consider groundwater supply to be at risk from drought until groundwater levels fall below the drought bounding curve.

For our groundwater DO assessments we have followed current best practice. This is as outlined in both the 1995 UKWIR A Methodology for the Determination of Outputs of Groundwater Sources (95/WR/01/2) and 2000 UKWIR Unified Methodology for the

Determination of Deployable Output (00/WR/18/1). We have assessed our groundwater sources' deployable output in the worst drought season and the worst case drought week. We have taken this approach for all of our groundwater sources across the company and use the same approach in both England and Wales.

As described earlier, our DO and our source performance diagrams account for the worst drought in the record and any other drought that has occurred in the period for which we have records. The guidance does not suggest that we base our DO on a drought worse than any on the record. We address the topic of droughts that are more extreme than any we have experienced in the past further in section 2.4.

We have assessed what the constraints are for all of groundwater sources. For example, in the Llandinam WRZ, our sources are constrained by licence or infrastructure. As described earlier this means that, if groundwater levels did fall to record low levels, we would not run out of water although we would need to address the constraint. In the case of an infrastructure constraint this could mean lowering our pumps. The table below shows what the constraints for the Llandinam WRZ.

Table 10 - Number of groundwater sources in each constraint category for the Llandinam WRZ

Water Resource Zone	Licence	Infrastructure	Level	Flow	WQ
Llandinam & Llanwrin	1	1	0	0	0

As we take a precautionary approach to assessing groundwater DO we expect that customers in groundwater only zones will, on average, have their use restricted less frequently than 3 times in 100 years. This is consistent with our company wide level of service as we plan for no customer having more restrictions than this.

Although we have no specific groundwater triggers, we note that our Aquator water resources model and our method for producing the reservoir drought trigger curves includes the latest information on our groundwater yields, as constrained by factors such as pump size, hydraulic capacities and licence constraints. This means that, in a water resource zone with surface water and groundwater sources, the reservoir group triggers indirectly account for groundwater. This is because Aquator meets customer demands with the least cost supply of water, regardless of whether it is from a surface or groundwater source.

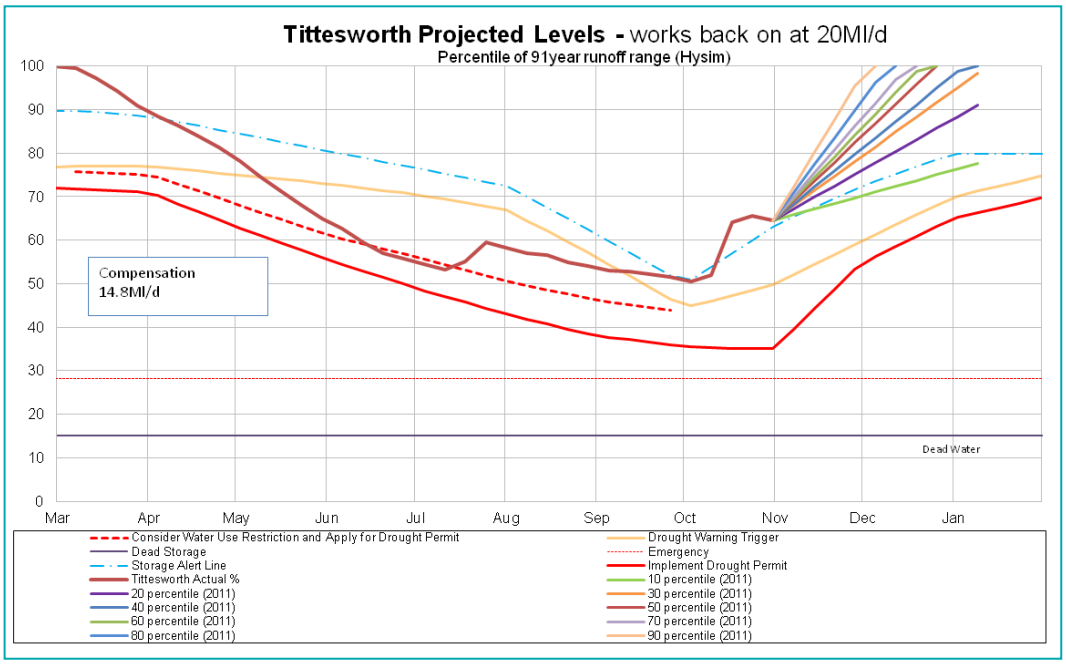
2.3 Drought Action Team

As the decision flow charts (see sections 2.1 and 7.4) show, when any reservoir storage enters trigger zone C we will convene our Drought Action Team (DAT). The DAT will scrutinise the drought indicators as the situation progresses and will make decisions on when drought action measures are required.

As well as monitoring actual hydrological data we also refer to external forecasts. In addition to looking at recent rainfall, soil moisture deficit and flows in rivers that we abstract water from, there is also a forward looking section. For example, the current and future hydrological situation is a permanent item on the agenda at every DAT meeting.

To produce these water resources summaries we monitor and refer to several different sources of information. For example, we use the *water situation reports* published on the Environment Agency website, the Centre for Ecology and hydrology (CEH) *hydrological summaries* as well as information from sources such as the Met Office. All of this information, as well as the latest reservoir levels and operational issues, allow us to project what the future reservoir storage will be in different flow scenarios. Figure 8 shows an illustration of the type of projection graphs that we circulate to DAT. This specific one illustrates how storage would change in Tittesworth reservoir from the 31 October 2011 to January 2012, given a demand of 20 Ml/d and the inflow scenarios shown. For example, the 10th percentile inflow scenario would, on average, be exceeded in 90% of years. As this figure illustrates projections we circulated in the drought that ended in 2012 it still refers to the drought triggers we set out in our 2010 drought plan and not to the revised trigger zones described earlier.

Figure 8 - Graph of reservoir storage projections for Tittesworth reservoir



The combination of defined drought action triggers, well understood operational responses and the ability to forecast the likely changes in reservoir storage levels all mean that the DAT is well placed to take appropriate and timely decisions. The storage projections are an important tool which we discuss in detail at DAT meetings. We describe the roles and responsibilities of the DAT, especially in relation to communications in section 5.

2.4 Historic droughts

We have modelled records showing how our reservoir storage reacted during historic droughts since 1920. We have historic draw down records available electronically from 1995 to the present. We also have information on how past droughts affected our ability to supply customers.

No two droughts are the same; each one will present different challenges to previous ones. However, our 91 year record of simulated runoff and river flows allows us to model the capability of the current Severn Trent infrastructure to meet customer demand in all of the droughts in this record. This record includes droughts with varying spatial extents, durations and intensities. For example, there was a drought lasting from 1989 to 1992, three double season droughts (1933-34, 1975-76, 1995-96), a late summer, severe drought in 1959, and other single year droughts in 1921, 1984 and 2003. Each of these

events affected parts of our region in different ways. Although we carried out this modelling to prepare our water resources management plan (WRMP) it also helps inform our drought management.

The EA's drought plan guidelines suggest we consider scenarios even more extreme than past recorded droughts. For example, one such scenario is the 1975-76 drought continuing for longer or having been even drier than actually occurred. We believe that the benefits of this approach are outweighed by the disadvantage of having no reliable way of assigning a return period to an event of this sort. Without a return period we can not relate such a hypothetical drought to our stated level of service (as defined in section 1.3). The 91 year flow records that we use to inform our drought plan and our WRMP allow us to estimate return periods and hence relate our supply demand position to our levels of service.

A greater disadvantage of basing our drought planning on hypothetical rather than observed droughts is that we may then require huge investment for infrastructure that may never be needed. We consider this is unlikely to be supported by our customers or Ofwat, our economic regulator. The evidence to justify what level of investment is needed to ensure resilient water supplies is set out in our business plan and not in this drought plan.

In order to test whether our levels of service are realistic, we have worked with Liverpool University to study rainfall records within our region that date back to the 1880s. This research looked at rainfall in three locations: Wallgrange, Rugby and Nanpantan. The research showed that, although there were some longer duration drought events in the forty year period prior to 1920, none of these drought events was more severe than the worst three droughts between 1920 and 2010.

We are aware that basing future drought management on historic droughts ignores 'non stationarity'. This is a concept that means that sometimes it is inappropriate to use historic events to predict future events. For example, climate change may mean that future droughts occur at a different frequency to those of the past. As described in section 1.3, we do not explicitly take climate change into account in this drought plan. As we have prepared this drought plan to cover our operations over the next three years we consider this to be an appropriate approach. However, in our longer term plans, such as our WRMP, we provide detailed assessments of the impact of climate change on our supply/demand balance.

Should a drought of a far greater severity and intensity than any of those experienced since 1920 occur we will refer to our emergency planning procedures (see section 3.4.1).

2.5 A flexible planning approach

The drought which ended in 2012 demonstrated the value of flexibility within our drought management. Since 2010 we have constantly challenged ourselves as a business to look at all options available, even ones that we had previously considered impractical. This has meant that we have implemented any schemes and solutions that provide a benefit. Not all of these schemes had been included in our previous drought plan. We note that the Environment Agency (EA) provided some guidance in January 2012 through the WaterUK water resources email group that pointed out that plans "should not be set in stone. Any drought can throw up different or unusual circumstances, and companies may identify new/alternative solutions that provide a more appropriate solution to managing drought. We [*the EA]* certainly would not want them [*water companies]* to be in a position where they could not take a sensible course where that was beneficial to their customers and stakeholders".

We fully support these sentiments and the risk based approach to water company drought planning mentioned in section 1.3 of the EA's guidelines. There will be some occasions when the risks to our customers' security of supply, and to the environment, exceed any potential risks caused by not rigidly following a published drought plan. We understand the need to revise and update drought plans in circumstances such as there being material changes. However, there needs to be a pragmatic balance between how we define material changes and the frequency at which companies update their drought plans.

Section 3.2 of the *Environment Agency Midlands Region's drought plan* states that the "crossing of a drought trigger does not mean that the action must automatically be taken. The drought team makes its decision on whether the action is needed based on a range of factors, including the present and forecast conditions and how effective the action would be. Local judgement is an important part of drought management." We agree with this and follow the same approach during our drought management.

Therefore, when we compare our water resources position against the drought triggers, tables of actions and flow charts we make our decisions based on all of the information we have available at that point in time. For example, we will take into account factors such as current demands, supplies, maintenance work and outages on our network. So

the best way for us to decide which actions to take and when, is after an informed discussion at the regular Drought Action Team (DAT) meetings. We discuss the role of this team more in section five.

3 Drought management actions

3.1 Demand-side actions

Our drought management action flow charts show how we would expect to phase in the different demand management options available to us. In addition, section 5 of this plan shows how decreasing reservoir storage triggers an escalation from 'Level 1 demand management' to 'Level 4 demand management'. Section 5 also provides detail on how we would increase our focus on demand management progressively in line with our communications strategy. In the tables in section 7.4 we have provided estimates of some of the potential savings that these demand management options can deliver.

We consider that demand side actions can be applied anywhere in our supply region. However, we will select the appropriate combination of options and target them depending on the extent to which different parts of our region are affected by drought. The following list shows some of the options available to us:

- Raise awareness within the company, convene DAT and alert works managers
- Liaise with the Environment Agency (EA) and other stakeholders about emerging drought and flexibility of available options
- Closely monitor demand, flows and abstraction/ releases
- Increase leakage detection
- Increase water conservation campaign (e.g. extra distribution of water saving devices, water audits for non household customers).
- High profile promotion of meter option
- Media appeals for customer restraint

And, in the most severe drought conditions:

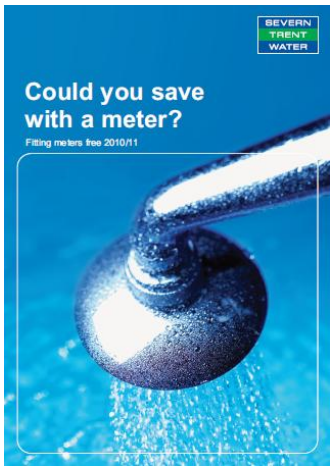
- Temporary water use restrictions, which are discussed in section 3.2 and, ultimately
- Restrictions on non-essential use through a drought order.

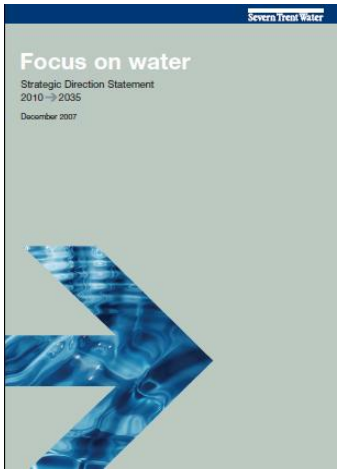
We consider that pressure optimisation and working with our customers to encourage the efficient use of water are routine activities that we carry out as part of our normal operation. This equates to 'Level 1' demand management as defined in section 5. The water conservation campaign mentioned above is over and above our 'normal' water

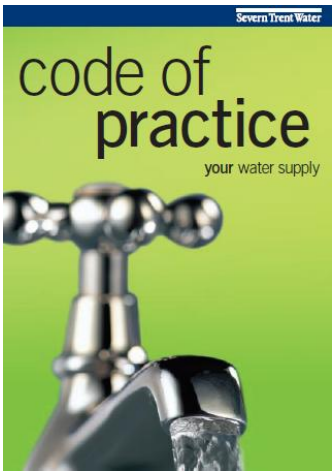
efficiency work. We have provided details of our water efficiency and leakage activities in the following sections.

Promoting Water Efficiency

We produce information leaflets and documents about how we are managing supplies and demand. These include the following, which are available on request or downloadable from our website (www.stwater.co.uk).







We have run proactive and extensive campaigns promoting water efficiency since 1996. We have focused on those areas where we think we can achieve the most benefit. For domestic customers this includes toilet flushing, gardening and frost protection. We have also focused on our business customers, education and research partnerships. We have used multiple communication channels. This includes media, literature, advertising, the internet, face to face, and telephone contact. Our campaigns are a key component of the company's communications which aim to reduce long term demand by our customers. We will continue our extensive promotion of water efficiency.

AMP5 water efficiency strategy

During AMP5 (the period from 2010 to 2015), Ofwat will measure our performance against a regulatory target. Ofwat sets this target and has divided the target into three parts:

- A volumetric target which is an annual target to save an estimated one litre of water per property per day through water efficiency activity, during the period 2010-11 to 2014-15
- A requirement to provide information to consumers on how to use water more wisely
- A requirement that each company actively helps to improve the evidence base for water efficiency.

Volumetric Target

We have outperformed our one litre per property per day annual target in both 2010-11 and 2011-12 delivering total savings of almost 10Ml/d during this period. This meets our entire regulatory obligation for AMP5. However, despite having already exceeded our regulatory target for AMP5, we will continue to outperform the annual target set by Ofwat in each of the next three years of AMP5. This is because we are committed to delivering a high level of water efficiency and to meet a key component of the supply/demand balance strategy set out in our *Water Resources Management Plan 2009* (WRMP09) to achieve a demand reduction of just over 16 Ml/d through water efficiency promotion and activity – a target which we will exceed. Our planned activities are:

- Provision of free water saving devices - We will continue to distribute free products directly to the public via our website, events, text messaging and through other promotional activity

- Product subsidies - Providing access to water efficient products will help consumers reduce waste. We have made some provision to allow for product subsidy e.g. water butts, to encourage uptake

- Install partnerships – We are partnering with other organisations (e.g. social housing, energy companies) to take advantage of visits to their customers. This is an opportunity to make optimum use of existing customer visits to promote changes in behaviour, and for partner organisations to fit water saving devices on our behalf. We expect to expand this programme. We are, for example, looking to develop partnerships with Green Deal providers

- Institutional and commercial audit and retrofit - Following our programme to deliver water efficient devices into schools, which we ran in AMP4 (the period

from 2005 to 2010), we continue to deliver water efficiency savings in institutional and commercial premises through the provision of advice, audits and, where practicable, water efficient devices.

Education

In addition to the information we provide to our customers through our general promotional activity, we have expanded the educational programme that we provide to schools and adult groups which aims to deliver long-term behaviour change and a change in water using habits. Our programme includes:

- Working with social housing providers and Global Action Plan to undertake targeted educational activity which included the setting up of Eco Teams to promote water efficiency within the community

- Attending shows and events in our region to promote water efficiency messages, tips, and to distribute water saving products

- At our sites where the public have access (such as Carsington Water), we are increasing our promotional activity to take advantage of these customer visits. This includes posters and leaflets, but also recently installed touch screen technology to advise customers on water efficiency and to enable the ordering of water efficiency products. Details of our sites with visitor centres are available at www.moretoexperience.co.uk

- We also work with partner organisations to better understand our customers' use of water and their attitudes to their use. We will use this information to better target our water efficiency activities.

Evidence Base

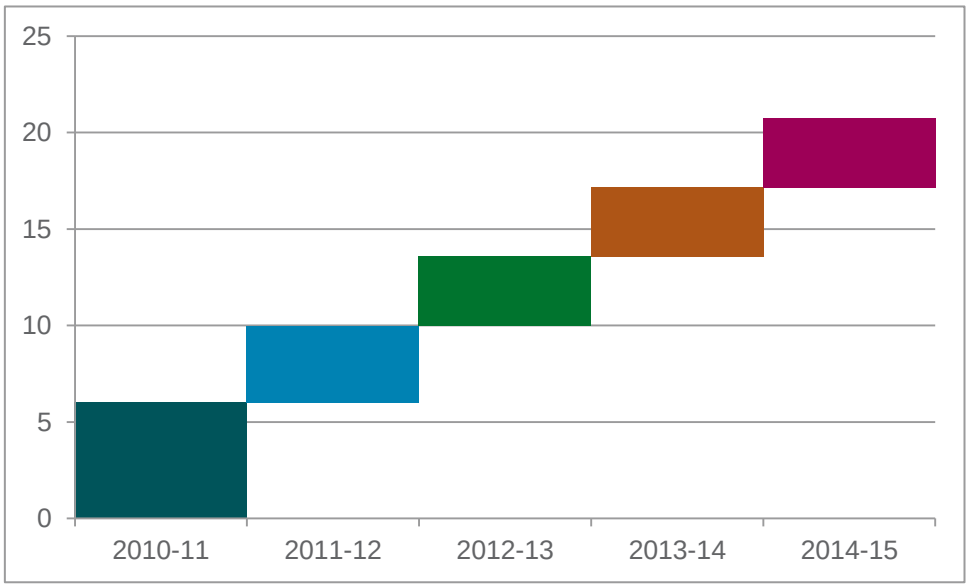
The third requirement of our regulatory targets is to contribute to the water efficiency evidence base to advance the understanding of the industry of how best to deliver water efficiency programmes.

For many years we have carried out our own research and worked with other water companies and organisations - we continue to do this. We also contribute information to the *Waterwise Evidence Base*, and sit on the steering group and other sub groups. We also contribute both time and financially to the collaborative evidence base fund announced by Ofwat in *Information Notice IN 12/06* in May 2012.

AMP 5 Water Savings

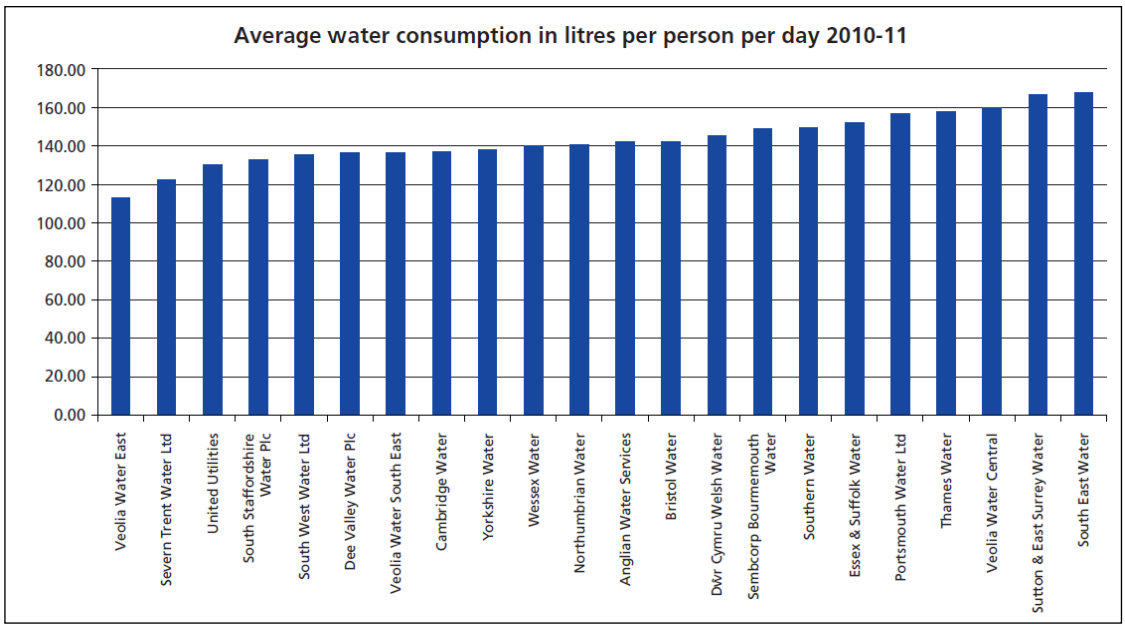
Figure 9 shows water savings in each year of AMP5 due to the water efficiency programme. The values shown for 2010-11 and 2011-12 are our actual delivery. For years 2012-13 to 2014-15, we forecast annual savings of 3.6Ml/d against our annual regulatory target of 1.64Ml/d. Our forecast total savings for AMP5 are 20.75Ml/d.

Figure 9 - Water efficiency water savings Ml/d



Ultimately, our water efficiency work has been so successful that our customers use less water than those of any other water and sewerage company. Across all of England and Wales we have the lowest average household consumption of all but one of the other water companies. This can be seen in the graph below (which we have taken from the Defra 2011 '*Water for Life'* document – as referenced in section 7.6):

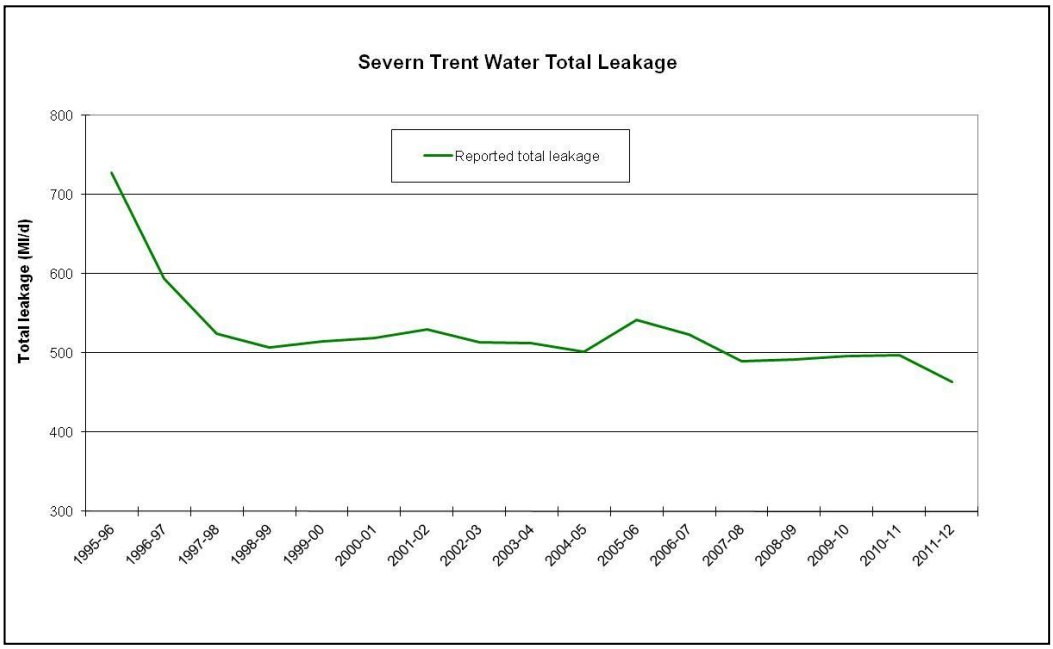
Figure 10 - Water consumption per person in England and Wales



Reducing Leakage

Figure 11 shows the record of total leakage in our region since 1996. The overall trend is one of falling leakage. This graph shows that, despite the fact that our network has grown in size over this period, leakage is now at its lowest ever level.

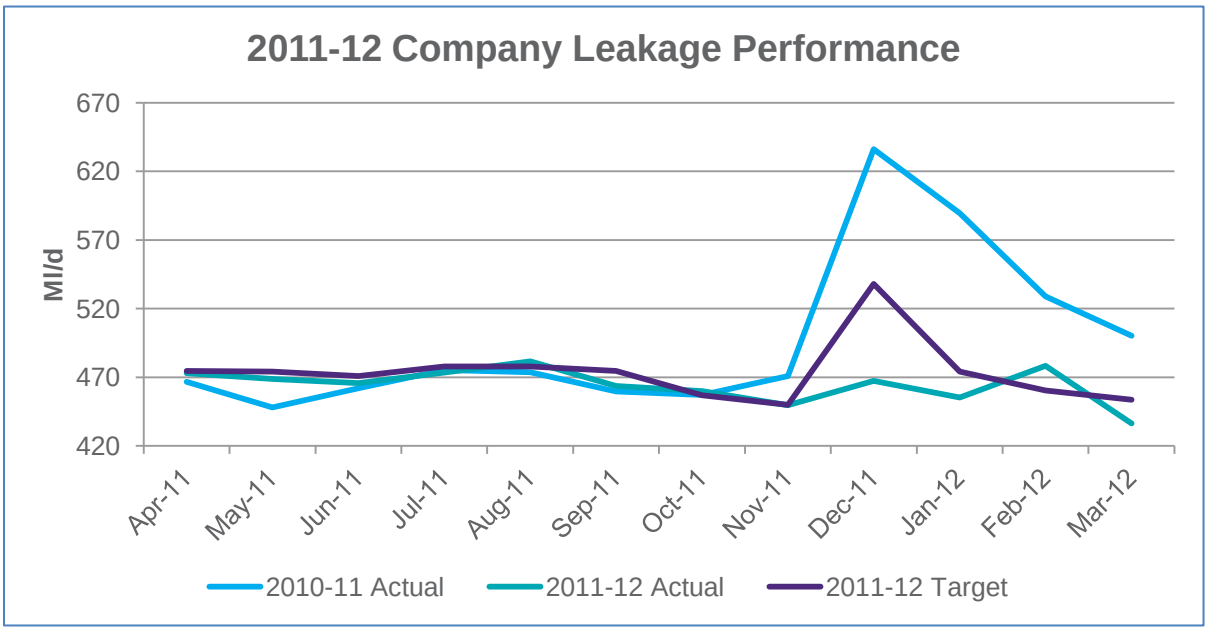
Figure 11- Company total leakage since 1996



As part of the supply/demand strategy set out in our water resources management plan (WRMP), we have assessed leakage control options alongside water resources, treatment and distribution enhancement options to derive the overall least cost mix of investment schemes. To close the AMP5 target headroom shortfall we will deliver significant leakage reductions. We will deliver this through more active leakage control, pressure management and mains renewal.

In an average year (in terms of weather), achieving the leakage targets which are set by Ofwat represents the best overall outcome for customers, shareholders and the environment. These targets are set at the sustainable economic level of leakage (SELL) and, whilst we will work to reduce leakage beneath this level during periods of drought, this is not beneficial in the long term. The reason for this is that, just as reducing the amount of water lost via leakage can reduce total costs (financial, as well as social and environmental) the activity needed to find and fix these leaks also has a cost. For instance, repairing leaking pipes can lead to road closures and traffic congestion. It is also true that there are some financial, social and environmental costs associated with other demand management options (although these are typically lower than those associated with supply side options).

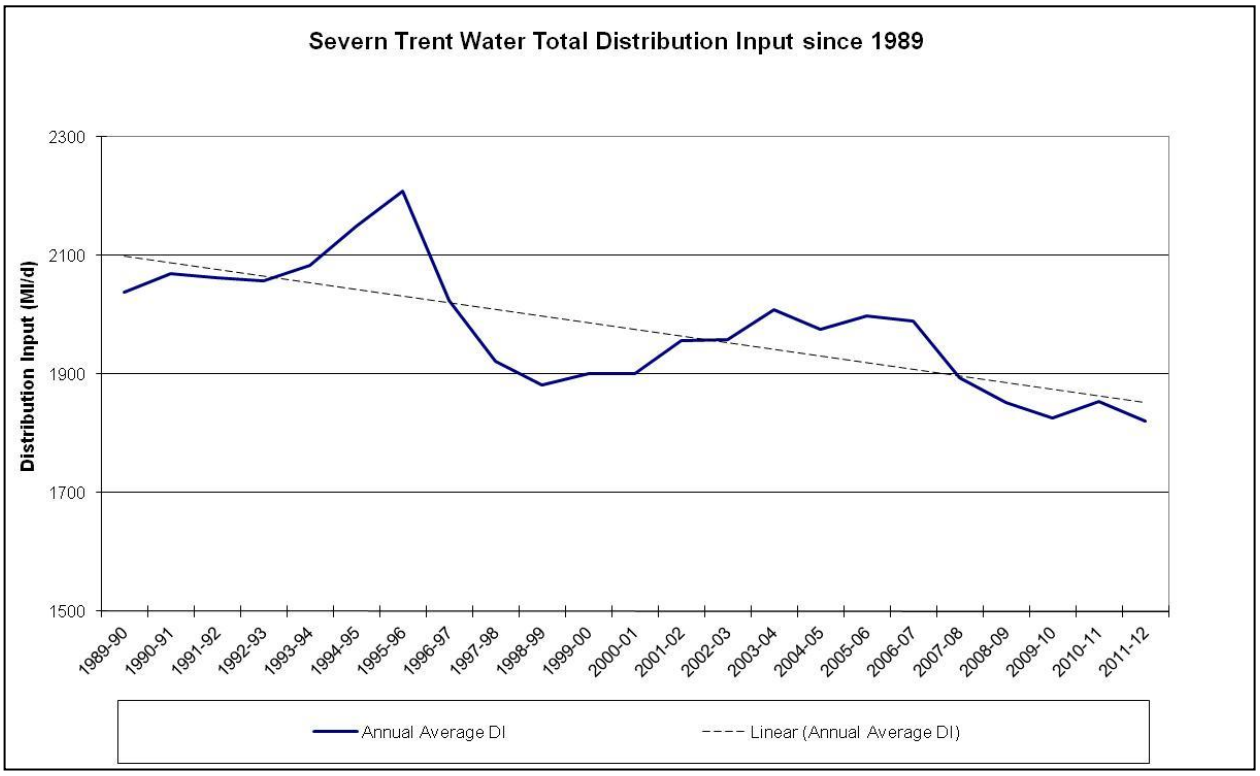
Figure 12 - Severn Trent leakage in 2011-12



As a result of our leakage reduction activities, we reduced our annual average company leakage by 33 Ml/d (7%) between 2010-11 and 2011-12. Our company wide leakage for the reporting year 2011-12 is 464 Ml/d. This is 10 Ml/d below the Ofwat target. This level of leakage is also lower than our internal KPI target. We have committed to reduce leakage between 2010 and 2015 by a higher percentage than any other water company in England and Wales. We expect to reduce leakage even further in AMP6 (the period from 2015 to 2020) and in subsequent years.

Increasing household demand has been more than offset by our water efficiency activities, our leakage reduction programme and declining demand from commercial customers. The decline in use by commercial customers is caused by a decline in the prominence of heavy industry. The following graph shows this overall decline in distribution input across our region. Distribution input is the amount of water we put into supply and we use this as a measure of the company wide demand for water.

Figure 13 - Severn Trent Water distribution input from 1989 to 2012



If our drought indicators are in trigger zone C we will place an extra emphasis on leakage. We refer to this again in the escalation of messages table in section 5.2. It is difficult to generalise about exactly how much further we could reduce leakage in a drought as it will depend on the severity or extent of the drought and our leakage performance as we enter the drought period. However, we will divert our staff from other tasks onto leakage work and we can also hire in external contractors if necessary. This is something we did after the very cold winter of 2010-11 as well as during the unusually hot weather in July 2013.

We have used scenario testing to give an indicative illustration of what extra leakage reductions we could achieve. At a company wide scale, based on current levels of leakage we estimate that a 10% increase in our detection costs could reduce annual District Metered Area (DMA) leakage by 5.5 Ml/d. This same work showed that a 20% increase would roughly reduce annual DMA leakage by 10.5 Ml/d.

Although these results are only indicative they show that doubling the extra resource (i.e. increasing by 20% rather than 10%) does not double the volume of water that we save. This is because leaks become harder and more expensive to find and fix the lower that

the level of leakage is. This is an important point as it means that although we think we can achieve these estimated extra leakage reductions now, these reductions would be more difficult in the future. In any future drought we will target our resources where they are needed most and the geographical area that we devote the extra resources to will affect how much we can reduce leakage by.

3.2 Restrictions on water use

If extended drought conditions mean that reservoir storage or other drought indicators are in drought trigger zone E, we may need to temporarily restrict certain uses of water. Before making a decision to impose restrictions our DAT will review current resources and how the outlook is likely to change. For example, DAT will use the reservoir storage projections that we described in section 2.3.

Prior to the *Water Use (Temporary Bans) Order 2010*, water companies were only allowed to restrict the use of a hosepipe if it was to water a garden or wash a private car. Since 2010 water companies have had wider and more far reaching powers to restrict water use. It is worth clarifying that we refer to temporary use bans (TUBs) in this plan where we may have used the phrase 'hosepipe ban' in previous publications. We have changed our terminology to better reflect the legislative changes that the Government has introduced since we published our last plan. As well as being able to bring in TUBs if we need to we can also apply for a drought order to bring in a non essential use ban (NEUB). For clarity, we define:

- A temporary use ban (TUB) as a way in which we can reduce customer demand for water during a drought by banning specified activities;
- A non essential use ban (NEUB) as a more severe measure to reduce demand by banning even more specified activities, including commercial uses of water.

We have listed the activities that we will restrict using a TUB or NEUB in the following sections of this plan.

3.2.1 Temporary Use Bans (TUBs)

The following table shows the 11 activities that the legislation now allows us to restrict under a temporary use ban (TUB) and it also shows the exceptions that we will make to this:

Table 11 - Table showing which activities we will restrict under a TUB and the exceptions we expect to make

Activity restricted by TUBs	Statutory exception	Discretionary exceptions	Notes
1) Watering a garden using a hosepipe	Using a hosepipe to water a garden for health or safety reasons. NB In this category, the definition of "a garden" includes "an area of grass used for sport or recreation". Therefore it should be noted that watering areas of grass, which are used for sport or recreation, is covered by a Statutory Exception for health & safety only in relation to the active strip/playing area, not the entire ground.	• To Blue Badge holders on the grounds of disability • Use of an approved drip or trickle irrigation system fitted with a pressure reducing valve (PRV) and timer • To customers on the company's Vulnerable Customers List who have mobility issues but are not in possession of a Blue Badge	The whole of the sports pitch can still be watered using other methods. Some companies may wish to grant a Discretionary Concessional Exception to allow the use of a hosepipe to water other grassed areas used for sport where there is no health and safety risk.
2) Cleaning a private motor-vehicle using a hosepipe	A "private motor-vehicle" does not include (1) a public service vehicle, as defined in section 1 of the Public Passenger Vehicles Act 1981(c), and (2) a goods vehicle, as defined in section 192 of the Road Traffic Act 1988(d)	• To Blue Badge holders on the grounds of disability • Use of a hosepipe in the course of a business to clean private motor vehicles where this is done as a service to customers • To customers on the company's Vulnerable	Taxis and minicabs are not considered to be public service vehicles and so are subject to bans[2].

[2] The position that taxis are not classed as public service vehicles is as follows. The current legislation (Section 76(2)(b) of the Water Industry Act 1991) allows TUB restrictions to be imposed on "*private motor vehicles*". The definition of a private motor vehicle in the Water Use (Temporary Bans) Order 2010 (Regulation 5) excludes public service vehicles as defined by Section 1 of the Public Passenger Vehicles Act 1981. This definition includes vehicles not adapted to carry more than eight passengers and "*used for carrying passengers for hire or reward at separate fares in the course of a business of carrying passengers*." Each element of this definition must be satisfied. In other words, it must be a vehicle which: is not adapted to carry more than eight passengers; ... used for carrying passengers for hire or reward; ... at separate fares; ... in the course of a business. In the case of taxis, elements 1,2 and 4 are satisfied, but (usually) not 3. A taxi, unlike a bus, does not (usually) carry passengers at separate fares. There is a fare for the journey undertaken rather than separate fares for each passenger in the vehicle.
Further, in the DfT document (dated November 2011) Public Service Vehicle Operator Licensing Guide for Operators, there is a statement that "*separate fares mean an individual payment by each passenger to the driver, conductor or agent of the operator for the journey undertaken*" This is not how taxis operate, so they therefore fall within the definition of private motor vehicle in the WIA. Taxis will be licensed by the local authority, but is clear from the DfT guidance that if they don't carry passengers at separate fares, they do not require a PSV licence, because they are not PSVs as defined.

		Customers List who have mobility issues but are not in possession of a Blue Badge	
3) Watering plants on domestic or other non-commercial premises using a hosepipe	Does not include watering plants that are (1) grown or kept for sale or commercial use, or (2) that are part of a National Plant Collection or temporary garden or flower display.	• To Blue Badge holders on the grounds of disability • Use of an approved drip or trickle irrigation system fitted with a PRV and timer • To customers on the company's Vulnerable Customers List who have mobility issues but are not in possession of a Blue Badge	The water restriction does not apply to the watering of plants that are grown or kept for sale or commercial use by horticultural businesses e.g. plant nurseries etc.
4) Cleaning a private leisure boat using a hosepipe	(1) cleaning any area of a private leisure boat which, except for doors or windows, is enclosed by a roof and walls. (2) Using a hosepipe to clean a private leisure boat for health or safety reasons	• Commercial cleaning • Vessels of primary residence • Cases where fouling is causing increased fuel consumption • Engines designed to be cleaned with a hosepipe.	
5) Filling or maintaining a domestic swimming or paddling pool	(1) filling or maintaining a pool where necessary in the course of its construction (2) filling or maintaining a pool using a hand-held container which is filled with water drawn directly from a tap (3) filling or maintaining a pool that is designed, constructed or adapted for use in the course of a programme of medical treatment (4) filling or maintaining a pool that is used for the purpose of decontaminating animals from infections or disease (5) filling or maintaining a pool used in the course of a programme of veterinary treatment (6) filling or maintaining a pool in which fish or other aquatic animals are being reared or kept in captivity	None	• Hot tubs are not classed as pools • Pools with religious significance are not domestic pools • Pools used by school pupils for swimming lessons should be excluded: they are covered by Drought Order legislation
6) Drawing water, using a hosepipe, for domestic recreational use	None	None	
7) Filling or maintaining a domestic pond using a hosepipe	Filling or maintaining a domestic pond in which fish or other aquatic animals are being reared or kept in captivity	• Blue Badge holders on the grounds of disability • To customers on the company's Vulnerable Customers List who have mobility issues but are	• Filling and topping up of a pond by fixed and buried pipes is not restricted

		not in possession of a Blue Badge	
8) Filling or maintaining an ornamental fountain	Filling or maintaining an ornamental fountain which is in or near a fish-pond and whose purpose is to supply sufficient oxygen to the water in the pond in order to keep the fish healthy	None	
9) Cleaning walls, or windows, of domestic premises using a hosepipe	Using a hosepipe to clean the walls or windows of domestic premises for health or safety reasons	• To Blue Badge holders on the grounds of disability • Commercial cleaning • To customers on the company's Vulnerable Customers List who have mobility issues but are not in possession of a Blue Badge • Where very low water use technologies are employed and approved by the water company	• The use of water-fed poles for window cleaning at height is permitted under the H&S statutory exception • The restrictions do not apply where the cleaning apparatus is not connected to mains supply
10) Cleaning paths or patios using a hosepipe	Using a hosepipe to clean paths or patios for health or safety reasons	• To Blue Badge holders on the grounds of disability • Commercial cleaning • To customers on the company's Vulnerable Customers List who have mobility issues but are not in possession of a Blue Badge • Where very low water use technologies are employed and approved by the water company	
11) Cleaning other artificial outdoor surfaces using a hosepipe	Using a hosepipe to clean an artificial outdoor surface for health or safety reasons	• To Blue Badge holders on the grounds of disability • Commercial cleaning • To customers on the company's Vulnerable Customers List who have mobility issues but are not in possession of a Blue Badge • Where very low water use technologies are employed and approved by the water company	• The use of water-fed poles for window cleaning at height is permitted under the H&S statutory exception • The restrictions do not apply where the cleaning apparatus is not connected to mains supply

The table above shows that some of the exceptions listed above are necessary for us to comply with legislative requirements (statutory exceptions) but others are at our discretion (discretionary exceptions). The discretionary exceptions that we have included in the table above includes all of the 'discretionary universal exceptions' and some of the 'suggested discretionary concessional exceptions' shown in table 3.2 of the 2013 UKWIR *Code of practice and guidance on water use restrictions* (see section 7.6 for full

reference). What this means is that we have granted more exceptions than the minimum industry standard. We have done this to minimise the impacts of restrictions on specific groups such as customers on our 'vulnerable customers list'.

We contributed to the development of the 2013 UKWIR *Code of practice and guidance on water use restrictions* (CoP). The Water UK board signed off this CoP in July 2013. The 2013 CoP is an update to the 2009 version. The 2013 version includes learning from the drought which ended in 2012 during which seven companies in the South and East of England implemented restrictions. It is also consistent with the current legislation and regulatory policy. We support and follow the principles of the 2013 CoP which are to:

- Ensure a consistent and transparent approach
- Ensure that water use restrictions are proportionate
- Communicate clearly with customers and the wider public/ users
- Consider representations in a fair way

Following the 2013 Code of Practice also helps us to delay the economic impacts of restrictions on business customers for as long as we can. By following this CoP we will also 'phase' in restrictions on use in a way that is consistent with other companies in the UK.

In most drought scenarios we think that the clearest way to impose restrictions on customers is on a company wide basis. However, if circumstances mean that this is not in our customers' best interests, we want to keep open the option of imposing restrictions in discrete areas. We do not believe that our customers, or the environment, would benefit if restrictions on use were imposed in parts of our region unaffected by drought conditions. We would choose these areas by considering how a specific drought was affecting our region and we would choose areas that are easy to define and communicate. We think that it is unlikely that we would need to apply TUBs at this scale but it is possible. If we did this and later needed to widen the spatial extent of the restrictions, we expect that the TUB would then apply to the whole company.

We are aware that imposing customer restrictions at a sub-zonal level is arguably inconsistent with the definition of a WRZ as provided in section 2.5.1 of the October 2012 *water resources planning guidelines (WRPGs*). This section of the guidelines describes a WRZ as

"The largest possible zone in which all resources, including external transfers, can be shared" and "*generally integrated to the extent that customers in the WRZ should experience the same risk of supply failure. Consequently all customers share the same level of service. There will be limitations in achieving these requirements within a distribution network but significant numbers of customers should not experience different risks of supply failure within a single WRZ.*"

However, leaving the option of sub-zonal restrictions open provides several benefits:

- It will ensure greater customer support and understanding
- When communicating with our customers we want to use boundaries that our customers are familiar with. Section 8.1, of the EA '*water company drought plan guideline*' recommends that we "consider the audiences that communications will apply to... and how best to communicate with them." Our proposed approach follows these principles.
- We can target restrictions whilst accounting for the latest information on demands, temporary engineering works, outages or other changes to our 'normal' production and distribution processes
- It allows us to target the restrictions to where they are most needed given the prevailing information.
- We keep any inconvenience to our customers to an absolute minimum
- We minimise the economic impacts of the restrictions.

3.2.2 Non Essential Use Bans (NEUBs)

Table 12 - Table showing which activities we will restrict under a NEUB and the exceptions we expect to make

Activity restricted by NEUBs	Statutory exception	Discretionary exceptions
Purpose 1: watering outdoor plants on commercial premises	The purpose specified does not include watering plants that are: (a) grown or kept for sale or commercial use; or (b) part of a National Plant Collection or temporary garden or flower display	• Use of an approved drip or trickle irrigation system fitted with a PRV and timer
Purpose 2: filling or maintaining	The purpose does not include: (a) filling or maintaining a pool that is open to the public;	None

a non-domestic swimming or paddling pool	(b) filling or maintaining a pool where necessary in the course of its construction; (c) filling or maintaining a pool using a hand-held container which is filled with water drawn directly from a tap; (d) filling or maintaining a pool that is designed, constructed or adapted for use in the course of a programme of medical treatment; (e) filling or maintaining a pool that is used for the purpose of decontaminating animals from infections or disease; (f) filling or maintaining a pool that is used in the course of a programme of veterinary treatment; (g) filling or maintaining a pool in which fish or other aquatic animals are being reared or kept in captivity; (h) filling or maintaining a pool that is for use by pupils of a school for school swimming lessons. Note that a pool is not open to the public if it may only be used by paying members of an affiliated club or organisation.	
Purpose 3: filling or maintaining a pond	The purpose does not include: (a) filling or maintaining a pond in which fish or other aquatic animals are being reared or kept in captivity (b) filling or maintaining a pond using a hand-held container which is filled with water drawn directly from a tap	• To Blue Badge holders on the grounds of disability • To customers on the company's Vulnerable Customers List who have mobility issues but are not in possession of a Blue Badge
Purpose 4: operating a mechanical vehicle-washer	Operating a mechanical vehicle-washer for health or safety reasons	• On bio security grounds
Purpose 5: cleaning any vehicle, boat, aircraft or railway rolling stock	Cleaning any vehicle, boat, aircraft or railway rolling stock for health or safety reasons	None
Purpose 6: cleaning non-domestic	Cleaning of any exterior part of a non-domestic building or a non-domestic wall for health or safety reasons	None

premises		
Purpose 7: cleaning a window of a non-domestic building	Cleaning a window of a non-domestic building using a hosepipe for health or safety reasons	None
Purpose 8: cleaning industrial plant	Cleaning industrial plant using a hosepipe for health or safety reasons	None
Purpose 9: suppressing dust	Suppressing dust using a hosepipe other for health or safety reasons	None
Purpose 10: operating cisterns (in unoccupied buildings)	None	None

If we need to impose TUBs or NEUBs customers can contact us to ask for exemptions or for more information. After we receive these representations we will consider these and whether it is appropriate for us to vary our policy to discretionary exceptions. If we impose restrictions and we become aware that some customers are not complying we will try to work with them to understand why this is. If this does not work then we will explore the enforcement options open to us. However, we expect that by demonstrating that we are reducing leakage and doing everything that we can, that the overwhelming majority of our customers will also 'do their bit'.

As we described in section 1.3 our stated levels of service are that we expect to impose restrictions three times every 100 years. When talking to customers we do not distinguish between a TUB and a NEUB. However, as our decision flow charts show we would not impose a NEUB until drought trigger zone F. This means that we will not impose a NEUB unless we have already imposed a TUB. It is important to realise that there is a difference between stated levels of service and the modelled frequency of TUBS and NEUBs. The following table shows both our stated and modelled frequency of these different types of restrictions:

Table 13 - Stated and modelled frequency of TUB or NEUB frequency

	TUBs	NEUBs
Stated level of service frequency	3 in 100 or less	3 in 100 or less
Modelled frequency	3 in 100	1 in 100 (in 1976)

The modelled TUB and NEUB frequency shown above is consistent with the levels of service we state to customers as both are 3 in 100 or less.

We have considered the results of UKWIR research as well as company specific factors when deciding what reduction in demand to expect as a result of temporary water use restrictions. The 2007 UKIWR report (*Drought and demand: modelling the impact of restrictions on demand during drought*) suggested that a full hosepipe ban could reduce demand in the summer by between 5% and 9.5%. There is some uncertainty associated with these results and they were gained from companies in the South East of England, where average water consumption is significantly higher than in our region. We believe that a 5% demand saving is a reasonable assumption for demand savings across the Severn Trent region. This reduction in demand is consistent with our previous drought plan. It is also consistent with the Aquator modelling we carry out in support of our water resources management plan (WRMP).

We plan on the basis that we will not impose a TUB if reservoir storage or other indicators have been in zone E for less than 7 days and that we would need a 'lead in' time of 14 days before we introduce restrictions on our domestic customers. This time scale allows sufficient, but not excessive, time for this engagement with our customers. We understand that there is no other formal process for objecting to restrictions imposed under a TUB, unless a customer requests a judicial review under the Human Rights Act. If any customers have any concerns about how and when we might restrict use we would welcome them to approach us at any time. We have given more detail on our communication plan and how we consider customer engagement in section 1.5 and section 5.2.

The compensation payments that we make to customers for interruptions to their supplies are as specified by condition Q of our Instrument of Appointment. This makes provision for compensation to household customers and business customers. These payments are to compensate customers for any loss of supply and not specifically those caused by droughts.

These payments apply regardless of whether there is a drought and we will not make any extra payments to customers if we apply restrictions in line with our stated levels of service. However, like all companies, we are not required to pay compensation to customers if the circumstances are so exceptional that, in Ofwat's view, it would be unreasonable to expect the interruption to supply to be avoided. Further information on the GSS payments is available from the Ofwat website (accessible via the link in section 7.8).

3.3 Supply-side actions

Optimising Existing Water Resources

As a drought develops we will carry out supply side activities to maximise the sustainable use of existing water resources within their licensed abstraction limits. The supply side options available to us in a drought include stopping or rescheduling maintenance work on our assets, optimising existing sources and assets, rezoning and importing from neighbouring water resource zones or adjacent companies. If these actions prove to be insufficient, we may need to apply for drought permits which would allow us to increase the quantity of water we take beyond normal abstraction licence limits. We describe the role of drought permits in more detail in section 3.4.

When we convene the DAT one of the first types of supply side actions we consider is rescheduling maintenance work. A review of our programme of maintenance at our key sites is one of the options we consider when an indicator is in drought trigger zone D. This review would seek to minimise the impact of any reduction in water production or treatment capacity at a treatment works, or in the distribution system, caused for example, by a capital investment scheme.

During the drought which ended in 2012 we used several sources and assets in ways different to normal operational practice to optimise our use of licensed water resources. Two examples include altering the set point of the Eathorpe river intake pumps at Draycote reservoir and transferring water from Meriden to Draycote via Siskin Drive, Coventry. In order to support the Siskin Drive transfer we have undertaken trials to reverse flow on the Highters Heath to Meriden link. Transfers of this sort enable us to utilise our strategic grid and move water to the parts of our region which need it the most.

Another of our responses to the drought that ended in 2012 has been to carry out re-zoning work on our distribution system. When we make changes of this sort to our distribution network the benefits are that we supply more customers from our more drought resilient sources and reduce demand on our more vulnerable sources. However, in order to achieve these benefits we need to overcome significant operational challenges, such as ensuring there are no adverse impacts on the pressure, colour or quality of the drinking water we supply. We have successfully achieved these benefits during 2011-12 without any adverse effects. These experiences prove that this is a

drought management activity that we can implement to the highest standards and in the timescales required.

Bulk Supplies

We have common boundaries with seven other water companies and bulk supply agreements with five of these companies. The following table summarises the bulk supply agreements we hold with neighbouring water companies.

Table 14 - Bulk supplies with neighbouring water companies

Neighbouring Company	Location	Basic details
Yorkshire Water Services	Derwent Valley reservoirs	Yorkshire Water Services take up to 60 Ml/d of untreated water. The quantity reduces as storage in the Derwent Valley reservoirs reduces
Anglian Water	East Midlands into our Strategic Grid and Rutland WRZs	Up to 18 Ml/d of treated water from Anglian Water
Dŵr Cymru Welsh Water (DCWW)	1. Export from our Forest and Stroud WRZ 2. Import from the Elan Valley reservoirs.	1. We provide DCWW with up to 9 Ml/d of treated water. This volume is supported by regulation releases from the Elan Valley. This is not usually variable in a drought 2. DCWW provide untreated water to our Strategic Grid WRZ. This import reduces by 29 Ml/d when storage in the Elan Valley reservoirs crosses the Licence Rule Curve
United Utilities	Our Shelton WRZ	The 'Llanforda' agreement states that we can receive a supply of up to 16 Ml/d of treated water from UU in case of an emergency failure of our ability to supply customers in this area. We are currently re-negotiating this agreement.

South Staffordshire	Import of treated River Severn water to the Wolverhampton WRZ	Up to a peak daily rate of 48 Ml/d.

All of our internal transfers of water and all significant bulk transfers to and from neighbouring companies are accounted for within our normal water resources modelling that we use for drought and water resource planning purposes. Our Table 10b submission shows the total volume of water imported and exported from each of our WRZs in the 2011-12 reporting year. This is one of the tables included in the *Annual Return* information that we routinely prepare for Ofwat and the EA.

For all of these bulk supplies our position is that, ultimately, we will decide whether to restrict our customers' use and other companies will decide whether to restrict their customers' use. As shown in the decision flow charts (shown in section 2 and section 7.4) we will communicate with other water companies early in our drought management process. As described in section 5 we will work to make our drought management communications consistent with the communications of other stakeholders. Despite this our drought planning can not second guess whether neighbouring companies restrict customer use. We plan on the basis that the importing companies can take what they are entitled to under the terms of the bulk supply agreements.

3.3.1 Bulk supply arrangements with Yorkshire Water

The normal operation of this bulk supply is governed by an agreement signed by both companies in 1989. The minimum supply rate between Severn Trent Water and Yorkshire Water is 35Ml/d. However, there is provision in the agreement to modify these rules and this occurred during the droughts of 1995-96 and in 2003. In the event of serious drought in our region we will approach Yorkshire Water and ask if it can ease pressure on our water resources by taking a reduced supply.

This is something we did as part of our drought management during 2012. We understand that the response we receive to these approaches will depend on the water resources position in Yorkshire. In this particular example, the prevailing hydrological conditions changed dramatically before any change to the bulk supply was necessary. Nevertheless we would make a similar approach in the future if required and we note that section 3.6.5 of the *Yorkshire Water's draft drought plan* (January 2012) states that it will consider how its operations could be varied "to reduce our bulk transfer from Severn Trent Water".

We are also aware that, as Yorkshire Water has stated in its *draft 2012 drought plan*, the decision on whether to impose restrictions in their supply area is theirs. The opposite is also true: if Yorkshire Water has imposed restrictions but we have not, we will make our decision based upon our own water resources position. However, in scenarios of this sort we will work closely with Yorkshire Water, and all other stakeholders, to minimise the impact of a drought on customers and the environment.

We think that the decision on whether to impose customer restrictions lies with each company and depends on their water resources position. This applies not only to us and Yorkshire Water but also to our interaction with all neighbouring companies.

3.3.2 Bulk supply arrangements with Anglian Water

Historically there were two agreements between us and Anglian Water. These were called Wing one and Wing two. Currently the only active bulk supply agreement that we have with Anglian Water is known as Wing one. This provides up to 18 Ml/d into the rural areas of the former county of Rutland. This supply does not automatically vary with any drought management measures, and the agreement does not stipulate that we will reflect any drought management measures that Anglian Water have to impose on its customers that are fed from their Wing WTW system. Nevertheless, in such circumstances, we will liaise closely with Anglian Water to minimise the impact on our customers whilst supporting Anglian Water's efforts to maintain supplies in its supply system.

As Anglian Water's 2012 draft drought plan (section 2.4) states there is "no formal requirement ...to impose the same restrictions". During the drought which ended in 2012 Anglian Water's customers had their use restricted whereas our customers did not. As Anglian Water has a lower level of service it is not surprising that, on average, it will restrict its customers use more frequently than we do.

However we make our best endeavours to co-operate with our neighbouring companies. For example, we demonstrated timely and effective communication with Anglian Water during the drought which ended in 2012.

3.3.3 Bulk supply arrangements with Dŵr Cymru Welsh Water (DCWW)

We met with DCWW in December 2011 to discuss how we would manage the bulk supply from our Forest and Stroud WRZ to DCWW and the bulk supply to us from the

DCWW reservoirs in the Elan Valley in a drought. We met DCWW in February 2013 to discuss the implications of either, or both, companies applying for drought orders or drought permits in relation to abstractions from the River Wye. We provide more detail on this topic in section 4.

3.3.4 Bulk supply arrangements with United Utilities (UU)

As stated in Table 14 this is an emergency supply which can provide a maximum of 16 Ml/d. It can do this for up to 28 days. The water is sourced from Lake Vyrnwy and the supply is referred to as either the Oswestry or the Llanforda agreement. We are currently re-negotiating the details of this agreement.

3.3.5 Bulk supply arrangements with South Staffordshire Water (SSW)

In a severe drought we would review the way we apportion our respective shares of the joint Hampton Loade – Trimpley abstraction licence with SSW and the Environment Agency (EA). This licence allows for the transfer of the overall quantity between SSW and us. Our intention would be to review our respective positions with regard to the other resources SSW have at their disposal, and our resource availability in this part of our region, and allocate the balance between Hampton Loade and Trimpley accordingly. This agreed arrangement has existed for over 15 years and has worked satisfactorily throughout this time.

The River Severn Regulation meetings with SSW, the EA and the Canal and Rivers Trust provide a forum for collaborative management of water resources. In addition to this we talk to SSW about the numerous emergency connections between ourselves but, we place no reliance on such emergency supplies being available for a protracted period during a drought. We have also been working with SSW so that the Aquator modelling that we do is joined up. For example, we have shared output from our model with them to facilitate this process. Another area where we are working together is in relation to the potential for us to apply for a drought permit at Trimpley. We discuss this in section 3.4.

3.3.6 Working with other water undertakers to better manage drought

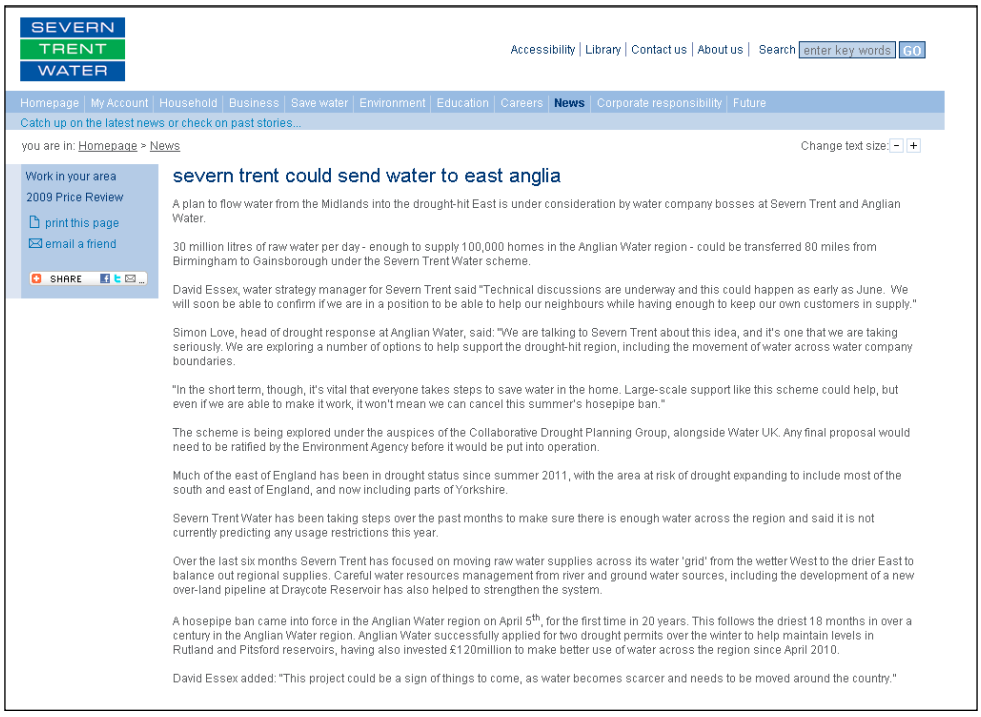
As well as working with these five companies we work with other water undertakers to understand how we can best align our drought plans, business plans and WRMPs with theirs. Not only do we talk to neighbouring water companies about existing and future transfers of water we also communicate with these and other stakeholders to ensure that any messages to customers are consistent. For instance, message consistency is vital

when companies consider restricting their customers' use – this topic is covered in more detail in section 5.

As explained in the 2011 report '*Changing course through water trading - How water trading can make a contribution to solving future water scarcity to the benefit of customers and the environment*', we believe that there are short and longer term benefits to the water industry, our customers and the environment to be gained through the development of a more integrated pipe network and greater co operation between water companies. So, as well as ensuring that we manage existing bulk supplies effectively, we are keen to explore new ways of transferring water to areas where there are inadequate supplies to meet customer demand.

We note that Anglian Water's *draft 2012 drought plan* (sec 6.5.1) states that "companies would provide mutual assistance dependent upon the characteristics of the prevailing drought and their respective availability of water resources and treated water supplies." The drought that ended last year showed that this is true, as we explored ways in which we can provide water supplies to Anglian Water. Work of this sort demonstrates that we are actively seeking to enter into agreements of this sort where appropriate. But we will only provide such supplies to other companies when we are confident that we can do so without putting the security of supply for our own customers at risk. The press release below is from the Severn Trent website and summarises how we seek to work together with other undertakers where we can:

Figure 14– Working with other water companies



SEVERN TRENT WATER

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severn trent could send water to east anglia

A plan to flow water from the Midlands into the drought-hit East is under consideration by water company bosses at Severn Trent and Anglian Water.

30 million litres of raw water per day - enough to supply 100,000 homes in the Anglian Water region - could be transferred 80 miles from Birmingham to Gainsborough under the Severn Trent Water scheme.

David Essex, water strategy manager for Severn Trent said "Technical discussions are underway and this could happen as early as June. We will soon be able to confirm if we are in a position to be able to help our neighbours while having enough to keep our own customers in supply."

Simon Love, head of drought response at Anglian Water, said: "We are talking to Severn Trent about this idea, and it's one that we are taking seriously. We are exploring a number of options to help support the drought-hit region, including the movement of water across water company boundaries.

"In the short term, though, it's vital that everyone takes steps to save water in the home. Large-scale support like this scheme could help, but even if we are able to make it work, it won't mean we can cancel this summer's hosepipe ban."

The scheme is being explored under the auspices of the Collaborative Drought Planning Group, alongside Water UK. Any final proposal would need to be ratified by the Environment Agency before it would be put into operation.

Much of the east of England has been in drought status since summer 2011, with the area at risk of drought expanding to include most of the south and east of England, and now including parts of Yorkshire.

Severn Trent Water has been taking steps over the past months to make sure there is enough water across the region and said it is not currently predicting any usage restrictions this year.

Over the last six months Severn Trent has focused on moving raw water supplies across its water 'grid' from the wetter West to the drier East to balance out regional supplies. Careful water resources management from river and ground water sources, including the development of a new over-land pipeline at Draycote Reservoir has also helped to strengthen the system.

A hosepipe ban came into force in the Anglian Water region on April 5th, for the first time in 20 years. This follows the driest 18 months in over a century in the Anglian Water region. Anglian Water successfully applied for two drought permits over the winter to help maintain levels in Rutland and Pitsford reservoirs, having also invested £120million to make better use of water across the region since April 2010.

David Essex added: "This project could be a sign of things to come, as water becomes scarcer and needs to be moved around the country."

Whether options of the sort described above are needed within the timescale covered by this drought plan depends on future climatic conditions. However, we are also working on options of this sort as part of the periodic review process.

3.3.7 Drought sources

In our 2010 drought plan we discussed a number of our sources that are licensed for abstraction but are currently closed down and isolated from the supply network. We have previously referred to these sources as ‘drought’ or ‘mothballed’ sources that we intended to be brought back into production during drought periods when normal water resources become limited. However, our experiences since 2010 have led us to conclude that we cannot bring most of these emergency reserves back on line during the time frame of a drought. This is because:

- These sources were originally closed down for sound operational reasons. These reasons include poor water quality that meant the water could not economically or feasibly be treated to Drinking Water Inspectorate (DWI) standards; poor or non-existent yield during droughts; unacceptable health and safety risks to our staff during operational visits

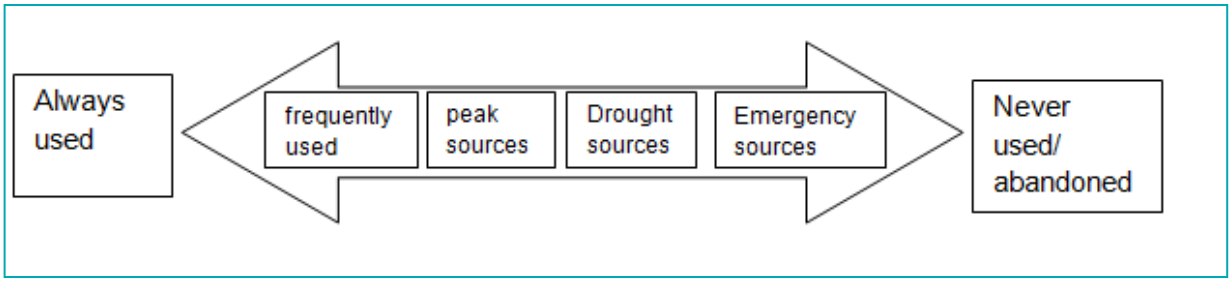
- More recently, the DWI has introduced the requirement for water companies to run all sources that have been off-line for a prolonged period of time to waste for three consecutive months. This is to ensure any water produced is of an acceptable, safe and stable quality (section 7.4 of this document provides some further information on the relevant water quality issues)
- Bringing drought sources back into supply can take up a substantial and disproportionate amount of staff time. We believe our staff and resources are better deployed, for example, targeting even greater efficiency of our existing treatment works during a drought
- Similarly, we see the reduction of losses from our distribution system through heightened leakage control in drought-critical supply zones as a better use of staff resources
- Recent developments in the EA's Restoring Sustainable Abstraction (RSA) programme, plus the Water Framework Directive (WFD) requirements for full environmental impact assessments of the occasional use of such sources of water, has introduced new challenges and requirements that cannot be resolved within the timeframe of a drought
- This is true both for bringing sources back into supply and for using these sources as replacements for compensation flows.

Our experiences since 2010 have shown that we now have very few extra water resources available to draw upon in a drought. When we published our draft drought plan we stated that the only drought sources available were the Norton C and D boreholes and Beechtree Lane. The licence for these boreholes allows us to pump a maximum of 18 Ml/d at each site. The use of the boreholes is linked to our Trimpley licence, the storage in Elan and the loss of the EVA. However, we now know that both existing boreholes (C and D) at Norton produce too much sand to be of practical use. Therefore, we are not considering these boreholes further for emergency use. However, we still consider that the boreholes at Beechtree Lane are drought sources that we can use in emergencies to supply water into the EVA. The five yearly total we can abstract from Beechtree Lane is 1,620 Ml. We plan to refurbish one borehole at Beechtree Lane by mid 2015 and to refurbish the second borehole of 9 Ml/d in early AMP6.

We note that there is actually a continuum between the sources that we use the most and those which we never use. This means that although it is fairly straightforward to tell which sources are at either end of this spectrum it is less obvious what to call the sources that fall in between these two categories. For example, there are a number of groundwater sources that we use to support river flows during periods of low flows. We operate these sources too frequently to class them as 'drought sources', but not frequently enough for them to be classed as constant sources of supply. Additionally there are sources which we may resort to in an emergency but which we do not consider to be drought sources. On the diagram below, these would fall between drought sources and abandoned sources. The timescales and requirements of a drought management

option are different to those of an emergency plan option. We discuss our emergency contingency planning process in section 3.4.1.

Figure 15– Frequency that we use our various sources



The sources that we considered to be drought sources in our last plan are subject to review within the remit of our water resources planning, which means we assess the feasibility and economical viability of the use of all these sources during the Periodic Review five year cycle. If all economical and operational feasibility tests fail to demonstrate that a source is of value to us, we have a site abandonment procedure that releases the source, and its abstraction licence, for alternative and more productive use.

3.4 Drought orders and permits

Should the actions described above mean that demands still exceed available supplies, we will need to apply to the Environment Agency for drought permits or the Secretary of State/ Welsh Ministers for drought orders. We have prepared our drought plan so that we will need to resort to these measures as infrequently as is reasonably possible. In this section when we talk about drought orders we refer to ordinary drought orders and not emergency drought orders. We explain our approach to emergency drought orders in section 3.4.1.

The main differences between drought orders and drought permits are that:

1. Drought permits allow companies to take water from specified sources and vary or suspend abstraction licence conditions
2. Drought orders do this, but also allow companies to discharge water to specified places and to modify or suspend discharges or filtering/ treating of water
3. Drought permits are normally determined within 12 days of the application

4. Drought permits are determined by the EA
5. Drought orders are determined by the Secretary of State/ Welsh Ministers
6. Drought orders are normally determined within 28 days
7. Drought orders allow water companies to restrict non-essential uses of water for their domestic and commercial customers

Drought orders

As specified in the May 2011 *drought permit and drought order guideline*, the Secretary of State or the Welsh Ministers can grant a drought order if they are satisfied that either:

- a serious deficiency of water supplies exists or is threatened or
- there is a serious threat to any flora or fauna

and

- this has been caused by an exceptional shortage of rainfall

The *2011 Drought Direction* states that water companies can restrict 10 non essential purposes under a drought order. We listed these categories and the exceptions that we will make in Table 12 which is in section 3.2.2 of this plan.

In our water resources modelling we assume that a restriction on these non essential uses lowers summer customer demand by an extra 5%. This means that, in combination with the temporary use restrictions applied to domestic customers, we model a 10% reduction in demand.

This value is consistent with the reduction in demand associated with a drought order shown in the *2007 UKWIR report Drought and demand: potential for improving the management of future droughts*. The cumulative or in combination reduction in demand of 10% is towards the lower end of the range of values quoted in other industry publications. This is appropriate to our company specific circumstances as our customers use less water on average than the customers of any other water and sewerage company.

We assume 28 days as the time required for Defra to grant a drought order to restrict the use of commercial customers. However, it does not follow that there must be an equivalent volume of reservoir storage in zone F to supply 28 days of average or peak demand. This is because as reservoir storage falls through the zones above we will implement actions to reduce the demand on the reservoir or reservoir group. For example, during the low storage experienced at Draycote reservoir in 2011-12 we were able to reduce the net outflow from Draycote reservoir to zero.

In our modelling we assume that when reservoir storage enters drought trigger zone E (which is defined in section 2.1) for more than seven days, we will:

- reduce the modelled demand by 5%

We also assume that if storage enters drought trigger zone F our modelled demand will:

- reduce by 10%

These reductions only occur if the modelled storage enters these zones in the summer (April to October inclusive) months as during winter there would be no significant reduction in demand. The 180 day duration for demand reductions is consistent with that assumed for a hosepipe ban when we prepared our last water resources management plan (WRMP09) and our 2010 drought plan. These demand reductions apply for a period of 180 days, unless storage recovers sufficiently before this period has finished.

We do not have a curve in our model solely for when we implement drought permits. Despite this we can predict when they are likely to occur by looking at the time of year, the reservoir current storage and our projections for future reservoir storage. If we think that there is a reasonable chance that we would need a drought order or permit we would engage with the relevant stakeholders at an early stage. For example, during the drought that ended in 2012 we contacted the Midlands Region EA to agree what we would need to provide to support any drought permit application. The following table illustrates some indicative scenarios:

Table 15 - Indicative drought permit application scenarios

Time of year	Current reservoir storage	Projected future reservoir storage	Is a winter or summer drought permit application likely?

Winter/ Spring/ early summer – (November to July inclusive)	Zone E	Projections indicate that storage will remain in zone E or reduce further	Yes, although we would not apply for a summer drought permit unless we had imposed a TUB
Winter/ Spring/ early summer – (November to July inclusive)	Zone E	Projections indicate that storage will increase to zone D or above within 28 days	No, this would be unnecessary
Late summer/ Autumn (August to October inclusive)	Zone E	Projections indicate that storage will remain in zone E or reduce further	Yes, but it is unlikely that our projections would indicate this as winter inflows are usually high
Late summer/ Autumn (August to October inclusive)	Zone E	Projections indicate that storage will increase to zone D or above within 28 days	No, this would be unnecessary

Although we expect to implement drought permits after we have restricted domestic customers' use and before we use drought orders to restrict commercial demand it is not critical to the modelling when this occurs. This is because drought permits trigger neither additional reductions in demand nor any change to our levels of service as we will have already applied restrictions on customer use. The impact on deployable output of drought permits when averaged across the 91 years is negligible. For short term projections of the impacts of drought permits on reservoir storage we would use an appropriate technique (such as Aquator or a spreadsheet) to model the probable inflows and demands on the reservoir or reservoirs in question. We would then debate scenarios such as reservoir storage with or without a drought permit at DAT meetings. We address the potential impact on the environment of drought permits or orders in section 4 of this plan.

By allowing us to restrict the non essential uses listed in the *2011 Drought Direction*, drought orders provide us with powers to manage the demand of more of our non household customers. We may also apply for a drought order rather than a drought permit in locations where we consider there needs to be a decision on the grounds of imperative reasons of over-riding public interest. Decisions of this type are taken by the Government rather than the EA.

Currently we think that there are two specific locations where we may apply for a drought order for this reason. These two locations are:

- The River Wye at Wyelands. The River Wye is a Special Area of Conservation (SAC) and therefore covered by the Habitats Directive (HD). As discussed in section 4, our drought order here would request a temporary variation to the conditions of our existing abstraction licence. The triggers for this application are summarised in section 2.1.1.
- The River Severn at Trimpley, if the EA has already applied for a drought order.

We do not think that the compensation referred to in 4 (g) of Defra's '*Drought Plan Direction 2011*' (see full reference in section 7.6) applies to any of the options described in this plan.

Lead in times for drought permits and drought orders

The lead in time that we will require to prepare our drought permit or drought order applications will depend on how much information we have readily available at the time. We estimate that we will require at least seven days lead in time for us to finalise our application. However if we are considering applying for either a drought permit or drought order we will have been preparing the sort of information shown in Table 16. This means that some of this lead in time could occur whilst the drought indicators are still in trigger zone D. In section 4.1 we explain that we are routinely gathering the supporting environmental information that we need as part of a drought permit/ order application. Therefore, we are confident that we could quickly make an application if necessary.

Drought permits

Drought permits allow us to take water from specified sources and vary or suspend conditions in abstraction licences to enable us to continue providing water for public consumption. This is a supply side drought management option as it can increase the amount of water available to abstract. The EA will grant drought permits if it is satisfied that:

- a serious deficiency of supplies of water in any area exists or is threatened and
- the reason for this is an exceptional shortage of rainfall

Although companies need to demonstrate a “serious deficiency of supplies” and “exceptional shortage of rainfall” to obtain either a drought order or permit, there are no exact definitions of either term. This is because each drought and situation is different. To provide the industry with clarity the EA produced a guidance note entitled ‘Exceptional shortage of rain: Principles for the assessment of drought orders and permits’. We have reproduced this note in section 7.7. In summary, this note states that the EA will consider the following matters when assessing drought orders or permits:

- technical analysis methods
- period of analysis
- geographic extent of analysis
- other meteorological and hydrometric measures
- relationship to the serious deficiency question
- relationship to water company system
- other sources of information
- presentation

This guidance note helps to define what the EA would expect without being excessively prescriptive. For example it states that there should be no set definition of exceptional shortage of rain and it states that the technical methods “can include return period analysis”. We believe that this note sets out a sensible and pragmatic approach. We also note that we will be analysing and monitoring some of the information mentioned in this note as part of our internal drought communications.

A drought permit will normally be in force for a maximum period of six months, but those six months can start at any time of the year. However, it is an understanding between the EA and water companies that a drought permit, starting in summer, would be accompanied by a reduction in domestic customer demand through a temporary use ban (TUB).

One alternative to a summer drought permit is a winter drought permit. These are usually preferable as they are potentially less detrimental to the environment. If reservoir storage was in drought zone E for more than a week during the winter our DAT may decide that we apply for a drought permit. In this scenario we would not impose a TUB to restrict our customers’ use. This is because applying such a measure during winter is very unlikely to deliver any significant extra demand savings.

We do not presume the implementation of customer restrictions will guarantee that the EA grant a drought permit. In preparing this plan, it has been our overriding objective to limit drought permit applications where possible to those that enable winter refill. In this way we will minimise the impact on the environment and not compromise levels of customer service.

Nevertheless, where we cannot avoid a summer drought permit, we will introduce restrictions on use in the area supplied by the source or sources affected by the drought permit. A prerequisite of obtaining drought permits is to identify in this plan the locations where we may seek such powers should a drought arise. We have identified the following locations where we consider it likely that drought permits will provide a significant supply benefit:

- The Derwent Valley Reservoirs, where we would request a reduction in the compensation flow

- The River Derwent at Ambergate, where we would ask to vary the prescribed flow at Derby to allow greater winter refill of Carsington Reservoir

- The Tittesworth Reservoir and River Churnet Conjunctive Use Area, where we will request a variation to the compensation requirements from Tittesworth Reservoir and Deep Haye Valley. We would also ask for a variation to the Leek Groundwater Unit abstraction licences. This will assist the refill of Tittesworth Reservoir

- The River Leam at Leamington and the River Avon at Stareton, where we will request a variation to both of the prescribed flows and an extension to the period during which we can abstract at Eathorpe to assist the refill of Draycote Reservoir. We would ask to extend this period when storage is low but not below the summer abstraction thresholds of 49.4% (from May to June) and 39.5% (between June and mid September)

- The River Severn at Trimpley, where we would seek a variation to the abstraction restrictions during maximum[3] regulation of the River Severn. This will allow

[3] When we mention 'maximum regulation' of the Severn we mean the maximum possible regulation with the existing capacity of the Shropshire Groundwater Scheme (SGS). The definition we use for maximum regulation is consistent with that given on page 8 of the EA Operating Rules for the River Severn Resource/ Supply System (Version 6). These guidelines state that "*Maximum Regulation is defined as 500 Ml/d from Llyn Clywedog, and the licensed limit*

greater conjunctive use of the River Severn and River Wye systems especially when storage in the Elan Valley Reservoirs is low. Before we applied for a drought permit, we would seek to maximise the water available at Trimpley water treatment works (WTW) and the neighbouring SSW works at Hampton Loade, whilst minimizing the impact on the river.

We note that it is technically possible (but unlikely) that an extreme drought would cause us to apply to the EA for a drought permit, the EA to then apply to Defra for a River Severn drought order and, finally, for water companies to apply to Defra for a drought order seeking to amend the terms of the EA drought order. We believe that we would be able to avoid this complicated scenario by collaborative engagement with the EA and the other relevant stakeholders.

We are confident that joint working of this sort can be productive and reduce overall costs. For example, we have met with both the EA and SSW during recent months as part of collaborative work to pool resources in order to assess the 'in combination' impacts of drought permits and/ or drought orders on the River Severn. By working together we can avoid duplication, prevent conflicting information which might arise from working in isolation and increase efficiency. We refer to this type of collaborative work more in section 4.1.

Having identified the potential drought permit/ order sites, we have carried out an extensive programme of environmental monitoring and assessment. We have described this programme in section 4. We have also referred to the May 2011 guideline produced jointly by Defra, the Welsh Assembly Government (WAG) and the EA. Table 3 in this guideline shows the information that companies need to provide to the EA in support of drought permit applications. We have prepared the following company specific table in a similar format.

Table 16– Information to support drought permit applications

Type of information	Data frequency	Resolution	Units	Comments
Monthly rainfall – compared to LTAs	Weekly	EA area names- river catchments	mm and % of LTA	Weekly updates from the Environment agency
Reservoir levels	Weekly	Per individual reservoir	Storage in Mega litres (Ml) also available as percentages	Updates made by Resource Technicians (water production) informed of levels by works.

of the Shropshire Groundwater Scheme. As SGS is not currently fully developed to deliver the licensed limit Maximum Regulation is not currently achievable."

			of historical levels	
Bore hole (BHs) levels – STWL tele-metered BHs	Live feed	15 minute data – site specific	metres relative to datum	Available when we dial into it
Borehole levels – STWL manually read BHs	Approximately monthly	site specific	metres relative to datum	Frequency of reading can vary with water resource position, staff availability etc.
Borehole levels – EA observation BHs	Monthly	Several observation sites across our region	metres relative to datum	We check these more frequently when DAT has been convened
Steps to reduce demand	Monthly	Company wide	KPI 14 measurement. Promoting water efficiency	Monthly tracking of supply/ demand data for all various zones to identify target areas. Promoting commercial and non commercial efficiency.
Evidence about WR management arrangements	Water Resources management plan (5 yearly)	Company wide	N/A	WRMP arrangements are published in our 5 yearly plans, and ongoing through each AMP period.
Changes to operational procedures	When relevant	Per source	Dependant on change- for outages, days of occurrence and available flow (Ml/d) recorded.	E.g. outage at BH site recorded in BH outage Gantt by resource techs who are informed by works/ operations of changes.
Steps to conserve supplies	N/A	Company wide	N/A	Engaging public; achieving leakage targets; promoting water efficiency (e.g. water saving guide and leading by example- Severn Trent Centre water efficiency schemes).
Other options considered	N/A	N/A	N/A	In DAT information
Consequences if permit's not granted	N/A	N/A	N/A	These vary dependent on the site, the water

				resources and the demand/ outages etc.
Demand	Daily	WTW level – in particular for works close to drought permit sites	Ml/d	none
Population affected	Population data is collated annually	Control group	1000s	The population affected will depend on which permit/ order/ combination we are applying for

3.4.1 Compliance with the Drought Plan Direction 2011

For our drought plan to comply with part 4(b) and 4(f) of this direction we need to show the permits and approvals that we may need in order to implement the drought measures and the associated mitigation measures described later in this plan. We have included this information in the seventh column of the drought management action tables contained in section 7.4. We have carried out this analysis on an 'option by option' basis.

3.4.2 Emergency drought orders and emergency plans

Our drought triggers and flow diagrams do not show emergency drought orders because, as discussed in section 1.3, our levels of service state that we consider rota cuts/ standpipes to be unacceptable for our customers.

The EA guideline recommends that "Companies should include emergency drought orders in their drought plans as the final action in severe droughts. Any drought actions beyond this relating to civil emergency should be dealt with in water company emergency plans rather than drought plans." Our levels of service mean that the first point does not directly apply to us. If a significant number of our drought indicators were to drop into zone F for a significant period of time then our emergency contingency plans and processes will come into force. Events of this nature are usually handled by a Gold Command which will involve working with external parties such as the emergency services.

Due to their sensitivity these plans/processes are not publicly available. Scenarios of this type are outside the scope of a drought plan. However, it is vital to stress that the probability of a drought causing such plans to be implemented is extremely low.

Legally, emergency drought orders allow companies to “prohibit or limit the use of water for such purposes as (they) see fit” and to supply water by means of stand-pipes or water tanks. The timing of applications and the determination on these applications is the same as for ordinary drought orders. However, emergency drought orders are granted for a period of up to three months and may only be extended to last a maximum total of five months.

3.5 Potential drought permit and order sites

We believe that at any site across our region there is the potential for us to require a drought permit or drought order. However, this is very unlikely at most locations. In section 3.4 we listed the locations where we consider that there is a reasonable chance that we may apply for drought orders or drought permits. In order to maintain flexibility within our drought planning, we note that the lists in section 3.4 are not exhaustive and there could be other sites or systems where we can not entirely rule the possibility of needing a drought permit/ order out. Should the circumstances of any future drought make us consider any location not mentioned in this plan as a realistic site for a drought order or permit we will inform the appropriate stakeholders. For instance, we will contact the Environment Agency, Defra the Welsh Government and other relevant stakeholders, as soon as is practical.

4. Environmental impacts

As mentioned in section 3.4 there are five specific locations that we have identified where we may apply to the EA for a drought permit and at least one where we may apply to Government for a drought order. The section below provides some details of what these applications would contain in terms of increasing the resources available to us in a drought.

Derwent Valley Reservoirs

In ‘normal’ conditions our abstraction licences mean that we:

- abstract approximately 75% of the annual licensed quantity from the reservoirs for our use and
- approximately 25% is for Yorkshire Water’s use
- and that we should provide a minimum compensation flow of 54 Ml/d from Ladybower reservoir (when the river flow at Derby is above 340 Ml/d)

This drought permit will:

- reduce the aggregate quantity of compensation water from Ladybower Reservoir to the River Derwent and to Jaggers Clough from 74 Ml/d (or 92 Ml/d when flow at Derby is <340 Ml/d) to 51 Ml/d
- reduce compensation water from Ladybower Reservoir from 54 Ml/d to 34 Ml/d

River Derwent at Ambergate

In 'normal' conditions our abstraction licences mean that we can:

- abstract up to 62,100 Ml annually from the river

We have included the daily maximum abstraction rate in Table 17

This drought permit will:

- Authorise the abstraction of up to 320 Ml/d at Ambergate when the flow in the River Derwent at Derby is not less than 500 Ml/d, rather than the present flow threshold of 680 Ml/d.

We have taken the table below from the River Derwent and Derwent Valley environmental report which we discuss in section 4.1. This table summarises the changes that these two drought permit applications would seek to make.

Table 17– Derwent and Derwent Valley drought permits

System	Mean daily flow controls (normal/drought permit) at St Mary's Bridge Derby (Ml/d)		Permissible Abstractions (Ml/d)	Total Upper Derwent compensatory flow requirements (normal/drought permit)			
	Normal	Drought Permit	Normal & Drought Permit	Yorkshire Bridge		Below Noe Confluence	
				Normal	Drought Permit	Normal	Drought Permit
Derwent Valley Reservoir System	≤ 340	≤ 340	245 (daily average value)	≥ 72	≥ 34	≥ 92	≥ 51
	> 340	> 340		≥ 54	≥ 34	≥ 74	≥ 51
Ambergate	> 680	> 500	320	n/a	n/a	n/a	n/a
	≤ 680	≤ 500	≤ 15	n/a	n/a	n/a	n/a
	≤ 340	≤ 340	0	n/a	n/a	n/a	n/a

Tittesworth Reservoir and the River Churnet

In 'normal' conditions our abstraction licences mean that we must:

- Provide at least 14.8 Ml/d compensation flow from Tittesworth Reservoir (including Solomon's Hollow) and
- That we can abstract up to 16,000 Ml annually from the reservoir.

This drought permit will:

- Allow the compensation flow at Tittesworth Reservoir (including Solomon's Hollow) to be reduced from a minimum of 14.8 Ml/d to a minimum of 6.8 Ml/d
- Authorise abstracting 8 Ml/d from the Abbey Green borehole, operating outside the borehole's abstraction licence limits, to discharge into the River Churnet 1.8 km downstream of Tittesworth reservoir
- Remove the requirement for a total minimum discharge of 19.32 Ml/d to be released from a combination of Tittesworth Reservoir (including Solomon's Hollow) and Deep Hayes.

Only one stretch of waterway is likely to have reduced flows under the proposed drought permit:

- A 1.8 km stretch of the River Churnet below the Tittesworth reservoir and down to the Abbey Green borehole discharge point.

The environmental impacts of this drought permit are covered in the Churnet environmental report. We describe the purpose and content of our environmental reports in section 4.1.

River Leam at Eathorpe and River Avon at Stareton

In 'normal' conditions our abstraction licences mean that:

- We can not abstract at Eathorpe between May and mid September
- We have to operate our system in such as way that it does not cause the flow in the river Leam at Princes Drive Weir in Leamington to drop beneath 18.2Ml/d
- We can not abstract from the River Avon if the flow at Stareton gauging station is below 45 Ml/d.

This drought permit will:

- Authorise abstraction at Eathorpe on the River Leam to Draycote Reservoir at any time of year when the lower storage condition at Draycote Reservoir would normally prohibit such abstraction
- Relax the prescribed flow in the River Leam at Princes Drive Weir in Leamington from 18 Ml/d to 12 Ml/d
- Reduce the hands-off flow in the River Avon at Stareton of 45 Ml/d to 35 Ml/d exclusively to allow us to transfer additional water from the River Avon at Brownsover into Draycote reservoir.

River Severn at Trimpley

In 'normal' conditions the flow in the Severn at Bewdley is greater than 850 Ml/d and our abstraction licences mean that:

- We can abstract a daily maximum of 180 Ml/d at Trimpley

However, we can also take another 20 Ml/d from Hampton Loade. So in 'normal' conditions the total daily maximum is 200 Ml/d but, we usually abstract less than this.

The key constraint at Trimpley during a drought is that our maximum daily abstraction reduces from 180 Ml/d down to 60 Ml/d during maximum regulation of the River Severn, and to a maximum of 6,000 Ml during the first 100 days of regulation (the figures are 80 Ml/d daily and 8,000 Ml with the 20 Ml/d currently transferred to Trimpley from Hampton Loade). The table below illustrates these restrictions upon our abstraction:

Table 18– Trimpley drought permit

		Trimpley	Trimpley + 20 Ml/d from Hampton Loade
Daily	**Bewdley >850Ml/d**	180 Ml/d	200 Ml/d
Seasonal	**First 100 days regulation (then pro-rata)**	6,000 Ml	8,000 Ml
Daily	**Maximum regulation**	60 Ml/d	80 Ml/d
Annual	**Maximum regulation**	**22,000 Ml/year**	**29,300 Ml/year**

We expect to apply for this drought permit if we have to reduce our abstraction at Trimpley due to the maximum regulation condition in the abstraction licence. A reduction in abstraction at Trimpley will have the greatest impact on our operation if there is the requirement to support the Elan Valley Aqueduct flow to Frankley in Birmingham from the River Severn. This is most likely to occur if the Elan Valley Reservoirs storage is below the Elan Valley Licence Rule curve and flow to Frankley has been reduced to 327 Ml/d. This flow is generally inadequate to support the demand on Frankley WTW.

The proposed drought permit will suspend:

- The daily abstraction restriction under maximum regulation
- The constraint limiting abstraction over the first 100 days of river regulation (special conditions 2b and 2c of the Trimpley licence).
- The joint licence constraints at Trimpley and Hampton Loade, under maximum regulation. The daily maximum of 272 Ml/d (max regulation) will revert to 400 Ml/d, and the seasonal limits equivalent to 242 Ml/d (licence No 110 and 163) and 272 Ml/d (licence No.110, 163 and 584) will be removed.

If the period of the drought permit extends beyond 100 days of river regulation we will review the situation with the EA in the light of likely future demand on Trimpley and current storage in Clywedog and the Elan Valley reservoirs.

In the event that the EA has already applied for a drought order on the River Severn then we would need to apply for a drought order at Trimpley. This drought order will:

- Reverse the 5% reduction on abstraction that would have been introduced by the EA's River Severn drought order
- Potentially make the other temporary changes that we would apply for in a drought permit application

River Wye at Wyelands

We described how we operate this source in both 'normal' and drought conditions in section 2.1.1.

We expect that this drought order will:

- Authorise the abstraction of up to 45.5 Ml/d at Wyelands when the flow in the River Wye at Redbrook is less than 1209 Ml/d and Elan Reservoirs storage is below the Elan Storage Licence Rule Curve.
- If DCWW is also experiencing severe drought conditions we may apply to increase our Wyelands abstraction to 48.5 Ml/d in order to transfer and extra 3Ml/d to DCWW.

4.1 Environmental Assessment Reports (EARs)

The 2011 Defra guidance states that all applications for drought permits and drought orders should be accompanied by appropriate Environmental Assessment Reports (EARs). These reports provide details of baseline conditions and assess the potential impacts on the water environment from implementation of the drought permit. Where the reports identify potentially significant negative impacts, they identify appropriate mitigation measures. In addition the reports include an Environmental Monitoring Plan (EMP) to set out the monitoring that is needed to determine the effect of the operation of the drought permit.

One of the lessons that we have learned since 2010 is the advantage of maintaining 'off the shelf' environmental reports. We have set up processes to ensure that these reports are regularly updated so as to reflect the latest legislation. In particular, we found that the environmental reports that we had produced in 2006/7 to support our 2010 drought plan did not reflect the current requirements of the Water Framework Directive (WFD). The following section describes the EAR for each of the drought permit/ order sites. We also acknowledge that even a completed EAR may need updating with environmental information before we make a drought permit application.

Derwent Valley Reservoirs

We have updated our environmental assessment reports with the information currently available to us. Defra has defined the requirements of these environmental reports in section 1.2.3 of its guidance and our environmental reports comply with this. For example, the '*Drought Permit Environmental Assessment Report: River Derwent at Ambergate and Derwent Valley Reservoirs'* includes a section 2.6.4 which specifically sets out how the report complies with the 2011 guidance.

We completed the EAR for the River Derwent and the Derwent Valley Reservoirs drought permits in April 2012. We did this in collaboration with the EA and they have

agreed that this report meets its requirements and it has been signed off by STWL and the EA. We have shared this report with Natural England and Natural Resources Wales (NRW)/ Cyfoeth Naturiol Cymru. Although this site is not in Wales we shared it with NRW to show what we include in our EARs. This report is available on request.

The non technical summary of this report includes the following conclusion:

'For most receptors, only negligible or minor negative impacts were predicted. The notable exceptions were some species and life stages of fish, where potential moderate or major negative impacts were considered possible (although not necessarily probable), depending on the timing and duration of Drought Permit implementation. The continual improvement in water quality over the last two decades has reduced the sensitivity of certain receptors to low flow events. In general the monitoring carried out during previous droughts shows that the river ecology recovers fairly rapidly after droughts'.

River Derwent at Ambergate

The EAR that we produced to support a Drought Permit application for the Derwent Valley reservoirs also covered the River Derwent at Ambergate. We combined these environmental assessments as the locations are close in distance and in terms of the likely impacts on the hydrology and ecology. This agreed and completed report is available on request.

We introduced a baseline monitoring programme in 2010 and have now completed three years work on the River Derwent. Further details are in section 4.2

Tittesworth Reservoir and the River Churnet

We produced an EAR for the River Churnet (and Tittesworth reservoir) in April 2012 in collaboration with the EA. This report has not yet been finalised or signed off as it identified a requirement to obtain some more information from Abbey Green borehole. Since then we have completed pump tests at Abbey Green borehole to ensure that we can implement this option if required. Now that these tests are complete we have updated the Churnet environmental assessment report. We sent this report to the EA and received their comments in March 2013. We have incorporated this feedback and

we finalised this report in autumn 2013, for sign off in spring 2014. Once it is signed off by the EA, this report will be available on request.

The non technical summary of this report includes the following conclusion:

'For most receptors, only negligible or minor negative impacts were predicted. The notable exceptions were some species and life stages of fish, where potential moderate negative impacts were considered possible (although not necessarily probable), depending on the timing and duration of Drought Permit implementation and potential water quality effects. The continual improvement in water quality over the last two decades has reduced the sensitivity of certain receptors to low flow events. In general the monitoring carried out during previous droughts shows that the river ecology recovers fairly rapidly after droughts.'

We introduced a baseline monitoring programme in 2010 and have now completed three years work on the River Churnet. Further details are in section 4.2

River Leam at Eathorpe and River Avon at Stareton

To support the Avon and Leam drought permit EAR, we have completed technical appendices in collaboration with the EA. In addition we sent the EA a draft Avon and Leam EAR and received their comments in March 2013. We have incorporated this feedback and we finalised this report in autumn 2013, for sign off in spring 2014. Once it is signed off by the EA, this report will be available on request.

The non technical summary of this draft report includes the following conclusion:

"For most receptors, only negligible or minor negative impacts were predicted. The notable exceptions were in-river habitats at Offchurch on the River Leam, and some species and life history stages of fish on the River Leam, where potential moderate negative impacts were considered possible (although not necessarily probable), depending on the timing and duration of DP implementation. No in-combination impacts are predicted for the River Avon downstream of the Leam confluence, given the generally negligible/minor nature of the predicted impacts on the reaches upstream and the negligible nature of the predicted changes in flow in this reach."

Before we circulated this draft EAR we had already received comments from the EA about the issues that this report should address. As shown in the table in section 5.3, we

learned several lessons about this part of our system during the drought that ended in 2012. We implemented innovative water transfers and managed demand at Draycote works so that, despite low storage in Draycote reservoir, we did not need to apply for a drought permit.

In future droughts our DAT will choose the appropriate combination of drought management actions (as shown by the decision flow chart in section 7.4). However, the fact that we avoided the need for a drought permit in 2011 or 2012 does not mean that there may not be circumstances when we would still need a permit to maintain secure supplies for our customers.

As with all of our drought permits we would need to justify the need for the permit and demonstrate that we have appropriate environmental assessments and mitigation in place. The water resources benefit that we get from each of the three elements of the Avon and Leam drought permit will vary with hydrology. For example, the flows in the Avon and Leam could react differently in any specific drought. If we apply for this permit we need all three elements of it to ensure that, in combination, we derive a significant water resources benefit.

We are aware that there are a number of long standing and complex issues relating to the current abstraction licensing regime in this catchment. These issues relate to the licences associated with Draycote Reservoir, Willes Meadow, Eathorpe and Brownsover We plan to work with the EA and other key stakeholders to find a way of operating that safeguards the interests of abstractors and the environment. For example, we intend to re-start the meetings of the 'Avon and Leam Liaison group'. We expect that the EA and the Canal and Rivers Trust will join us to form this group.

We introduced a baseline monitoring programme in 2011 and have now completed two years work on the Rivers Avon and Leam. Further details are in section 4.2

River Severn at Trimpley

We have not yet updated our environmental assessment report (EAR) to support this potential drought permit/ drought order. This is because we have been waiting to see the outcome of the EA's recent drought order EAR. However, we have agreed a programme of work with the EA and South Staffordshire Water (SSW) to complete a combined EAR this year. The key milestones in this programme are as follows:

- We produced a scope for the EAR in March 2013
- The EA consultation on its River Severn Drought Order work began on 1 July 2013
- The EA completes its River Severn Drought Order work in early 2014
- The River Severn Drought Management Group reforms after the EA drought order work is complete
- **We will produce a Trimpley EAR by spring 2014**
- If this EAR shows that we need to produce a document to inform an 'Appropriate Assessment' of the individual effect of our drought permit/ order then we will use the information in the EAR to produce this
- We produce our '*2013 drought monitoring report'* in early 2014

In preparation for the EAR that we are going to complete by spring 2014 we are working with SSW, Natural Resources Wales/ Cyfoeth Naturiol Cymru and the EA to ensure that our assessment of the environmental impacts of any drought permit/ order is consistent with the work they have done and will be doing in the future. To ensure consistency we have shared relevant information. The following two reports are of particular relevance to any drought permit/ drought order (DP/DO) proposals at Trimpley:

- the *Severn Drought Order Report* (draft EA, 2012) and
- the *Hampton Loade DP/DO Environmental Assessment Report Update (SSW/ ESI) 2012)*

The draft Severn Drought Order Report indicated that, based on observations from historic drought events, even with activation of the River Severn Drought Order (in various forms) and reduction of the Bewdley prescribed flow to 545 Ml/d, flows in the River Severn in 1976 were still higher than would naturally have been expected at Bewdley.

EA modelling of a 'chronic' drought of greater magnitude/severity than the 1976 event indicated that flows and water quality would deteriorate below local WFD targets as part of the natural drought process, regardless of whether the River Severn Drought Order was operated or not. This suggests that any impact to WFD status would be a natural consequence of drought, rather than a consequence of anthropogenic management practices. This draft EA report predicted no additional WFD water quality failures during

the River Severn Drought Order operation and all flow and subsequent ecological impacts were short term with a quick recovery in line with the natural event.

The EA report modelled an in-combination scenario of all drought orders/ permits together. However it did not model scenarios of either the Trimpley DP/DO alone or an in-combination SSW/ Severn Trent Water drought permit/ order scenario. Our report will seek to address the first scenario. SSW has confirmed to us that the second scenario will not occur so we do not need to assess this. We have provided comments and data to the EA to support their River Severn Drought Order (RSDO) work. The EA consultation on the RSDO began on 1 July 2013 and we expect them to complete the project in early 2014.

The SSW report considered the potential effects of the Hampton Loade drought permit/ order proposals (in combination with the EA Severn Drought Order proposals and our Trimpley drought permit/ order proposals) on WFD classification status and drew similar conclusions to those in the draft 2012 EA Severn Drought Order report.

The 2012 SSW report assessed the following receptors, which are common to all EARs:

- Water quality
- River habitats
- Macro invertebrates
- Fish populations and migration (this category includes eels)
- Amenity, heritage and culture
- Abstractions and discharges
- Sites with environmental designations

This SSW study predicted only negligible or minor negative impacts for most receptors, particularly for the riverine reaches. The continual improvement in water quality in the River Severn over the last two decades has reduced the sensitivity of certain receptors to low flow events and in general, monitoring data show that river ecology recovers fairly rapidly after droughts. Nevertheless, in-combination effects on the Severn Estuary particularly associated with the Gloucester and Sharpness canal abstraction can not be ruled out. This is particularly important as the Severn estuary is a special area of conservation (SAC).

Given that there are a large number of competing interests for water resources within the Severn catchment, we do not consider that the responsibility for assessment, monitoring

or mitigation of such impacts lies with any one party. Rather, we support the reforming of the River Severn Drought Management Group. We agreed in February 2013 with the EA and SSW that we would join this group when it reforms. We expect this to take place after the EA has concluded its River Severn Drought Order. This group should work to determine drought operating agreements with the Canal and River Trust (formerly British Waterways) which are also acceptable to Natural England, Natural Resources Wales/ Cyfoeth Naturiol Cymru and others with abstractions on the River Severn. This group will also aim to facilitate appropriate management of available water in the Severn catchment during drought conditions.

We are working collaboratively to best balance the demands of public water supply and those of the environment. Working together also reduces the chance that different parties will have potentially conflicting studies. An example of our collaborative work in relation to the Severn is that when we met the EA and SSW in February 2013 we agreed that the Severn drought permit/ order EAR should primarily focus on the individual impact of a Severn Trent Trimpley drought permit/ order. We completed this EAR scope in March 2013.

This River Severn EAR will also take account of the work SSW has done and the EA's Severn Drought Order assessment. However, in order to deliver overall efficiencies and avoid any potential duplication our EAR will assess neither:

- the 'in combination' impact (as the EA work is covering this)
- nor the impact of a SSW and STWL joint drought permit (as SSW has decided not to apply for a drought permit at Hampton Loade although it may apply for a drought order in the scenario that the EA has implemented its River Severn Drought Order)

We have started to update our understanding of the relationship between flows and ecology on the Severn by including a new section in the annual drought monitoring reports that we produce. The draft report: '*Drought Monitoring 2012: River Severn*', includes a section on WFD classification status which previous annual reports did not.

As described in section 3.4, we may need a drought order at Trimpley to alter the terms of the EA's Severn Drought Order. This means that we would need to demonstrate that there are imperative reasons of over-riding public interest (IROPI). In any event this would be an extremely unlikely scenario. However, when faced with these circumstances we will provide supporting evidence to demonstrate why we need the drought order to

continue to provide public water supply. This evidence will include an assessment of the likely environmental effects based on the data we have available at the time. We will ensure that we provide appropriate mitigation measures. Additionally we would provide the necessary compensatory measures as outlined below.

If we need to provide compensatory measures these will occur after the event has occurred. Compensatory measures are intended to offset the negative effects of a plan or project in order to maintain the overall ecological coherence of the Natura 2000 Network. Examples of compensatory measures include habitat creation or enhancement. If we need to introduce any mitigation or compensatory measure it will be to mitigate or offset the impacts of a drought permit or order and not to offset the impacts of the drought itself.

As we do not know in advance exactly how a future drought will manifest itself the detail of our supporting evidence will depend on the water resources available elsewhere in our grid. In particular, the resources situation in the Elan Valley reservoirs will be extremely important to our decision making as we operate our abstractions in the River Severn and River Wye catchments conjunctively.

Although we have not yet produced an EAR we did introduce a baseline monitoring programme in 2011 and have now completed two years work on the River Severn. We produced an environmental report in 2007 to support our 2010 drought plan. Although sections of this are now out of date it still contains some useful information that we can draw on. We provide further details on environmental data and monitoring in section 4.2.

In the extremely unlikely event that we need a drought order for Trimpley before we have completed the environmental assessment report we will only apply to Government after first consulting with key stakeholders such as Cyfoeth Naturiol Cymru/ Natural Resources Wales (NRW), Natural England and the EA. We recognise the severity of this measure and before applying for a drought permit/ order we will implement the 'Strategic Grid West' options shown in section 7.4 of this plan. In addition, as requested by the letter we received from Defra on 6 January 2014, we include a commitment that:

- If the Appropriate Assessment for the drought order at Trimpley concludes that there could be 'likely significant effects' on the Severn Estuary European site, we will set out the case for over-riding public interest. This includes the requirement to demonstrate that there are no feasible alternative solutions to rely on other than this drought order. We will review the feasibility of all alternative solutions

before we update this drought plan. As stated in the final sentence of section 4.1, we will update this plan after we have completed the Wyelands EAR.

We will not implement a drought order unless we have entered drought trigger zone F. If this were to occur it would be after we had introduced a temporary use ban (TUB) and after we had applied for any necessary drought permits. It is effectively a 'last resort' measure. Our modelling shows that the frequency of entering drought trigger zone F is approximately once in 100 years. As we take our environmental responsibilities very seriously we would only progress this measure as a last resort in extreme circumstances and we will introduce appropriate mitigation measures and compensatory measures accordingly. We describe our approach to mitigation in section 4.3.

River Wye at Wyelands

We have not yet updated our 2006 EAR to support this potential drought order. This is because we need to collect more baseline data and we need to fully understand the effect of our drought order 'in combination' with the actions of other abstractors. We have been working with the relevant stakeholders to define what further work is required. Key activities completed so far in 2013 include:

- We have reviewed the calibration of the Hysim and Aquator River Wye catchment flows that we use in our water resources modelling and we circulated the findings of this to the River Wye and Usk Abstraction Management Group (WUAMG) modelling group in July 2013
- The Midlands EA reviewed the high level strengths and weaknesses of our modelling approach as well as the approach that Natural Resources Wales/ Cyfoeth Naturiol Cymru used for its Review of Consents (RoC) work. We have shared information from our review to ensure that there is no duplication. The EA circulated the interim draft report in July 2013. We expect that this EA review will be complete in 2014
- We met DCWW in June and September 2013 to agree our approach to an 'in combination' EAR
- We met NRW, DCWW, EA and the WUF several times during 2013 at the River Wye and Usk Abstraction Management Group (WUAMG) modelling group to discuss the approaches to hydrological and deployable output modelling. The most recent one of these meetings was in December 2013.

The remaining key milestones for the agreed work plan to finalise the EAR are:

- The River Wye and Usk Abstraction Management Group reports its findings in 2014
- We produce a 2013 drought monitoring report early in 2014
- We will agree the EAR scope in early 2014 and we will ensure that this EAR and any subsequent assessments address the Habitats Directive issues raised in connection with the HRA that accompanied this drought plan
- We produce an updated Wyelands EAR by autumn 2014
- Once we have finalised this EAR we will use the information it contains to produce a document to inform an 'Appropriate Assessment' on the effect of our drought order.

We introduced a baseline monitoring programme in 2011 and have now completed two years work on the River Wye. Further details are in section 4.2. When we published our draft drought plan for consultation we expected to complete the Wye 'in combination' EAR by December 2014 but we now think we can bring this forward to autumn 2014. There are several reasons why we can not produce a robust EAR before then, including:

- We will have completed one more year of our annual monitoring on the Wye (these sites are shown in section 7.4). This extra monitoring will provide us with better baseline ecological and hydrological information. We need at least three years of this baseline data so that we can reliably assess the impact of any future changes
- There are a large number of important stakeholders whose actions affect the environmental status of the River Wye and any robust environmental assessment needs to account for 'in combination' as well as individual impacts. Key stakeholders are represented on the WUAMG. This group will report on its findings in 2014. We elaborate on the importance of collaborative work like this below
- Producing robust and signed off EARs is an iterative process and we need realistic deadlines to produce a high quality assessment. The deadline we have proposed will give regulators time to provide comments and give us time to incorporate this feedback.

We are working closely with DCWW on the environmental monitoring, reporting and mitigation associated with any potential River Wye drought orders. This is an essential step in order to properly consider the 'in combination' effects of both companies applying for a drought order. We intend to show consistency as far as possible between both

organisations in terms of water resources planning and environmental reporting. We are approaching this in a similar way to the River Severn environmental work as we want to produce a joint environmental assessment that avoids conflicting information, duplication and makes the most efficient use of customers' money.

To achieve this we have regular meetings with DCWW and other relevant stakeholders to discuss water management issues, current and future environmental work, modelling assumptions and agreed timescales. We actively contribute to the Rivers Wye and Usk Abstraction Management Group and will continue to do this. This collaborative stakeholder group has representatives from DCWW, the Canal and River Trust, the Environment Agency, Natural Resources Wales/ Cyfoeth Naturiol Cymru, the Wye and Usk Foundation and Natural England. The primary aim of the Group is to undertake ecological monitoring of both rivers, to better understand the interaction of river flow, ecology and habitat. This will provide a scientific evidence base to improve knowledge of the impact of abstractions on the riverine SAC features. The Group will be working together to review potential future management regimes for the rivers and will report its findings in 2014. We intend to incorporate these findings into an EAR which we will complete in 2014.

In the shorter term, we have already prepared an annual environmental monitoring report for the calendar year 2012. This report contains a section that we had not included in previous annual reports. This extra section describes Water Framework Directive (WFD) classification status for this section of the River Wye. The main focus of this report is to describe the annual monitoring that we will carry out at the locations already agreed with the EA and as shown in section 7.4 of this plan.

We communicate regularly and share information about the River Wye with DCWW. For example, we are currently looking to digitise some of the historical records held at Elan Valley to provide more robust data for modelling. Although we do not yet have an updated EAR to support a potential drought order application we can still make conclusions from the evidence that is available and by drawing on expert judgement.

On this basis we think it is unlikely that any future EAR will be able to conclude definitively that our continued abstraction does not have an impact. The onus is on us as a company to prove that our abstraction does not cause harm, rather than it being for others to demonstrate that there is an effect. The reason for this precautionary approach is that the River Wye is a Habitats Directive (HD) protected site.

In a severe drought, if we had exhausted all alternative solutions, we may have to apply for a drought order. If we did apply it would be on the grounds of imperative reasons of over-riding public interest (IROPI). In any event, this would be an extremely unlikely scenario. However, when faced with these circumstances, we will provide substantial evidence to demonstrate IROPI to Government. This evidence will include an assessment of the likely environmental effects based on the data we have available at the time. We will ensure that we provide appropriate mitigation measures. Additionally we would provide the necessary compensatory measures as outlined below.

If we need to provide compensatory measures these will occur after the event has occurred. Compensatory measures are intended to offset the negative effects of a plan or project in order to maintain the overall ecological coherence of the Natura 2000 Network. Examples of compensatory measures include habitat creation or enhancement. If we need to introduce any mitigation or compensatory measure it will be to mitigate or offset the impacts of a drought permit or order and not to offset the impacts of the drought itself.

As we do not know in advance exactly how any future drought will manifest itself, the detail of our supporting evidence will vary depending on demands and operational factors such as the availability of water resources elsewhere in our region. In particular, flows in the Wye, the resources situation in the Elan Valley reservoirs and flows on the River Severn will be extremely important to our decision making as we operate our abstractions in the River Severn and River Wye catchments conjunctively.

Although we have not produced an EAR for the Wye at Wyelands we have introduced baseline monitoring and have presented our agreed monitoring programme in section 7.4 of this plan. We produced an environmental report in 2007 to support our 2010 drought plan. Although sections of this are now out of date it still contains some useful information that we can draw on.

In the unlikely event that we need a drought order for Wyelands before we have completed the environmental assessment report we will only apply to Government after first consulting with key stakeholders such as Cyfoeth Naturiol Cymru/ Natural Resources Wales (NRW), Natural England and the EA. We recognise the severity of this measure and before applying for a drought permit/ order we will implement the options shown in figure 6 of this plan. In addition, as requested by the letter we received from Defra on 6 January 2014, we include a commitment that:

- If the Appropriate Assessment for the drought order at Wyelands concludes that there could be 'likely significant effects' on the Severn Estuary European site, we will set out the case for over-riding public interest. This includes the requirement to demonstrate that there are no feasible alternative solutions to rely on other than this drought order. We will review the feasibility of all alternative solutions before we update this drought plan.

We will not implement a drought order unless we have entered drought trigger zone F. If this were to occur it would be after we had introduced a temporary use ban (TUB) and after we had applied for any necessary drought permits. It is effectively a 'last resort' measure. Our modelling shows that the frequency of entering drought trigger zone F is approximately once in 100 years. As we take our environmental responsibilities very seriously we would only progress this measure in extreme circumstances and we will introduce appropriate mitigation measures and compensatory measures accordingly. We describe our approach to mitigation in section 4.3.

As we realise the importance of both the Severn estuary and the River Wye we commit to updating our drought plan once we have finalised the Wyelands EAR.

4.1.1 Strategic Environmental Assessment (SEA) and Habitat Regulations Assessment (HRA)

The Strategic Environmental Assessment Directive (2001/42/EC) requires a formal environmental assessment of certain categories of plans and programmes which are likely to have significant effects on the environment. Government has transposed the Directive into appropriate Regulations to apply to England and Wales. We are the responsible authority and have to judge whether our drought plans fall within the scope of the SEA Directive. Although we did not carry out an SEA for our 2010 Drought Plan we have taken a different approach to this plan and will produce an SEA. This SEA will report on the likely significant environmental effects of implementing the plan.

We issued a SEA scoping report to the EA, Natural England (NE) and EA Wales (now Natural Resources Wales/ Cyfoeth Naturiol Cymru) in November 2012. This provided these consultees an opportunity to comment on the proposed scope and level of detail in our SEA Environmental Report. We have now finalised this SEA and we published it alongside our draft drought plan. We are publishing a SEA post adoption statement alongside this final plan.

We have also undertaken a Habitat Regulations Assessment (HRA) for this draft drought plan. This assesses the likely effects of the drought plan on European sites, alone or in combination with other plans. This HRA considers whether actions in a drought plan would adversely affect the integrity of any European sites. There are significant similarities between the HRA produced for the periodic review in 2009 (PR09) and this HRA as they both assess the same sites (the Humber and the Severn estuaries).

We shared a draft version of this HRA with the EA, Natural England (NE) and EA Wales (now Natural Resources Wales/ Cyfoeth Naturiol Cymru) in March 2013. We have shared the finalised HRA assessment with these organisations and we have said on our website that it is available on request. As described in section 4.1, we will ensure that the Severn and Wye EARs address the Habitats Directive issues raised in this HRA.

The consultation on the SEA and HRA is separate to the draft drought plan consultation although there is some cross over, for example, in terms of the sites affected.

4.2 Environmental data provision and monitoring plan

As part of our drought management work we have collected, and continue to collect, environmental data at all of our potential DP/DO sites

For each site there is a Site Investigation Plan (SIP) which is agreed with the EA each year. This is to ensure we do not duplicate work between us. For example, the EA agreed the Avon/ Leam monitoring at a meeting on 5 May 2011. These agreed monitoring plans will allow us to assess the environmental impact of any changes to our normal operations that we make as a result of the drought. This phase of monitoring is often referred to as ‘baseline’ monitoring to distinguish it from ‘in-drought’ or ‘post-drought’ monitoring (which we mention in section 4.3).

Our environmental monitoring records:

- The feature(s) we monitor
- The location of survey sites
- The timing and frequency of monitoring
- Who undertakes the monitoring.

The SIP details sites to monitor for:

- Spot flow
- Permanent flow
- Macro invertebrates
- Fish
- The river habitat as part of a RHS (river habitats survey)
- The habitat during habitat walkovers and
- White clawed crayfish.

We have provided summaries of the annual monitoring plans that we have agreed with the EA in section 7.4. For each year monitored we have produced a stand alone monitoring report, which will be included within the EAR as an appendix. When we update the EAR we will incorporate the new data from these into the assessment.

We will also seek comments on our environmental monitoring from Natural England and Natural Resources Wales/ Cyfoeth Naturiol Cymru.

4.3 Mitigation measures

As we described in section 3.1 we are investing significant resources every year to manage customer demands, promote water efficiency and reduce leakage. In section 5 we have committed to devote even more resources to demand management during a drought. This work reduces the likelihood of needing drought permits or drought orders. However, when we have exhausted all of the demand management options available we will have to use supply side measures like drought permits.

When we implement any drought management action we seek to avoid any adverse environmental damage. In addition to trying to prevent any environmental harm from occurring we have also considered numerous environmental mitigation measures. Some of these mitigation measures are generic and can apply to any location where we may apply for a drought permit/ order.

The following list shows generic mitigation measures that we will consider if we have to implement a drought permit or drought order:

- Fish rescue

- Aeration (for example, of discharges)
- Reduction of other abstractions, if possible
- Freshet releases
- Other forms of flow augmentation (potentially from rarely used/ emergency/ resilience sources)
- Increase the frequency/ coverage of monitoring – this constitutes 'in- drought' monitoring
- Ensure there is adequate 'post-drought monitoring'
- Habitat restoration.

The list above is neither exhaustive nor prescriptive. This means that we may not necessarily need all of these measures in every drought. It also means that if there are measures not listed here that will provide an environmental benefit then we may still implement them. We will decide on the precise combination of measures that is most appropriate to the circumstances of any given drought. We will discuss any necessary mitigation measures with the EA during the drought permit application process to determine the most appropriate monitoring and mitigation regime.

We have not included compensation in the generic list of mitigation measures above as we do not think that any of our drought management actions will cause losses to third parties. The mitigation measures that we propose using are appropriate for the level of impact predicted and the importance of the receptor. We design our measures to minimise the impacts occurring as a result of maintained, or increased, abstraction during a drought. As a result we would expect the majority of them only to be in place for the duration of the drought permit/ order.

The mitigation measures we implement will mitigate the impacts of the drought permit and not the impacts of the drought itself.

We have also carried out more detailed site specific assessments of mitigation measures in each of the environmental assessment reports we described in section 4.1.

For example, section 5 of the environmental report for the Derwent describes mitigation. In section 7.4 we have reproduced pages 7 and 8 of the Derwent Drought Permit Technical summary. This illustrates how we plan to:

- Understand the baseline condition of the hydrology and ecology at the location
- Set appropriate monitoring and
- Mitigate against any adverse impacts if they occur.

In the draft Avon and Leam EAR we propose additional monitoring and mitigation measures to reduce all potential impacts to a minor negative level of significance, where possible. This EAR describes measures which "*include:*

- *A repeat habitat walkover survey and spot gauging will facilitate the identification of temporal minimum flow requirement thresholds for all species and life stages. This will facilitate assessment of the minimum flow required to protect fish populations during key periods of sensitivity, whilst still optimising the supply resource;*
- *Temporary return to normal abstraction rates in the event of a pollution incident, evidence of ecological distress, or evidence of serious detrimental environmental consequences on downstream watercourses;*
- *Funding of appropriate reasonable measures (e.g. habitat restoration) in the event of ecological damage occurring on watercourses affected by increased abstraction; and*
- *Provision of appropriate assistance and / or funding of reasonable additional measures to protect habitats and sites or species of special ecological interest affected by the DP*."

We provide the detail of our mitigation measures in the completed environmental assessment reports and will do likewise for those two that are not yet complete. The environmental assessment reports for the River Severn and River Wye are not complete so we have reproduced the likely mitigation measures for these sites here:

River Severn at Trimpley mitigation measures

In addition to the generic mitigation measures, options specific to the Severn include:

- varying our pattern of abstraction from our major sources along the River Severn to minimise the threat of reductions in dissolved oxygen to the Upper Estuary during critical combinations of low flow and Spring tide
- Variations to releases from Lake Clywedog and/ or Lake Vyrnwy
- Use of the Lake Vyrnwy 'bank'
- Working with the Canal and Rivers Trust to see if they can vary their abstraction from the River Severn to the Gloucester and Sharpness Canal.

We will consult United Utilities before we make any change in the operation of Vyrnwy as this source supplies their customers. We may work with the Canal and Rivers Trust independently but it is more likely to be as part of a collaborative group. We plan to discuss the triggers for implementation of mitigation measures and details of the drought and post-drought monitoring with the EA during the drought permit application process.

In addition to these environmental mitigation measures, we will also consider:

- Measures to mitigate 'in combination' impacts on the Severn Estuary

We think that these measures should be agreed with the 'River Severn Drought Management Group' mentioned in section 4.1.

River Wye at Wyelands mitigation measures

The generic mitigation measures shown above cover the likely environmental mitigation measures that we will consider. We plan to discuss the triggers for implementation of mitigation measures and details of the drought and post-drought monitoring with the EA/ Defra during the drought order application process. In addition to these, on the Wye specifically we will also consider:

- Changes to how we operate the Elan Valley reservoirs, aqueduct and the rest of our strategic grid WRZ
- Working collaboratively with other abstractors on the 'River Wye and Usk Abstraction Management Group'
- Measures to mitigate 'in combination' impacts on the Wye and the adjacent Usk catchment

We think that these measures will be most effective if we can agree them with the 'Rivers Wye and Usk Abstraction Management Group' mentioned in section 4.1

5. Management and communications strategy

5.1 Management structure/ roles and responsibilities

As a drought develops, it is essential that we have a clear management chain and line of communication. This is necessary so we can make informed decisions quickly and effectively, and can agree and implement these actions. Overall control of our response to a drought is managed by our Drought Action Team (DAT). This is a pre defined inter-

departmental team that we convene when we have entered a drought or consider that we are about to enter one. We will judge whether we need to convene the DAT by monitoring if storage in any of our raw water strategic reservoirs or other triggers are approaching drought trigger zone C.

The DAT is chaired by the Water Service Director or an appropriate deputy. The DAT includes senior managers who have expertise in water resources, water treatment, water quality and communications. These managers are supported by extensive technical expertise from within their departments. The DAT circulation list is shown below:

Table 19 - Drought Action Team (DAT) circulation list

DAT Member	Role
Chairman – Director of Water Services	Overall responsibility for managing the response to a drought
General Manager - Water Strategy	Responsible for monitoring development of drought
General Manager - Service Delivery - Water Production	Responsible for operating water resources supply and treatment
General Manager - Service distribution	Responsible for network management
General Manager - Asset Delivery	Responsible for the development and management of the water services asset base
General Manager - Asset Delivery – water distribution	Responsible for water distribution asset base
General manager - planning	Responsible for planning
Performance and regulatory reporting manager	Responsible for performance and regulatory reporting
Water resources planning manager	Responsible for preparation and presentation of DAT information and accounting for environmental considerations
Principal hydrologist	Support water resources planning manager
Water resources modellers	Support water resources planning manager
Water resources manager	Responsible for managing water resources operations
Maintenance manager - South	Responsible for regional maintenance management
Water quality performance manager	Responsible for quality issues
Communications Executive	Responsible for managing external communications with the media and customers
Head of Communications	Responsible for managing external communications with the media and customers
Regional Production Manager - West	Responsible for regional water production
Regional Production Manager - South	Responsible for regional water production
Regional Production Manager - East	Responsible for regional water production
Water Quality Compliance Manager	Responsible for quality and compliance
Asset Manager - Distribution	Responsible for management of distribution assets
Customer Operations Service Centre Manager	Responsible for all external customer communications
Business change manager	Responsible for business change
Director of STS	Responsible for Severn Trent Services
Senior commercial lawyer	Responsible for commercial law
Commercial lawyer	Responsible for commercial law
Senior administrator	Responsible for administration

Our DAT allows us to monitor and evaluate the effectiveness of our drought management actions. It also provides the benefit that it is a forum for technical discussions as well as for understanding the implications to our communication activities. By ensuring consistent internal drought messages we are in a stronger position to join-up our communications with those of our relevant stakeholders.

Annual Review

This drought plan and the DAT do not only apply during drought years. For example, we have a company policy that the DAT meets at least once a year, regardless of the water resource position. This helps to remind staff of the processes described in this plan, to assess the need for further meetings and to ensure that our drought plan remains both current and achievable.

5.2 Communications plan

It is vital that we have a clear communications route to our customers and other stakeholders so that we communicate the correct messages at the correct time. This section of our plan sets out the communications plan that we will follow at different stages before, during and after a drought.

Effective communications can help to reduce demand in a drought, for example, by raising customer awareness of the limited availability of water resources. Conversely, poorly prepared messages can have a detrimental effect on the public response to appeals for restraint.

We use the DAT to prevent this from happening. For instance, the communications team attend DAT meetings and work with the DAT to provide clear briefings for internal communication, ensuring our employees communicate appropriate messages and advice to customers. External methods of communication available to us include leafleting, mailed letters, radio and/or television, local and national press, social media and by updating our website.

Stakeholders

The following table provides a list of stakeholders that we expect to communicate with during a drought. In this list, we have included all of the groups mentioned in appendix I of the EA guidelines regardless of whether these are statutory or non-statutory consultees. Although we expect to contact most of the non-statutory groups in a drought there may be circumstances when we do not need to specifically contact every one of

these groups. This list is not exhaustive and we may contact other bodies not included in this table:

Table 20 - Stakeholders that we expect to contact in a drought

Group	Stakeholder	Comments
Domestic and commercial customers	Private customers	In our region
	Consumer Council for Water	
	Citizens Advice Bureau	
Regulators	Drinking Water Inspectorate (DWI)	Only if water quality may be affected
	Welsh Government	
	Ofwat	
	Defra	
	Environment Agency	
	Natural Resources Wales/ Cyfoeth Naturiol Cymru	
	Natural England	
Environmental and other relevant interest organisations and groups	Local wildlife groups and campaign groups	
	Waterwise	
	Local fisheries bodies and groups	
	Angling Trust	
	Campaign to Protect Rural England	
	RSPB	
	WWF	
	Friends of the Earth	

Local authorities and political representatives	Councils	In our region
	MPs	In our region
	MEPs	In our region
Representative bodies	e.g. Confederation of British Industry, NFU, Chambers of Trade and Commerce, Countryside Landowners and Business Association, Horticultural Trade Association	
Community based institutions and organisations	Parish Councils	In our region
	Town Councils	In our region
Water companies		
Water UK		
Public services	Fire Service	
	Health Authorities	
	Police services	
Press and media	Newspapers	
	TV	
	Radio	
Sports and interest groups	Angling clubs	In our region
	Canoe/ boating clubs	In our region
Waterways and navigation	Canal and Rivers Trust	
	Canal authorities	In our region
Other relevant water undertakers		In our region

In addition to the public consultation, we invited the following statutory stakeholders to comment on this draft drought plan:

- Environment Agency
- Natural Resources Wales/ Cyfoeth Naturiol Cymru
- Ofwat
- Secretary of State/Welsh Ministers
- Any licensed or appointed water supplier which supplies water in the Severn Trent region via our supply system.

Once DAT has recommended that we impose restrictions on our customers' water use we will send regular briefing statements to Defra, CCWater and Ofwat. If drinking water standards are likely to be compromised, we will contact the DWI. All such communications will be approved by DAT.

We will report on the situation regularly to Water UK particularly if other UK water utilities are suffering similar drought problems. It is important that Water UK co ordinate any reporting of the national situation and present it in a consistent manner in the national news media. Regular conference calls will ensure this is handled consistently.

Similarly, we will involve other external bodies if supplies are under extreme risk. For example, if tankering to outlying areas becomes necessary, we may ask the police and county highways departments for advice. We will make contact with the regional civil contingency groups to ensure full public awareness of the situation.

Escalation of messages

Communications will

- Convince consumers that their contribution to water efficiency is worthwhile
- Explain to customers in simple terms how they can save water
- Convince customers that we are doing our bit to manage water resources wisely

Table 21- Escalation of messages

Level of communication	Trigger
Level 1 – first fall in resources	Reservoir storage/ other indicators

• Ongoing water efficiency communications continue as per normal water efficiency campaign plan Includes standard marketing of • Save-a-flushes • Water butts and other products (e.g. shower heads, timers) • Guide to saving water (print and web) • Education activity • Opportunistic media and PR	moving towards zone C
Level 2 – projections show likelihood of continued fall in resources • Specific and targeted focus on promoting water efficiency through regional media, exploiting existing relationships • Social media campaigns, e.g. ask customers for their best water saving tips • Extra emphasis on leakage. We provided some illustrative information on the quantities of leakage reduction we could achieve in section 3.1. We will start this extra emphasis on leakage in level 2 but will continue with this work in levels 3 and 4. • We will showcase our work in finding and fixing leaks, promotion of leakline, reporting leaks online and report a leak app. • Show good examples of our customers taking action to reduce consumption • Working with the gardening industry to promote saving water in the garden • Frost awareness PR • Work with WaterWise, Water UK and other water companies to ensure joined up and consistent messaging • Working with large commercial customers to understand their predicted water use profiles over the coming weeks	DAT convened/ indicators in zone C
Level 3 – one to two weeks leading to proposed restrictions on use • Specific focus in the regional media on water usage and efficiency	DAT decision/ indicators in zone D or E

• Radio campaign showing what we do and what customers can do • This would include paid for elements of advertising, including features and promotions • Increased activities such as water efficiency product giveaways via radio and TV • Higher profile of water saving on the website, including front page banner • Increased use of social media including twitter campaign • Press features on water resources activity, summarising how we plan for dry spells and how customers can help • Water efficiency adverts in newspapers • Formal media appeals to conserve water • Possible sponsorship of weather section in print media • Participate in any joint national media campaigns on water efficiency • One to one media briefings • Setting out what actions are likely to happen over the coming days/weeks so that nothing comes as a surprise to people • Close liaison with stakeholders and regulators to maintain “no surprises” • Close working with other water companies – consider joint statements and adverts • Asking large commercial customers if there is scope for them to reduce demand	
Level 4 – restrictions imminent or in place • We plan to give a notice period (14 days) to customers before we put any restrictions in place • We will use at least two local newspapers as well as our website to advertise restrictions. • We will give details of how customers can make representations • Daily updates on water resources levels to manage high volumes of reactive interest • Intense local broadcast activity – all media. This activity will reach far more people than those who see the adverts in the local newspapers and on our website • Advertising in the media in areas where there is a known supply/demand imbalance • Close contact with stakeholders on a regular basis • Withdrawal of softer messaging to avoid any confusion as hard messaging introduced.	DAT decision/ indicators in zone E or zone F

Level 5 – removal of restrictions • Strong message in the media - thank you to our customers for their help at this time • Close liaison with stakeholders to ensure messaging is consistent	DAT decision/ indicators in zone A

When we communicate with customers during a drought or a period of extremely hot weather we are able to measure the number of people accessing information on our website, the number of tweets that people click to request further information and the number of water efficiency packs that we distribute. We also know how many people different newspapers or radio programmes reach and we record what communications activities we do and when. In addition to this we measure how demand changes across the company and over time.

However, there is not always an obvious correlation between the extent and type of communications work and the demand for water. This makes monitoring the effectiveness of our communications a challenging exercise. For example, in response to the hot weather in July 2013 we increased the amount of proactive media work that we did. We did this after a weekend increase of approximately 300 Ml/d above 'normal' demand. The following weekend was even hotter and demand increased by around 350 Ml/d. This does not show that our communications work was not effective. What it demonstrates is that the weather and factors like school holidays affect demand to an even greater degree than our communications work. In fact, without the work we did the demand would have probably increased by more than 350 Ml/d.

We describe the extra leakage work that we will do in a drought in section 3.1. During the hot weather of July 2013 our communications team encouraged customers to report leaks online as our call centres were very busy. We observed a very significant increase in this online leak reporting after this media campaign. We expect that this would also happen in a drought.

Waterwise published a report in July 2013 on the recent drought (see section 7.6 for full reference) and one conclusion of this was that “The impacts on the public of communications and promotion are difficult to measure but by most measures, there seems to have been a positive reaction both in terms of action and understanding”. This supports our point that it is not easy to measure the effectiveness of this type of communications.

5.2.1 Private supplies

We have prepared this drought plan to show how we intend to provide our customers with water during drought. However, we are aware that some people in our region depend on ‘private supplies’. For example, householders or businesses may have their own borehole. If a drought adversely affects these people then we encourage them to contact us. If this scenario arises we will consider how we can help without putting our own customers’ supplies at risk.

5.3 Lessons learned from previous droughts

We have not had to restrict our customers’ use of water since the 1995-96 drought. Therefore when we look to learn from our experiences of previous droughts, this is the drought we often refer back to. For example, when we analyse reservoir storage information we frequently show the actual drawdown records from 1995 and 1996 as these are useful comparators. As a result of this two year drought we restricted the use of all of our customers in 1995 and the use of approximately half of them in 1996.

As well as implementing this form of demand management we also sought to increase the supplies available to us. Although there have been several changes since 1996, for example legislation has changed, we think that we can still learn lessons from this unusually dry period. In the 1995-96 drought we applied for a Drought Order relating to the refill of the Derwent Valley and Carsington reservoirs. In 1996 we applied for a drought permit for the Derwent catchment but we withdrew our application due to changed weather conditions. In the Churnet Valley we were granted a drought order from December 1995 to June 1996 to aid the winter refill of Tittesworth reservoir. We used Abbey Green borehole to compensate the River Churnet in a way similar to how we may do so if we needed a drought permit here in the future. However, we are aware that different legal and regulatory requirements exist now and we address these in the Churnet environmental report.

Since the 1995-96 drought we undertook a comprehensive review of the areas where providing a reliable supply was most difficult. Since then we have invested significantly to improve our infrastructure. As described in section 3.1 our investment and the commitment of our staff have reduced leakage to its lowest ever. Other examples of where we have invested in our network since 1996 include enhancements to the network by duplication or upsizing of mains and provision of new local booster pumps. We assigned the investment to where it would have the most impact in making our sources more robust in terms of treatment and deployability.

We continue to invest in the construction of permanent infrastructure. We target this investment in proportion to the risk of loss of supply during extreme events such as droughts. As we prepare our PR14 submission we assess what we need to invest to provide the optimal level of resilience for our customers. When we talk about resilience in this context we mean making our network better able to cope with the challenges posed by extreme events that are beyond the control of Severn Trent. These extreme events can include droughts, flooding and even acts of malicious threats/attacks.

To help us manage our drought communications in the most effective way we collected local demand data at sub-daily time intervals during previous drought years. We have collected valuable information, some examples of which are shown below:

- In summer 1995, peak demands in local networks tended to occur at 9 o'clock in the evening, which we assume was associated with use of sprinklers and hose pipes for garden watering
- For small areas of mainly detached houses the ratio of peak flow to mean daily flow was over 7 to 1
- For small areas of terraced and semi-detached properties the ratio was 3.6 to 1
- For a mixed suburban area of properties, the ratio was 2.6 to 1
- Nationally, customer awareness campaigns during 2006 demonstrated the benefits of media awareness campaigns in reducing total demand, despite no restrictions on use in our region. One of the most effective ways of reducing peak demands is to reduce dependence upon the public water supply by gardeners. This can be achieved through encouraging alternative practices.

As described above we have learned lessons from managing previous droughts and used this knowledge to prepare this plan. Most recently, we have learned some specific and some general lessons from implementing various drought management actions

between 2010 and 2012. The following table summarises these lessons and provides references to the relevant part of this drought plan:

Table 22- Lessons learned since previous drought plan

Lessons learned since publication of our 2010 drought plan	Section of drought plan
We need updated environmental reports to accompany any drought permit/ order application	4
We have far fewer 'drought sources' available than we previously thought	3.3.7
We are able to implement new drought management actions to reduce the demand on Draycote reservoir. These include the Willes Meadow to Draycote transfer and the Siskin Drive de-chlorinated water option.	Reflected in flow charts and tables (section 2.1 and 7.4)
We have a greater knowledge of which internal transfers we can use and what issues are likely to arise when we do this. For example we undertook trials to reverse the flow in the Highters Heath to Meriden main	3.3
We have improved knowledge of which water treatment works (WTW) can be turned, how far output can be reduced to and how quickly they can be put back into supply at full capacity. For example, we know we can put Draycote WTW into 'hot standby'[4] mode as we did this for 17 days in January 2012.	Reflected in flow charts (section 2.1 and 7.4)
We have an improved understanding of the EA's requirements for drought permit/ order applications especially in relation to the associated environmental reports/ monitoring requirements. We have learned from the experience of companies that successfully secured drought permits/ orders in 2011 and 2012	3.4 and 4.1
We know more about the water quality issues and what needs to be in place before we can use Abbey Green borehole to support flow in the River Churnet	Linked to lesson above

[4] by 'hot standby mode' we mean that the water treatment works stopped supplying water to our grid but we were capable of putting the works back into supply at short notice if demand increased

We learned more about what re-zoning we can achieve and the operational issues that arise. For example, we have improved knowledge of our groundwater sources in the Hanchurch/ Meir group and what would need to be in place for us to re distribute this water towards the Ladderedge system.	3.3
We learned more about effectively communicating water efficiency messages. We have drawn on the data collected by the companies that implemented TUBs in 2012	3.1, 3.2 and 5.2
We assessed the staged pressure management option but found that pressures were already optimal	3.1

We remain committed to learn, review and improve our processes and will do so when we experience droughts in the future.

6. Post-drought actions

We define the end of a drought as when our water resources availability has returned to 'normal'. Indicators of the end of a drought are that:

- There have been several months of average or above average rainfall (winter rainfall usually provides greater recharge)
- Reservoir storage has recovered, for example, storage in the majority of reservoirs is above the appropriate trigger curves (these curves are shown in sections 2.1 and 7.1)
- River flows have returned to normal
- Groundwater levels have returned to the normal range

We will analyse these and other relevant indicators (such as those described in section two) before we conclude that conditions have returned to 'normal'. Due to the long term impacts that droughts can have, for example on our groundwater sources, there may be a significant delay before we can say definitively that a drought is over. We will liaise with the EA, NRW and Water UK/other companies before we formally declare a return to 'normal' conditions. We will consult with other stakeholders if necessary before declaring a drought is over. This is part of the message consistency that our communications plan discussed.

Once normal conditions have been resumed and all restrictions lifted, our DAT will undertake a review of our drought management processes against those as outlined in

this drought plan. There will be a post-drought review to learn lessons, review the effectiveness of our drought planning, communications, drought and environmental management. If we have used customer restrictions, drought permits or drought orders we will review these in detail. Should there be any information relevant to our WRMP work or to other areas of the company then we will pass this directly to those teams.

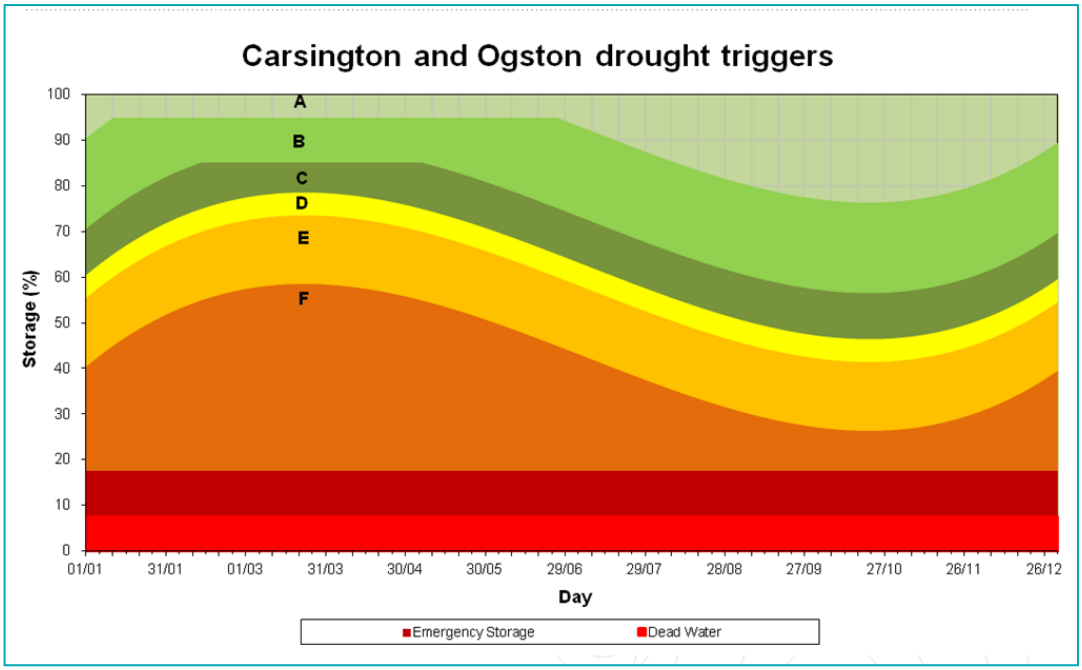
Following the drought that ended in 2012 we have engaged with other companies and stakeholders. For example, we contributed to a Water UK drought resilience workshop on 23 July 2012 as well as the joint Water UK and EA work shop 'Drought resilience – Securing the future' on 16 August 2012. We are aware that the EA is working to set up a 'national water resources stakeholder group'. The 'Demand Management Bulletin' circulated by the EA in January 2013 mentioned this group. We will engage with any relevant group as appropriate and act on anything that will help us to improve our drought management processes.

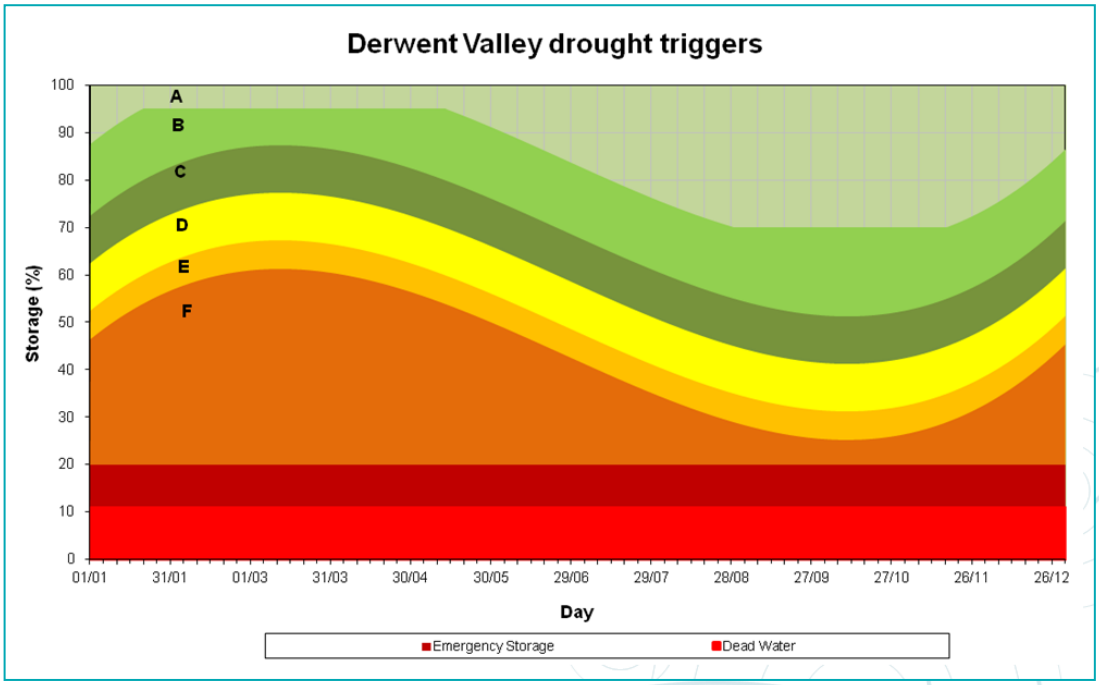
7. Appendices

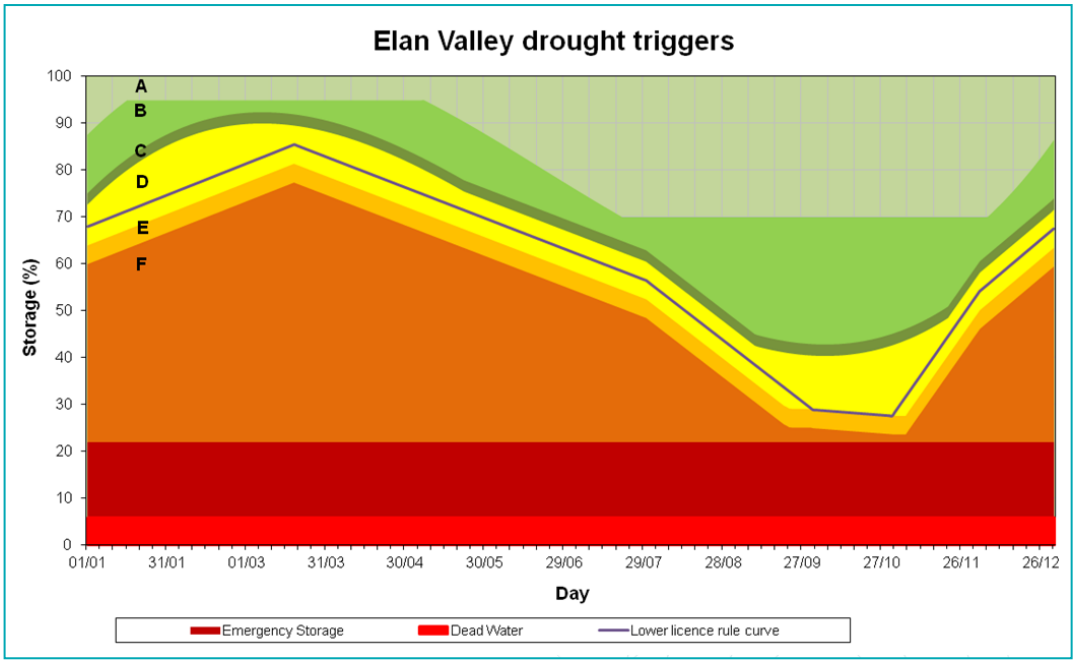
7.1 Drought trigger zones

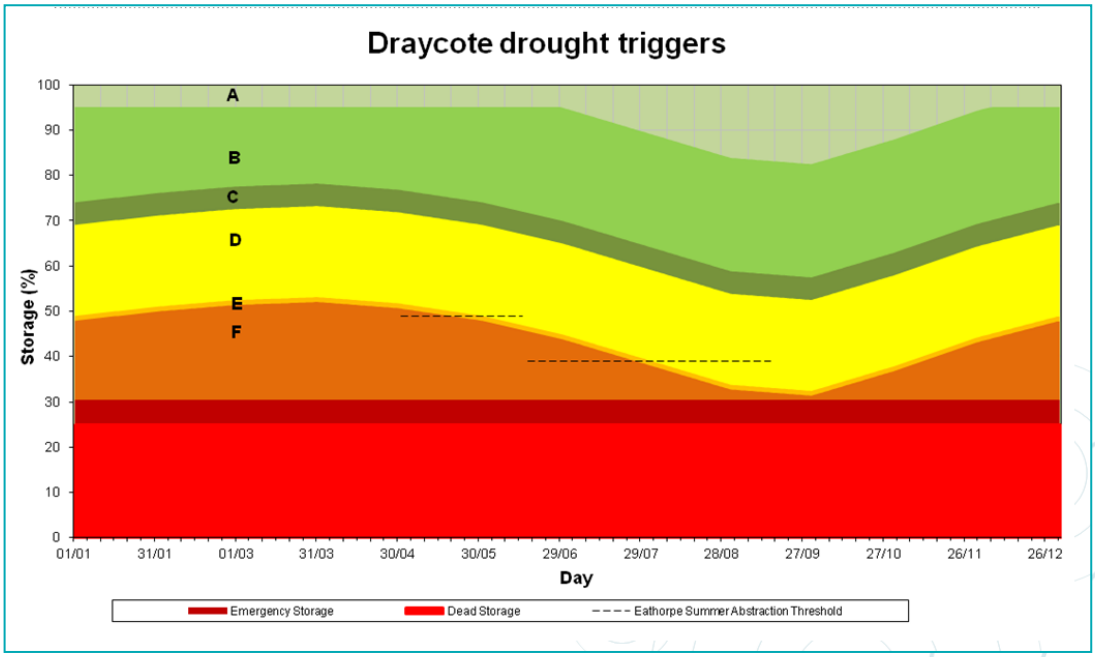
We included the drought trigger zones for Tittesworth in section 2.1

The other drought triggers for the strategic grid and Nottinghamshire WRZs are shown below:


Carsington and Ogston drought triggers
Storage (%)
100
90
80
70
60
50
40
30
20
10
0
A
B
C
D
E
F
01/01
31/01
01/03
31/03
30/04
30/05
29/06
29/07
28/08
27/09
27/10
26/11
26/12
Day
Emergency Storage
Dead Water

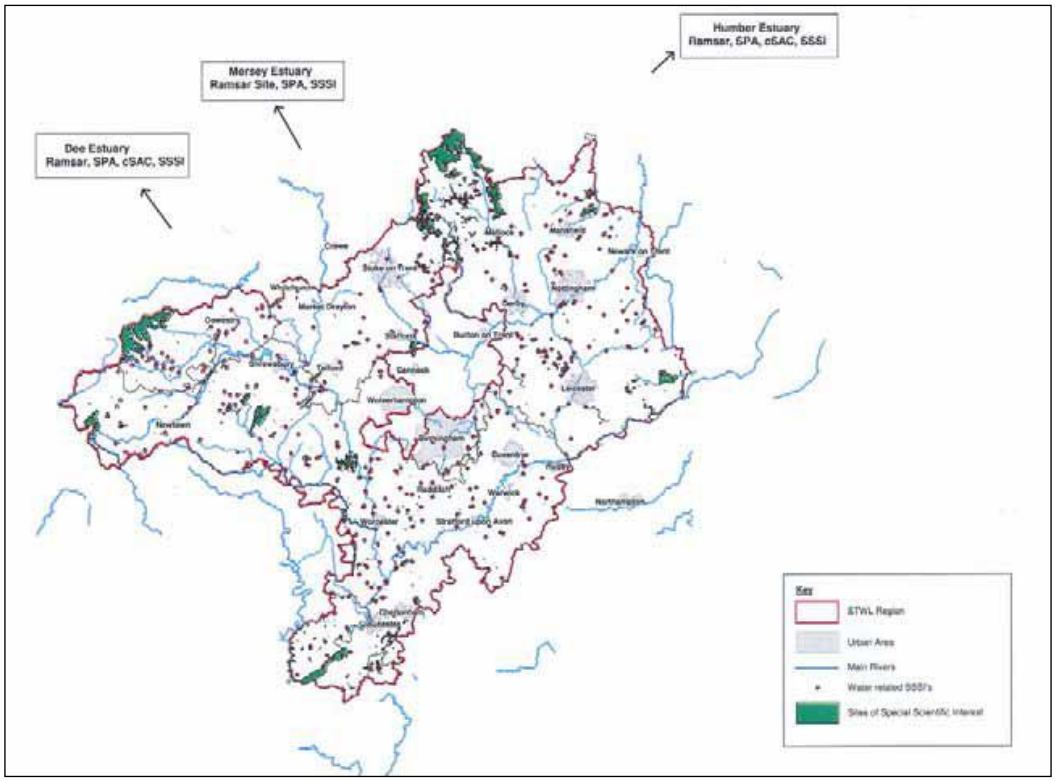

Derwent Valley drought triggers
Storage (%)
100
90
80
70
60
50
40
30
20
10
0
A
B
C
D
E
F
01/01
31/01
01/03
31/03
30/04
30/05
29/06
29/07
28/08
27/09
27/10
26/11
26/12
Day
Emergency Storage
Dead Water

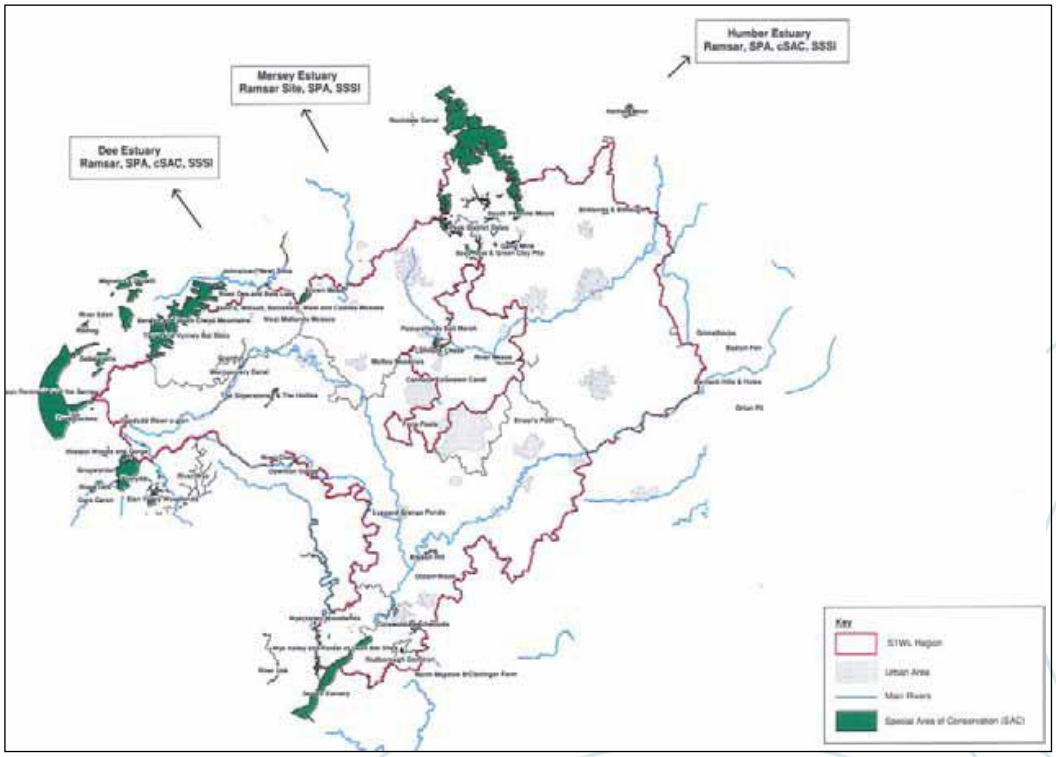




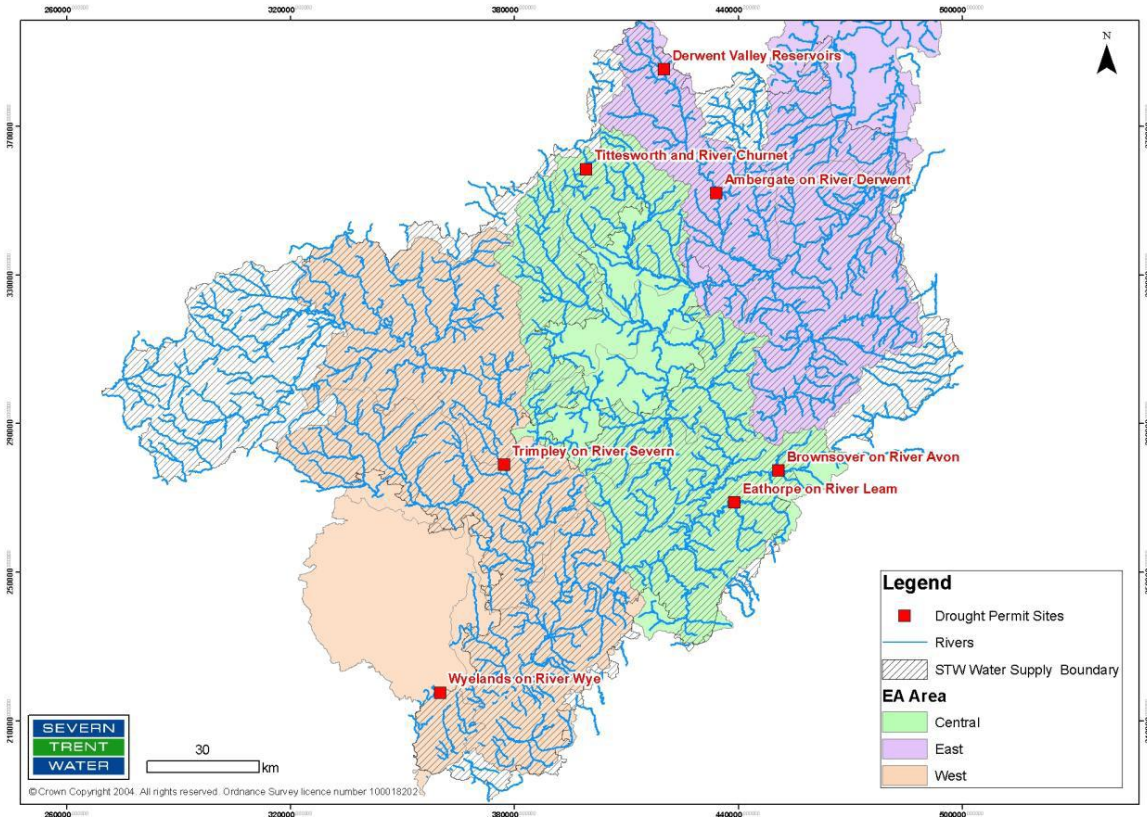
7.2 Maps

The maps below show the location of SSSIs and SACs in our operating region





The map below shows the location of potential drought permit/ drought order sites (although the key says drought permit sites, the Trimpley and Wyelands sites may be subject to a drought order (as discussed in section 3.4).



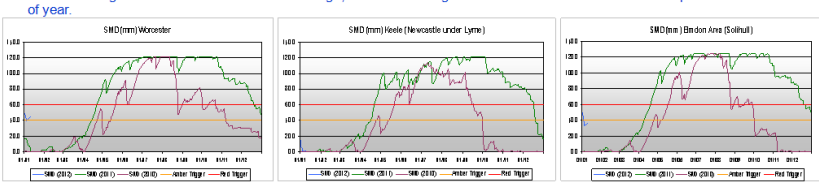
7.3 Data/tables

We have included some example slides illustrating the type of monitoring information and projection graphs that we discuss at DAT meetings.

Current Situation and Projection

Current Status	19/01/12
Hot Weather Status	Normal
Drought Status	Heightened

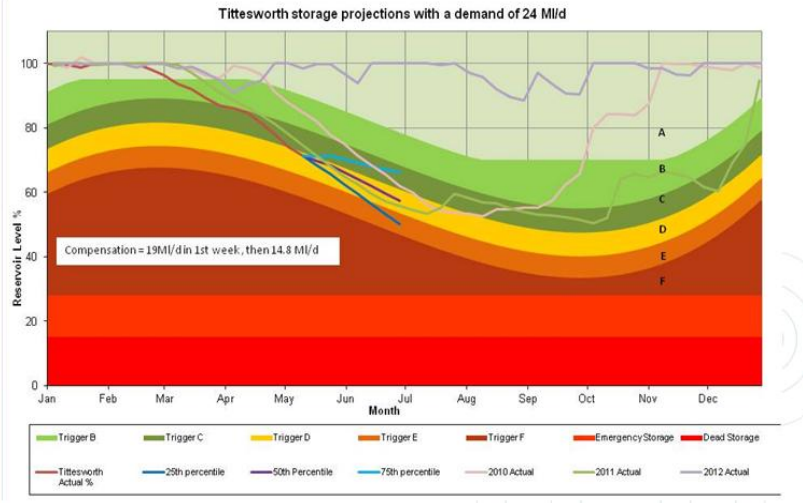
- Regional rainfall for January (up to 12th) has been 43% of LTA (37% LTA in Derwent catchment, 51% LTA in Tittesworth catchment and 31% LTA in Draycote catchment).
- Across the region soil moisture deficit remains high, but is continuing to fall. Levels of around 0 are still expected at this time of year.



- The river Derwent is currently not in regulation and Ambergate abstraction has been operating since Monday 5th December.
- Since early January we have been abstracting on average around 14Ml/d at Eathorpe.
- Groundwater levels continue to decline for the majority of sites across the Midlands. However, with the high rainfall levels in December levels may start to recover slightly over the coming weeks. We are awaiting updated data from the EA for observation boreholes in our region.
- Met office weather outlook:
  - Unsettled weather looks set to continue through January and into February, with a mixture of sunny spells and blustery showers. Temperatures are expected to be near average throughout January.

1

2. Tittesworth storage has entered drought zone D, and is lower than at this time in 2010 and 2011. Plans to reduce works output to 24Ml/d are expected by 16 May.



2. EA groundwater map:

This map is from the Midlands regional water situation report

It shows that recovery is site specific

Two sites are still exceptionally low (Heathlanes still in decline) but one is now exceptionally high

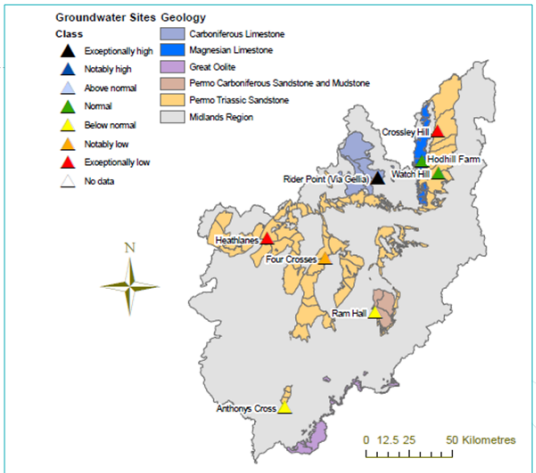
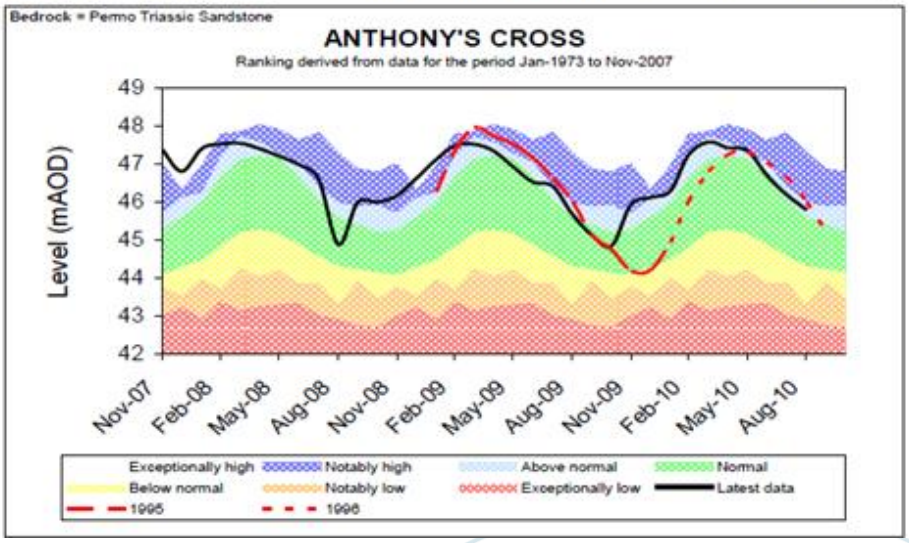


Figure 7: Groundwater levels at the end of July 2012, classed relative to an analysis of historic July groundwater levels. *© Crown Copyright. All rights reserved. Environment Agency, 100026380, 2010.*

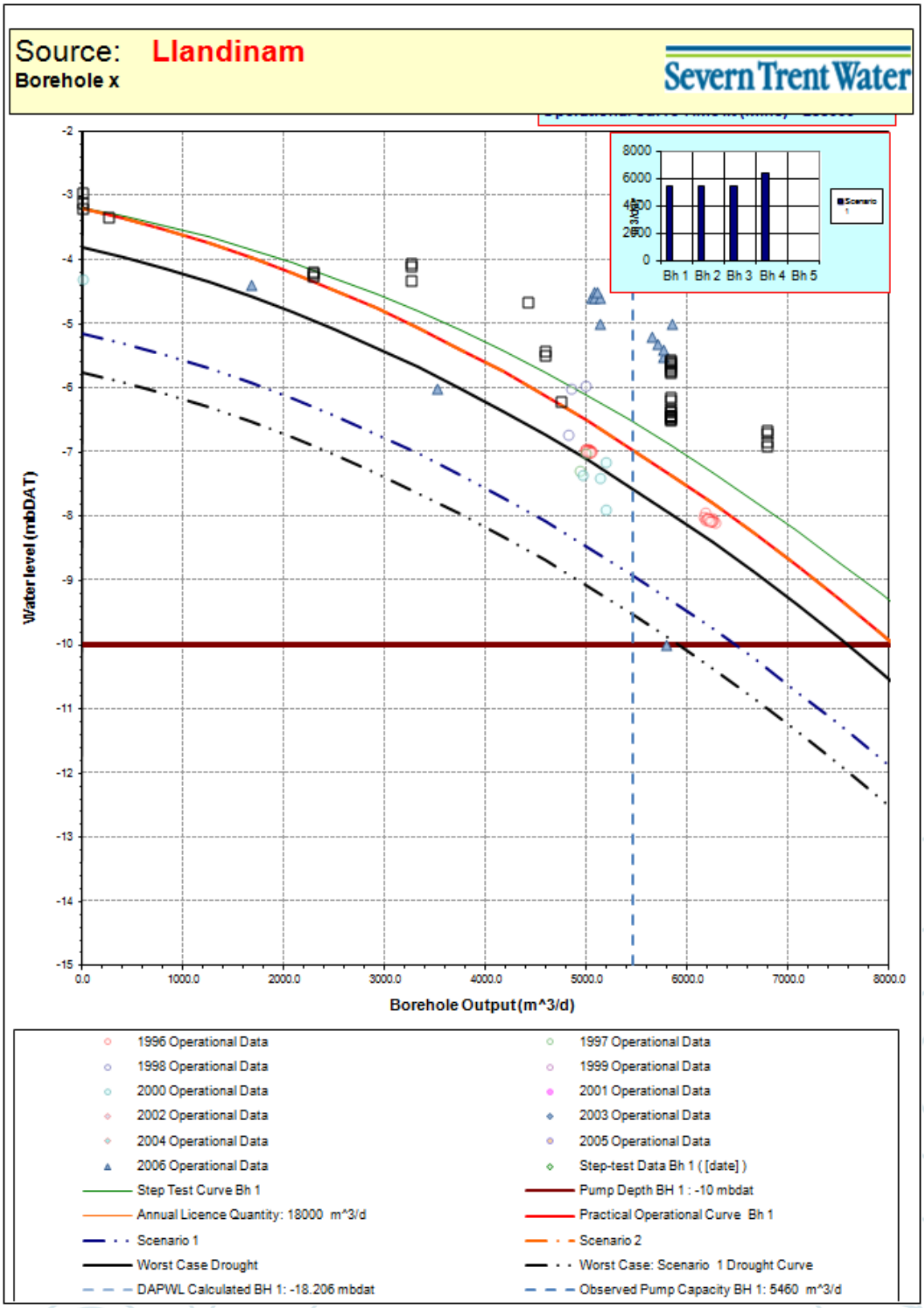
5

We have copied the figure below from the Midlands EA drought plan as it shows an example of the format in which they present their groundwater level data. We refer to graphs of this type to help inform our DAT

C.4 Graphs of Groundwater monitoring boreholes, gauging stations and rainfall sites

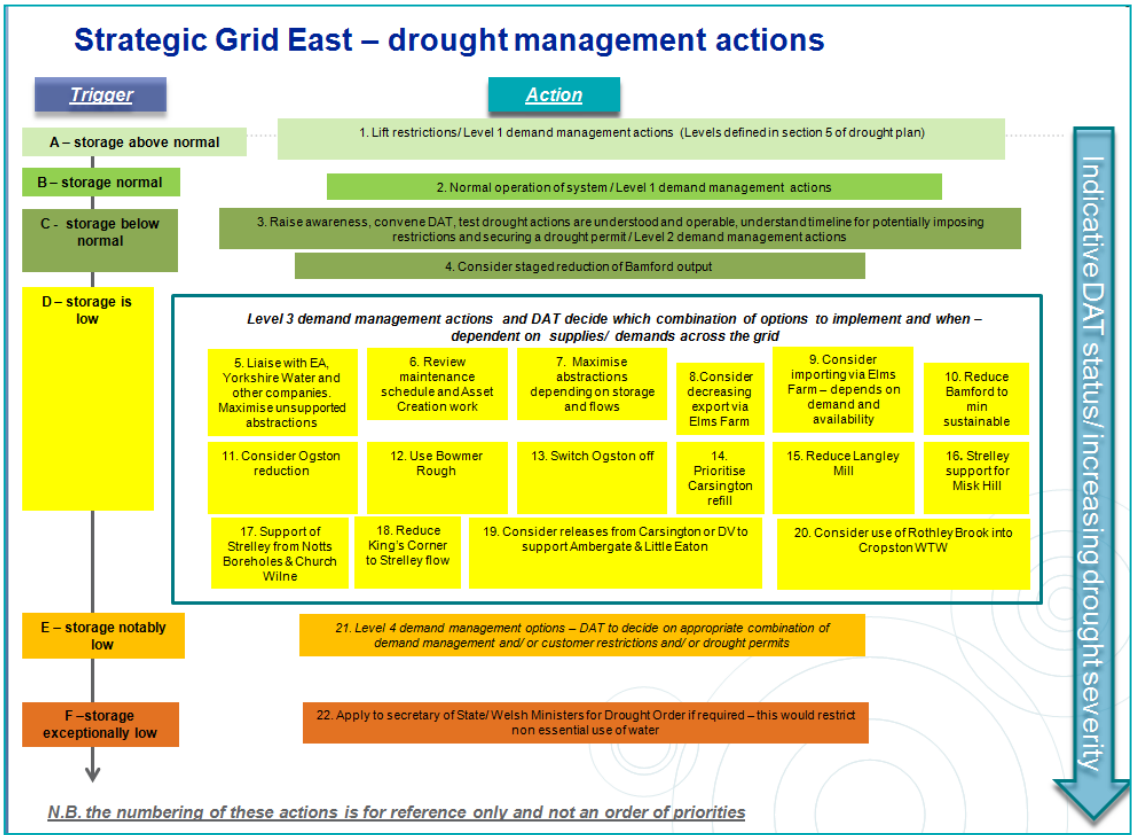


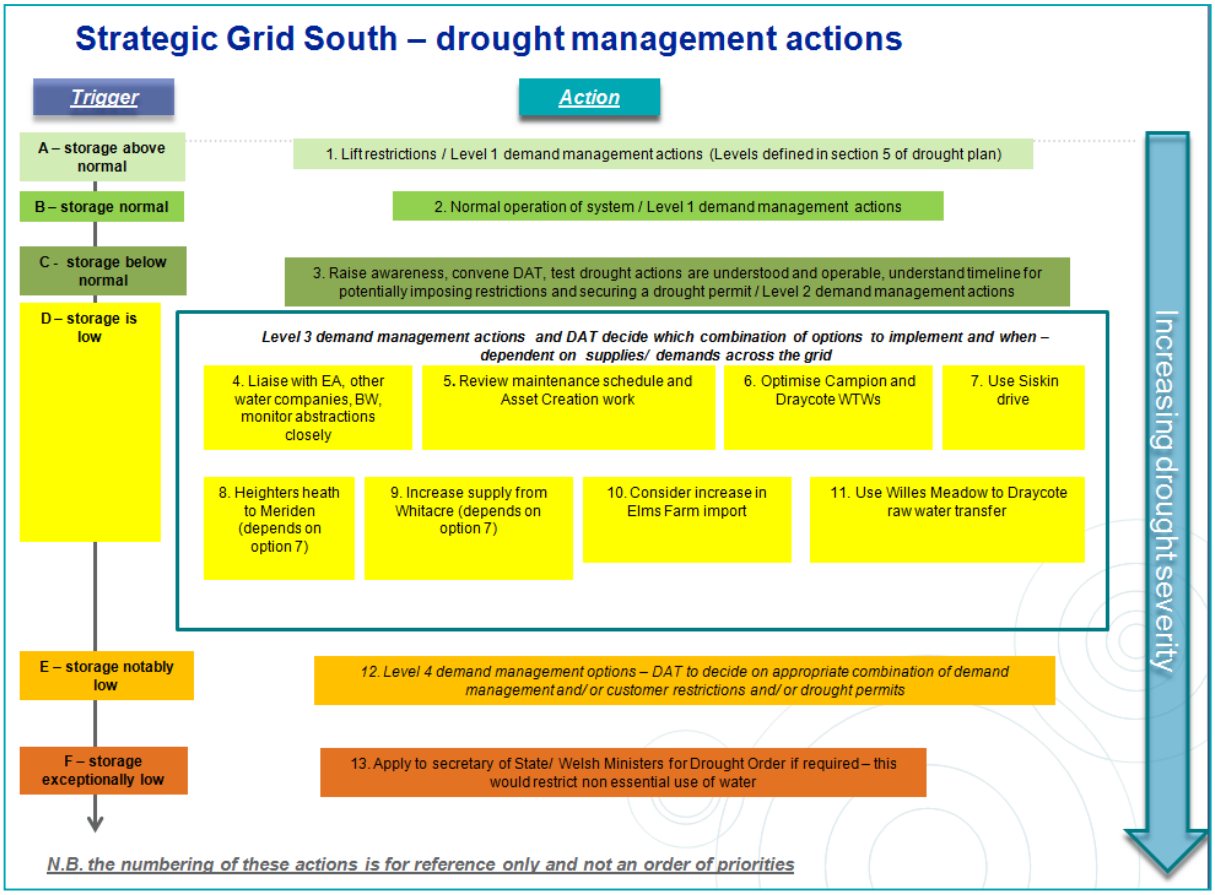
Llandinam source performance diagram (SPD)

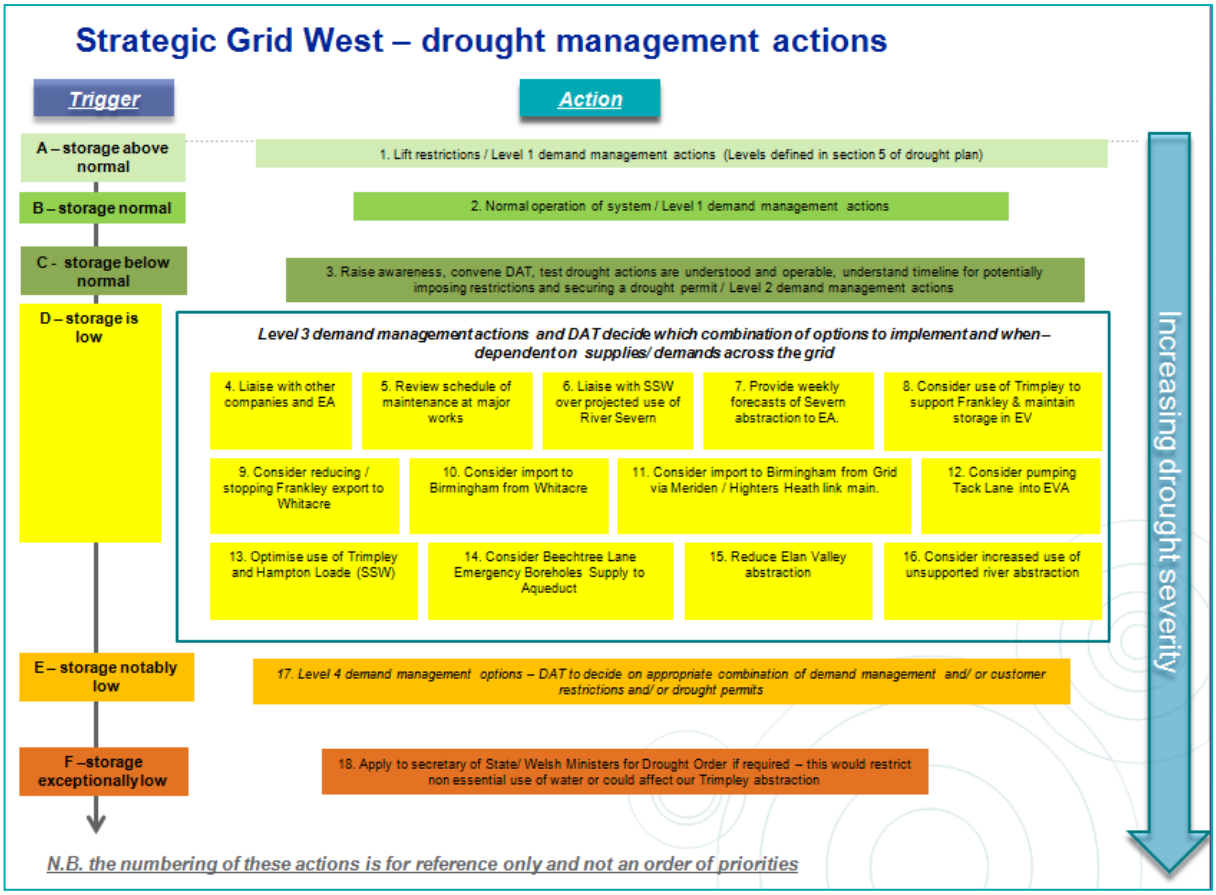


7.4 Technical and/or supplementary information

Decision flow charts showing drought management actions for strategic grid WRZ, which also benefit the Notts. WRZ:




Strategic Grid South – drought management actions
Trigger
Action
A – storage above normal
1. Lift restrictions / Level 1 demand management actions (Levels defined in section 5 of drought plan)
B – storage normal
2. Normal operation of system / Level 1 demand management actions
C - storage below normal
3. Raise awareness, convene DAT, test drought actions are understood and operable, understand timeline for potentially imposing restrictions and securing a drought permit / Level 2 demand management actions
D – storage is low
Level 3 demand management actions and DAT decide which combination of options to implement and when – dependent on supplies/ demands across the grid
4. Liaise with EA, other water companies, BW, monitor abstractions closely
5. Review maintenance schedule and Asset Creation work
6. Optimise Campion and Draycote WTWs
7. Use Siskin drive
8. Heighters heath to Meriden (depends on option 7)
9. Increase supply from Whitacre (depends on option 7)
10. Consider increase in Elms Farm import
11. Use Willes Meadow to Draycote raw water transfer
E – storage notably low
12. Level 4 demand management options – DAT to decide on appropriate combination of demand management and/ or customer restrictions and/ or drought permits
F – storage exceptionally low
13. Apply to secretary of State/ Welsh Ministers for Drought Order if required – this would restrict non essential use of water
Increasing drought severity
N.B. the numbering of these actions is for reference only and not an order of priorities



The tables below accompany the decision flow charts and have been developed to use a similar format to that shown in appendix F and appendix G of the 2011 EA guideline.

Option implementation assessment: Drought management actions: North Staffordshire

No.	Option description	Trigger(s) (or preceding actions)	Deployable Output of action Ml/day unless stated otherwise	Location Area affected or whole supply zone	Implementation timetable Preparation time, time of year effective, duration	Permissions required and constraints Including details of liaison carried out with bodies responsible for giving any permits or approvals	Risks associated with option
1	Lift restrictions/ Level 1 demand management as shown in section 5	Zone A	n/a for lift restrictions/ level 1 demand management is business as usual so	Whole supply zone	1 day	None required	Normal level of operational risk

			will not yield any extra DO				
2	Operate system within normal operating parameters/ Level 1 demand management as shown in section 5	Zone B	As above	Whole supply zone	Ongoing	None required	Normal level of operational risk
3	Raise awareness in company. Convene DAT, test drought actions are understood and operable, understand timeline. Level 2 demand management as shown in section 5, including extra emphasis on leakage reduction/ consider staged reduction of WTW output	Zone C	None for raise awareness etc/ Level 2 demand management benefits depend on extent of activity but we estimate saving of 0 to 2%	Whole supply zone	Ongoing	No permissions needed but liaison constrained by availability of internal and external staff	Normal level of operational risk
4	Liaise with stakeholders such as neighbouring companies and EA/ Start to Introduce Level 3 demand management as shown in section 5, including formal appeals for restraint	Zone D – DAT decision	No direct DO benefit from liaison/ Level 3 demand management benefits depend on extent of activity but we estimate saving of 0 to 2%	Whole supply zone	Ongoing	No permissions needed but liaison constrained by availability of internal and external staff	Normal level of operational risk
5	Review schedule of maintenance at major works	Zone D – DAT decision	Dependent on schedule	Stoke/ Ladderedge/ Tittesworth area	1 day	No permissions needed. Internal review of alternative production scenarios	Plant failure if change is protracted
6	Consider rezoning Stoke area and reduce demand on Ladderedge	Zone D – DAT decision	Reduction of import from Ladderedge Zone	Stoke/ Ladderedge/ Tittesworth area	7 days	No permissions needed. Need to confirm this is acceptable to other Severn Trent teams	Discolour-ation of supplies – customer warning as necessary
7	Maximise Leek area GW/ Maximise Cresswell Group of	Zone D – DAT decision	Staged reductions from max output of 48	Stoke/ Ladderedge/ Tittesworth area	7 days	No permissions needed. Need to confirm this is acceptable to other Severn	Low risk of discolour-ation of supplies

	sources (excludes Meir)		Ml/d (see options 9 and 10)			Trent teams	
8	Consider use of Abbey Green borehole	Zone D – DAT decision	Tests are ongoing to confirm achievable output	Stoke/ Ladderedge/ Tittesworth area	Depends on environmental reports/ investigations	Discharge permit not required from EA if we transfer this water to a WTW	Potential risk to quality
9	Rezone Coopers Green / Goldenhill systems and reduce demand on Ladderedge	Zone D – DAT decision	Dependent on supplies/ demands	Stoke/ Ladderedge/ Tittesworth area	7 days	No permissions needed. Need to confirm this is acceptable to other Severn Trent teams	Potential risk to quality/ pressure/ reliability
10	Reduce Tittesworth WTW output to minimum flow	Zone D – DAT decision	Min sustainable flow thought to be 16 Ml/d	Stoke/ Ladderedge/ Tittesworth area	7 days	No permissions needed. Need to confirm this is acceptable to other Severn Trent teams	Potential risk to supply
11	Consider turning WTW off	Zone D – DAT decision	Up to 16 Ml/d additional to previous reductions	Stoke/ Ladderedge/ Tittesworth area	7 days	No permissions needed. Need to confirm this is acceptable to other Severn Trent teams	Potential risk to supply
12	Determine scope for re-commissioning Meir	Zone D – DAT decision	Up to 4 Ml/d	Stoke/ Ladderedge/ Tittesworth area	14 days	Complete Drinking Water Safety Plan risk assessment and appropriate regulatory drinking water quality sampling. Need to confirm this is acceptable to other Severn Trent teams	Poor water quality into supply
13	Start Level 4 demand management as shown in section 5/ seek TUB and/ or drought permit as required	Zone E – DAT decision	TUB ~ 5% reduction in demand Drought permit ~ 8 Ml/d at Tittesworth Reservoir.	Whole supply zone, company wide or other – DAT decision	Timetable as described in section 3.2 and 3.4. We expect to have a 14 day lead in time for TUBs EA need 12 days to determine permit – this assumes no objections or objections are resolved.	Need to allow public / stakeholder representations on TUB. Drought permit approval required from EA following advertising and representation period. If any objections cannot be resolved, a public hearing may be required. We have a Flood Defence Consent in place until	Medium risk – to customers and environment - mitigated by environmental assessment report and comms plan

						October 2015 which covers the temporary works we need to implement this drought permit. We will update this before it expires.	
14	Seek non essential use drought order if required	Zone F – DAT decision	Approx an extra 5% reduction in demand	Whole supply zone, company wide or other – DAT decision	Timetable as described in section 3.4. Defra determination in 28 days	Drought Order application to Secretary of State (Defra) and associated advertising and stakeholder consultations. If any objections cannot be resolved, a public hearing may be required.	High risk to affected commercial customers

Environmental assessment: Drought management actions: North Staffordshire

Option implementation Assessment		
	Option Name	**Options 1-7 and 9-12 (Options as numbered in table above)**
	Trigger(s) (or preceding actions)	See table above
	Deployable Output of action Ml/day unless stated otherwise	See table above
	Location Area affected or whole supply zone	See table above
	Implementation timetable Preparation time, time of year effective, duration	See table above
	Permissions required and constraints Including details of liaison carried out with bodies responsible for giving any permits or approvals	No permissions are required for these options provided operation is within all current licensed abstractions. Consultation may be required with relevant Health Authorities as to transfers of treated water between zones where fluoridation of water is required.

	Risks associated with option	See table above
Environmental Assessment	**Risk to the Environment** (High/Medium/Low or unknown)	Low as these options are all within existing abstraction licence conditions
	Summary of likely environmental impacts Include details for features of moderate and major sensitivity and minor sensitivity features from designated sites	None – we are operating all licences in accordance with licence conditions and most of the options simply involve us operating our internal network differently.
	Baseline information used	Routine monitoring of demand, flows, ecology and water quality
	Summary of additional baseline monitoring requirements	We may need extra monitoring if dis-colouration is likely to be an issue
	Mitigation measures	We do not anticipate any environmental mitigation, but we will ensure our distribution and/ or treatment processes maintain our usual high water quality standards.
	Impact on other activities e.g. fisheries, industry etc	None

Option implementation Assessment	**Option Name**	**Option 8 – Consider use of Abbey Green borehole (for non drought permit purposes e.g. transferring the water to the WTW)**
	Trigger(s) (or preceding actions)	See option implementation assessment table above
	Deployable Output of action Ml/day unless stated otherwise	See option implementation assessment table above
	Location Area affected or whole supply zone	See option implementation assessment table above
	Implementation timetable Preparation time, time of year	See option implementation assessment table

	effective, duration	above
	Permissions required and constraints Including details of liaison carried out with bodies responsible for giving any permits or approvals	Depending on where water abstracted from the Abbey Green borehole is discharged to, a discharge permit may be required from the Environment Agency (if discharged to a watercourse). Temporary works will require adherence to health and safety at work regulations, including CDM Regulations. If we discharge this directly to our treatment works we do not require a discharge permit for this option, nor do we require a drought permit for this option. Complete Drinking Water Safety Plan risk assessment and appropriate regulatory drinking water quality sampling for re-commissioning of the Meir supply. Liaise as necessary with the DWI.
	Risks associated with option	See option implementation assessment table above
Environmental Assessment	**Risk to the Environment** (High/Medium/Low or unknown)	Low – if we do not discharge the water in the way described in our drought permit work but transfer it to e.g. our treatment works
	Summary of likely environmental impacts Include details for features of moderate and major sensitivity and minor sensitivity features from designated sites	None – as this option would be abstracting in accordance with licence conditions and doesn't involve our discharging to the environment.
	Baseline information used	We have collected large amounts of data as part of the preparation for the potential drought permit. We can also draw on the routine monitoring we carry out
	Summary of additional baseline monitoring requirements	No additional monitoring needed
	Mitigation measures	No environmental mitigation is required but we will ensure our distribution and/ or treatment processes maintain our usual high water quality standards.
	Impact on other activities e.g. fisheries, industry etc	None

Option implementation Assessment		
	Option Name	**Options 13 and 14 – Level 4 demand management/ TUB/ drought permit/ drought order to restrict non essential use**
	Trigger(s) (or preceding actions)	See option implementation assessment table above
	Deployable Output of action Ml/day unless stated otherwise	See option implementation assessment table above
	Location Area affected or whole supply zone	See option implementation assessment table above
	Implementation timetable Preparation time, time of year effective, duration	See option implementation assessment table above
	Permissions required and constraints Including details of liaison carried out with bodies responsible for giving any permits or approvals	Prior to introducing a Temporary Use Ban, the details of the proposed water use restrictions need to be published on the company's website and advertised in local newspapers so that representations can be made. The company must consider any representations before confirming the implementation of the Temporary Use Ban. In advance of the Tittesworth drought permit application, consultation will take place with Environment Agency, Natural England and other key stakeholders/conservation bodies. Demonstration to the Environment Agency that appropriate demand measures have been implemented is also required in advance of the drought permit application. Application for a drought permit for Tittesworth Reservoir will made to the Environment Agency, with advertising of the proposals to allow representations to be made. We have a Flood Defence Consent in place until October 2015 which covers the temporary works we need to implement this drought permit. We will update this before it expires. Application to the Secretary of State for a Drought Order to prohibit prescribed non-essential water use, with advertising of the proposed restrictions to allow representations

		to be made.
	Risks associated with option	See option implementation assessment table above
Environmental Assessment	**Risk to the Environment** (High/Medium/Low or unknown)	Medium/ high for drought permit –work for the Churnet/ Tittesworth drought permit highlighted possible permitting, flood risk and water quality issues in relation to discharging water from Abbey Green borehole directly into the environment. n/a for demand management options.
	Summary of likely environmental impacts Include details for features of moderate and major sensitivity and minor sensitivity features from designated sites	Impacts could be caused by a depletion of flow but are limited by the fact that this only affects a 1.8km reach between the reservoir and Abbey Green – see Churnet/ Tittesworth environmental report for details. n/a for demand management options.
	Baseline information used	Routine monitoring of demand, flows, ecology and water quality. n/a for demand management options.
	Summary of additional baseline monitoring requirements	We may introduce extra monitoring if the EA grants this permit. n/a for demand management options.
	Mitigation measures	We described the environmental mitigation measures available to us in section 4 of this plan. In carrying out these measures, we may require permission to access land from landowners. Habitat restoration measures may require Flood Defence Consent from the EA and for works within or adjacent to SSSIs, consent will likely be required from Natural England. Equally, consent would be required from the owners/managers for works at any locally designated wildlife sites. Fish rescue actions require agreement and FR2 Consent

		from the EA. Flow augmentation and freshet release mitigation options may require a discharge permit or modification to abstraction licences (dependent on the nature of the mitigation measure). Reduction in abstraction by other abstractors would require discussion and agreements with those abstractors as appropriate. n/a for demand management options.
	Impact on other activities e.g. fisheries, industry etc	None

Option implementation assessment: Drought management actions: Strategic Grid East

No.	Option Name	Trigger	Deployable Output of action Ml/day unless stated otherwise	Location Area affected or whole supply zone	Implementation timetable Estimated time, to implement	Permissions required and constraints Including details of liaison carried out with bodies responsible for giving any permits or approvals	Risks associated with option
1	Lift restrictions/ Level 1 demand management as shown in section 5	Zone A	n/a	Whole supply zone	1 day	none	Normal level of operational risk
2	Operate system within normal operating parameters/ Level 1 demand management as shown in section 5	Zone B	n/a	Whole supply zone	Ongoing	none	Normal level of operational risk
3	Raise awareness in company. Convene DAT, test drought actions are understood and operable, understand timeline. Level 2 demand	Zone C	None for raise awareness etc/ Level 2 demand management benefits depend on extent of	Whole supply zone	Ongoing	No permissions needed but liaison constrained by availability of internal and external staff	Normal level of operational risk

	management as shown in section 5, including extra emphasis on leakage reduction		activity but we estimate saving of 0 to 2%				
4	Begin staged reduction of Bamford output	Zone C	Depends on demand	Whole supply zone	Ongoing	No permissions required. Need to confirm this is acceptable to other Severn Trent teams	Low/ medium
5	Liaise with stakeholders such as Yorkshire Water and EA/ Start to introduce Level 3 demand management as shown in section 5, including formal appeals for restraint	Zone D – DAT decision	No direct DO benefit from liaison/ Level 3 demand management benefits depend on extent of activity but we estimate saving of 0 to 2%	Whole supply zone	Ongoing	No permissions needed but liaison constrained by availability of internal and external staff	Normal level of operational risk
6	Review schedule of maintenance at major works	Zone D – DAT decision	Dependent on planned works	Whole supply zone	Ongoing	No permissions required. Internal review of alternative production scenarios	Plant failure if change is protracted
7	Maximise river abstraction depending on flow storage and quality restrictions	Zone D – DAT decision	Flow/ licence dependent	Whole supply zone	1day	No permissions needed if we operate within our licences	Low/ medium
8	Consider decreasing export via Elms Farm	Zone D – DAT decision	Demand dependent	Whole supply zone	7 days	Must bear in mind fluoridation issues – permissions may be needed from relevant Health Authorities	Medium – fluoridation is an issue
9	Consider importing via Elms Farm	Zone D – DAT decision	Demand dependent but up to 20 Ml/d possibly available	Whole supply zone	7 days	As above	Medium risk – mitigated by monitoring impact on grid
10	Reduce Bamford to minimum sustainable	Zone D – DAT decision	Demand dependent but minimum sustainable output achieved in	Whole supply zone	7 days	No permissions required. Need to confirm this is acceptable to other Severn Trent teams	Low/ medium

			summer 2011 was 90 Ml/d				
11	Consider Ogston reduction	Zone D – DAT decision	Dependent on available borehole abstraction	Grid & Notts WRZs	7 days	No permissions required. Need to confirm this is acceptable to other Severn Trent teams	Low/ medium
12	Use Bowmer Rough	Zone D – DAT decision	Dependent on availability/ demand	Whole supply zone	7 days	As above	Low/ medium
13	Switch Ogston works off	Zone D – DAT decision	Demand dependent	Whole supply zone	7 days	As above	Low/ medium
14	Prioritise Carsington refill	Zone D – DAT decision	Demand/ flow dependent	Whole supply zone	7 days	As above	Low/ Medium
15	Reduce Langley Mill if feasible	Zone D – DAT decision	Demand/ flow dependent	Whole supply zone	7 days	As above	Low/ Medium
16	Strelley support for MiskHill	Zone D – DAT decision	Dependent on availability	Whole supply zone	7 days	As above	Low/ medium
17	Support of Strelley from Notts Boreholes & Church Wilne	Zone D – DAT decision	Dependent on availability	Whole supply zone	7 days	As above	Low/ medium
18	Reduce King's Corner to Strelley flow if feasible	Zone D – DAT decision	This option saved 5 Ml/d in 2011	Whole supply zone	7 days	As above	Low/ medium
19	Consider releases from Carsington or DV to support Ambergate & Little Eaton	Zone D – DAT decision	Dependent on reservoir levels	Whole supply zone	Less than a week	No permissions needed if we operate within our licences	Low/ Medium
20	Consider use of Rothley Brook into Cropston reservoir	Zone D – DAT decision	Dependent on availability	Whole supply zone	Several weeks	Need to consult EA	Medium/ high
21	Start Level 4 demand		TUB likely to reduce	Whole supply	Timetable as described in section 3.2 and	Need to allow public / stakeholder	Medium risk – to customers and

	management as shown in section 5/ seek TUB and/ or drought permit as required	Zone E – DAT decision	demand by 5%. Up to 23 or 41 Ml/d - based on aggregate quantity of compensation water from Ladybower to Derwent and Jaggers Clough reducing from 74 Ml/d (or 92 Ml/d when flow at Derby is <340 Ml/d) to 51 Ml/d;	zone, company wide or other – DAT decision	3.4. We expect to have a 14 day lead in time for TUBs EA need 12 days to determine permit – this assumes no objections or objections are resolved.	representations. DP approval required from EA following advertising and representation period. If any objections cannot be resolved, a public hearing may be required.	environment - mitigated by environmental assessment report and comms plan
22	Seek non essential use drought order if required	Zone F – DAT decision	Approx an extra 5% reduction in demand	Whole supply zone, company wide or other – DAT decision	Timetable as described in section 3.4. Defra determination in 28 days	Drought Order application to Secretary of State (Defra) and associated advertising and stakeholder consultations. If any objections cannot be resolved, a public hearing may be required.	High risk to affected commercial customers

Environmental assessment: Drought management actions: Strategic Grid East

Option implementation Assessment	Option Name	Options 1-19 (Options as numbered in table above)
	Trigger(s) (or preceding actions)	See table above
	Deployable Output of action Ml/day unless stated otherwise	See table above
	Location Area affected or whole supply zone	See table above
	Implementation timetable Preparation time, time of year effective, duration	See table above
	Permissions required and constraints Including details of liaison carried out with bodies responsible for giving any	No permissions are required for these options provided operation is within all current licensed abstractions. Consultation may be required with relevant Health Authorities as to transfers of

	permits or approvals	treated water between zones where fluoridation of water is required.
	Risks associated with option	See table above
Environmental Assessment	**Risk to the Environment** (High/Medium/Low or unknown)	Low as these options are all within existing abstraction licence conditions
	Summary of likely environmental impacts Include details for features of moderate and major sensitivity and minor sensitivity features from designated sites	None – we are operating all licences in accordance with licence conditions and most of the options simply involve us operating our internal network differently.
	Baseline information used	Routine monitoring of demand, flows, ecology and water quality
	Summary of additional baseline monitoring requirements	We may need extra monitoring if dis-colouration is likely to be an issue
	Mitigation measures	No environmental mitigation required, but we will need to ensure our distribution or treatment processes maintain our usual high water quality standards
	Impact on other activities e.g. fisheries, industry etc	None

Option implementation Assessment	**Option Name**	**Option 20 – Consider use of Rothley Brook into Cropston reservoir**
	Trigger(s) (or preceding actions)	See option implementation assessment table above
	Deployable Output of action Ml/day unless stated otherwise	See option implementation assessment table above
	Location Area affected or whole supply zone	See option implementation assessment table above
	Implementation timetable Preparation time, time of year effective, duration	See option implementation assessment table above
	Permissions required and constraints Including details of liaison carried out with bodies	No specific permissions required, but given the potential impact of the option on Cropston Reservoir SSSI, consultation will be required

	responsible for giving any permits or approvals	with the Environment Agency and Natural England and other relevant stakeholders/conservation bodies.
	Risks associated with option	See option implementation assessment table above
Environmental Assessment	**Risk to the Environment** (High/Medium/Low or unknown)	Medium – SSSI designation but abstraction within licence conditions and agreed mode of operation.
	Summary of likely environmental impacts Include details for features of moderate and major sensitivity and minor sensitivity features from designated sites	Cropston reservoir is a SSSI and this option has the potential to increase phosphate levels in this water body.
	Baseline information used	Routine monitoring of reservoir level, demand, flows, ecology (including crayfish) and water quality.
	Summary of additional baseline monitoring requirements	We would carry out the extra monitoring of abstracted water which would include: Dissolved Oxygen (DO), temperature, turbidity, ammonia, pH, conductivity and NO3
	Mitigation measures	In addition to the extra monitoring described above, we would regularly consult the EA and other stakeholders to ensure that we operate this option in a way that is sensitive to the environmental needs. No specific permissions are required for these measures.
	Impact on other activities e.g. fisheries, industry etc	None expected

Option implementation Assessment	**Option Name**	**Options 21 and 22 – Level 4 demand management/ TUB/ drought permit/ drought order to restrict non essential use**
	Trigger(s) (or preceding actions)	See option implementation assessment table above
	Deployable Output of action Ml/day unless stated otherwise	See option implementation assessment table above

	Location Area affected or whole supply zone	See option implementation assessment table above
	Implementation timetable Preparation time, time of year effective, duration	See option implementation assessment table above
	Permissions required and constraints Including details of liaison carried out with bodies responsible for giving any permits or approvals	Prior to introducing a Temporary Use Ban, the details of the proposed water use restrictions need to be published on the company's website and advertised in local newspapers so that representations can be made. The company must consider any representations before confirming the implementation of the Temporary Use Ban. In advance of the Derwent Valley Reservoirs drought permit application, consultation will take place with Environment Agency, Natural England and other key stakeholders/conservation bodies. Demonstration to the Environment Agency that appropriate demand measures have been implemented is also required in advance of the drought permit application. Application for a drought permit for the Derwent Valley Reservoirs will made to the Environment Agency, with advertising of the proposals to allow representations to be made. Application to the Secretary of State for a Drought Order to prohibit prescribed non-essential water use, with advertising of the proposed restrictions to allow representations to be made.
	Risks associated with option	See option implementation assessment table above
Environmental Assessment	**Risk to the Environment** (High/Medium/Low or unknown)	Medium for drought permit – see drought permit environmental assessment report for details. n/a for demand management options.
	Summary of likely environmental impacts Include details for features of moderate and major sensitivity and minor sensitivity features from designated sites	Impacts could be caused by a reduction in compensation flow from Ladybower and the control flow at Derby St Mary's as a result of the drought permit – see R. Derwent/ Derwent Valley reservoirs environmental report for

		details. For example, Table 2.7 in the Derwent environmental report shows the 'Impact significances as derived from measures of feature sensitivity / value and impact magnitude'. n/a for demand management options.
	Baseline information used	Routine monitoring of demand, flows, ecology and water quality. n/a for demand management options.
	Summary of additional baseline monitoring requirements	We may introduce extra monitoring if the EA grants this permit. n/a for demand management options.
	Mitigation measures	We described the environmental mitigation measures available to us in section 4 of this plan. In carrying out these measures, permission may be required to access land from landowners. Habitat restoration measures may require Flood Defence Consent from the EA and for works within or adjacent to SSSIs, consent will likely be required from Natural England. Equally, consent would be required from the owners/managers for works at any locally designated wildlife sites. Fish rescue actions require agreement and FR2 Consent from the EA. Flow augmentation and freshet release mitigation options may require a discharge permit or modification to abstraction licences (dependent on the nature of the mitigation measure). Reduction in abstraction by other abstractors would require discussion and agreements with those abstractors as appropriate. n/a for demand management options.
	Impact on other activities e.g. fisheries, industry etc	None

Option implementation assessment: Drought management actions: Strategic Grid South

No.	Option Name	Trigger	Deployable Output of action Ml/day unless stated otherwise	Location Area affected or whole supply zone	Implementation timetable Preparation time, time of year effective, duration	Permissions required and constraints Including details of liaison carried out with bodies responsible for giving any permits or approvals	Risks associated with option
1	Lift restrictions/ Level 1 demand management as shown in section 5	Zone A	n/a	Whole supply zone	1 day	none	Normal level of operational risk
2	Operate system within normal operating parameters/ Level 1 demand management as shown in section 5	Zone B	n/a	Whole supply zone	Ongoing	none	Normal level of operational risk
3	Raise awareness in company. Convene DAT, test drought actions are understood and operable, understand timeline. Level 2 demand management as shown in section 5, including extra emphasis on leakage reduction	Zone C	None for raise awareness etc/ Level 2 demand management benefits depend on extent of activity but we estimate saving of 0 to 2%	Whole supply zone	Ongoing	No permissions needed but liaison constrained by availability of internal and external staff	Normal level of operational risk
4	Liaise with stakeholders such as the Canals and Rivers Trust and EA / Start to introduce Level 3 demand management as shown in section 5, including formal appeals for restraint	Zone D – DAT decision	No direct DO benefit from liaison/ Level 3 demand management benefits depend on extent of activity but we estimate saving of 0 to 2%	Whole supply zone	Ongoing	No permissions needed but liaison constrained by availability of internal and external staff	Normal level of operational risk
5	Review schedule of maintenance	Zone D – DAT	Dependent on planned	Whole supply	7 days	No permissions required.	Plant failure if change is

	at major works	decision	works	zone		Internal review of alternative production scenarios	protracted
6	Optimise use of Campion Hills and Draycote WTWs	Zone D – DAT decision	Dependent on flows, demands, licence use and blending requirements. Improvements at Eathorpe delivered over 1000Ml extra in the 2011-12 drought	Whole supply zone, primarily South of zone	1 day	No permissions needed if we operate within our licences	Negligible risks
7	Use Siskin drive option	Zone D – DAT decision	Dependent on demands on grid but over 20 Ml/d achieved in 2011-12	Whole supply zone, primarily South of zone	7 days	Discharge permit needed to discharge de-chlorinated water to reservoir	Low/ medium risk – mitigated by ability to stop/ vary option if required
8	Highters Heath to Meriden	Zone D – DAT decision	Dependent on option 7 and demand on grid. Sustainable maximum achieved in 2012 ~15 Ml/d	Whole supply zone	7 days	No permissions needed	Low/ medium risk – mitigated by monitoring impact on Birmingham/ grid
9	Increase supply from Whitacre WTW	Zone D – DAT decision but depends on Siskin drive option	Dependent on option 7 and demands on grid	Whole supply zone	7 days	No permissions needed	Low/ medium risk – mitigated by monitoring impact on Birmingham/ grid
10	Consider scope for increased import from Elms Farm	Zone D – DAT decision	Up to 50 Ml/d made available	Whole supply zone	1 day	No permissions needed	Low/ medium risk – mitigated by monitoring impact on grid
11	Use raw water transfer from Willes Meadow to Draycote	Zone D – DAT decision	Up to 10 Ml/d	Whole supply zone, primarily South of zone	Approx. 28 days	No permissions needed	Low/ medium risk – mitigated by monitoring impact on Campion Hills/ grid

12	Start Level 4 demand management as shown in section 5/ Seek TUB and/ or drought permit as required	Zone E – DAT decision	TUB likely to reduce demand by 5%. Drought permit increase to Draycote refill depends on river flows	Whole supply zone, company wide or other – DAT decision	Timetable as described in section 3.2 and 3.4. We expect a lead in time of 14 days for TUBs. EA need 12 days to determine permit – this assumes no objections or objections are resolved.	Need to allow public / stakeholder representations. DP approval required from EA following advertising and representation period. If any objections cannot be resolved, a public hearing may be required.	Medium risk – to customers and environment - mitigated by environmental assessment report and comms plan
13	Seek non essential use drought order if required	Zone F – DAT decision	Approx an extra 5% reduction in demand	Whole supply zone, company wide or other – DAT decision	Timetable as described in section 3.4. Defra determination in 28 days	Drought Order application to Secretary of State (Defra) and associated advertising and stakeholder consultations. If any objections cannot be resolved, a public hearing may be required.	High risk to affected commercial customers

Environmental assessment: Drought management actions: Strategic Grid South

Option implementation Assessment		
	Option Name	**Options 1-6 and 8-11 (Options as numbered in table above)**
	Trigger(s) (or preceding actions)	See table above
	Deployable Output of action Ml/day unless stated otherwise	See table above
	Location Area affected or whole supply zone	See table above
	Implementation timetable Preparation time, time of year effective, duration	See table above
	Permissions required and constraints Including details of liaison carried out with bodies responsible for giving any permits or approvals	No permissions are required for these options provided operation is within current licensed abstractions.
	Risks associated with option	See table above

Environmental Assessment	**Risk to the Environment** (High/Medium/Low or unknown)	Low as these options are all within existing abstraction licence conditions
	Summary of likely environmental impacts Include details for features of moderate and major sensitivity and minor sensitivity features from designated sites	None – we are operating all licences in accordance with licence conditions and most of the options simply involve us operating our internal network differently.
	Baseline information used	Routine monitoring of demand, flows, ecology and water quality
	Summary of additional baseline monitoring requirements	We may need extra monitoring if dis-colouration is likely to be an issue
	Mitigation measures	No environmental mitigation required, but we will ensure our distribution and/ or treatment processes maintain our usual high water quality standards.
	Impact on other activities e.g. fisheries, industry etc	None

Option implementation Assessment	**Option Name**	**Option 7 – use Siskin Drive option**
	Trigger(s) (or preceding actions)	See option implementation assessment table above
	Deployable Output of action Ml/day unless stated otherwise	See option implementation assessment table above
	Location Area affected or whole supply zone	See option implementation assessment table above
	Implementation timetable Preparation time, time of year effective, duration	See option implementation assessment table above
	Permissions required and constraints Including details of liaison carried out with bodies responsible for giving any permits or approvals	Discharge permit will be required from the Environment Agency to allow discharge of de-chlorinated water to the reservoir.
	Risks associated with option	See option implementation assessment table above

Environmental Assessment	**Risk to the Environment** (High/Medium/Low or unknown)	Medium/ Low – we used this option in the 2011-12 drought without any causing any environmental harm.
	Summary of likely environmental impacts Include details for features of moderate and major sensitivity and minor sensitivity features from designated sites	The reservoir ecology could be affected by a discharge of de-chlorinated water but we expect that these impacts will be negligible.
	Baseline information used	We draw on our experience of using this in 2011-12, in particular the water quality sampling programme that we undertook. Also routine monitoring of reservoir level, demand, flows, ecology and water quality, for example in support of Avon/ Leam drought permit.
	Summary of additional baseline monitoring requirements	If required we would carry out extra monitoring, as we did previously.
	Mitigation measures	In addition to the extra monitoring, if we needed to mitigate the impacts of this option we would consider some of the generic mitigation measures described in section 4 of this plan. In carrying out these measures, permission may be required to access land from landowners. If fish rescue was required this would need agreement with the EA and FR2 Consent.
	Impact on other activities e.g. fisheries, industry etc	None expected

Option implementation Assessment	**Option Name**	**Options 12 and 13 – Level 4 demand management/ TUB/ drought permit/ drought order to restrict non essential use**
	Trigger(s) (or preceding actions)	See option implementation assessment table above
	Deployable Output of action Ml/day unless stated otherwise	See option implementation assessment table

		above
	Location Area affected or whole supply zone	See option implementation assessment table above
	Implementation timetable Preparation time, time of year effective, duration	See option implementation assessment table above
	Permissions required and constraints Including details of liaison carried out with bodies responsible for giving any permits or approvals	Prior to introducing a Temporary Use Ban, the details of the proposed water use restrictions need to be published on the company's website and advertised in local newspapers so that representations can be made. The company must consider any representations before confirming the implementation of the Temporary Use Ban. In advance of the Avon/Leam drought permit application, consultation will take place with Environment Agency, Natural England and other key stakeholders/conservation bodies. Demonstration to the Environment Agency that appropriate demand measures have been implemented is also required in advance of the drought permit application. Application for a drought permit for the Avon/Leam will made to the Environment Agency, with advertising of the proposals to allow representations to be made. Application to the Secretary of State for a Drought Order to prohibit prescribed non-essential water use, with advertising of the proposed restrictions to allow representations to be made.
	Risks associated with option	See option implementation assessment table above
Environmental Assessment	**Risk to the Environment** (High/Medium/Low or unknown)	Medium for drought permit – see Avon/ Leam drought permit environmental assessment report for details. n/a for demand management options.
	Summary of likely environmental impacts	Impacts could be caused by a reduction in hands-off flows at Prince's Drive Weir and at

	Include details for features of moderate and major sensitivity and minor sensitivity features from designated sites	Stareton. There is also a possibility that abstracting from the R. Leam at Eathorpe outside of the usual abstraction 'season' could impact on the environment. All of these impacts are assessed in the environmental assessment report. n/a for demand management options.
	Baseline information used	Routine monitoring of demand, flows, ecology and water quality. n/a for demand management options.
	Summary of additional baseline monitoring requirements	We may introduce extra monitoring if the EA grants this drought permit. n/a for demand management options.
	Mitigation measures	We described the environmental mitigation measures available to us in section 4 of this plan. In carrying out these measures, permission may be required to access land from landowners. Habitat restoration measures may require Flood Defence Consent from the EA and for works within or adjacent to SSSIs, consent will likely be required from Natural England. Equally, consent would be required from the owners/managers for works at any locally designated wildlife sites. Fish rescue actions require agreement and FR2 Consent from the EA. Flow augmentation and freshet release mitigation options may require a discharge permit or modification to abstraction licences (dependent on the nature of the mitigation measure). Reduction in abstraction by other abstractors would require discussion and agreements with those abstractors as appropriate. n/a for demand management options.
	Impact on other activities e.g. fisheries, industry etc	None

Option implementation assessment: Drought management actions: Strategic Grid West

No.	Option Name	Trigger	Deployable Output of action Ml/day unless stated otherwise	Location Area affected or whole supply zone	Implementation timetable Preparation time, time of year effective, duration	Permissions required and constraints Including details of liaison carried out with bodies responsible for giving any permits or approvals	Risks associated with option
1	Lift restrictions / Level 1 demand management as shown in section 5	Zone A	n/a	Whole supply zone	1 day	none	Normal level of operational risk
2	Operate system within normal operating parameters/ Level 1 demand management as shown in section 5	Zone B	n/a	Whole supply zone	Ongoing	none	Normal level of operational risk
3	Raise awareness in company. Convene DAT, test drought actions are understood and operable, understand timeline Level 2 demand management as shown in section 5, including extra emphasis on leakage reduction	Zone C	None for raise awareness etc/ Level 2 demand management benefits depend on extent of activity but we estimate saving of 0 to 2%	Whole supply zone	Ongoing	No permissions needed but liaison constrained by availability of internal and external staff	Normal level of operational risk
4	Liaise with stakeholders such as neighbouring water companies and EA / Start to introduce Level 3 demand management as shown in section 5,	Zone D – DAT decision	No direct DO benefit from liaison/ Level 3 demand management benefits depend on extent of activity but we estimate saving of 0 to 2%	Whole supply zone	Ongoing	No permissions needed but liaison constrained by availability of internal and external staff	Normal level of operational risk

	including formal appeals for restraint						
5.	Review schedule of maintenance at major works	Zone D – DAT decision	Dependent on planned works	Whole supply zone	7 days	No permissions needed. Internal review of alternative production scenarios	Plant failure if change is protracted
6	Liaise with SSW over projected use of River Severn	Zone D – DAT decision	No direct increase	Whole supply zone, primarily West of zone	1 day	Constrained by negotiations with South Staffs	Risk that South Staffs Water will need its full entitlement
7	Provide weekly forecasts of River Severn abstraction to EA.	Zone D – DAT decision	none	Whole supply zone, primarily West of zone	ongoing	No permissions needed but work constrained by availability of internal and external staff	Low risk
8	Consider use of Trimpley to support Frankley to maintain storage in Elan Valley	Zone D – DAT decision	40Ml/d	Whole supply zone, primarily West of zone	none	No permissions needed. Need to confirm this is acceptable to other Severn Trent teams	Low/ medium risk
9	Consider reducing / stopping Frankley export to Whitacre	Zone D – DAT decision	Dependent on supplies/ demands	Whole supply zone, primarily West of zone	7 days	No permissions needed. Need to confirm this is acceptable to other Severn Trent teams	Low/ medium risk
10	Consider import to Birmingham from Whitacre	Zone D – DAT decision	Extra 20 Ml/d into Birmingham supply	Whole supply zone, primarily West of zone	7 days	none	High risk of major discolouration in supply to NE Birmingham
11	Consider import to Birmingham from Grid via Meriden / Highters Heath link main.	Zone D – DAT decision	Dependent on supplies/ demands	Whole supply zone, primarily West of zone	7 days	No permissions needed. Need to confirm this is acceptable to other Severn Trent teams	Low/ medium
12	Consider pumping	Zone D – DAT	Up to 10Mld	Whole supply zone, primarily	7 days	No permissions needed. Need	Low/ medium

	Tack Lane into EVA	decision		West of zone		to confirm this is acceptable to other Severn Trent teams	
13	Optimise use of Trimpley and Hampton Loade (SSW)	Zone D – DAT decision	unknown	Whole supply zone, primarily West of zone	1 day	Agreement with SSW Abstraction licence limits. Quality of River Severn water	Low/ medium
14	Consider Beechtree Lane Emergency Borehole Supply to Aqueduct	Zone D – DAT decision	Up to 18 Ml/d extra to Aqueduct	Whole supply zone, primarily West of zone	7 days	No permissions needed. Need to confirm this is acceptable to other Severn Trent teams	Low/ medium
15	Reduce Elan Valley abstraction	Zone D – DAT decision	Approximately 16 Ml/d	Whole supply zone, primarily West of zone	7 days	No permissions needed. Need to confirm this is acceptable to other Severn Trent teams	Low/ medium
16	Consider increased use of unsupported river abstraction	Zone D – DAT decision	Flow dependent	Whole supply zone, primarily West of zone	1day	No permissions needed if we operate within our licences	Low/ medium
17	Start Level 4 demand management as shown in section 5/ Seek TUB and/ or Trimpley drought permit as required	Zone E – DAT decision	TUB likely to reduce demand by 5%. Increased abstraction to support to Frankley WTW from Severn – dependent on flows	Whole supply zone, company wide or other – DAT decision	Timetable as described in section 3.2 and 3.4. We expect to have a 14 day lead in time for TUBs EA need 12 days to determine permit – this assumes no objections or objections are resolved. If EA has to consult Natural England then they have 28 days to respond.	Need to allow public / stakeholder representations. DP approval required from EA following advertising and representation period. If any objections cannot be resolved, a public hearing may be required. A drought order at Trimpley would require application to the Secretary of State.	Medium risk – to customers and environment - mitigated by environmental assessment report and comms plan
18	Seek non essential use drought order if required	Zone F – DAT decision	Approx an extra 5% reduction in demand	Whole supply zone, company wide or other – DAT decision	Timetable as described in section 3.4. Defra determination in 28 days	Drought Order application to Secretary of State (Defra) and associated advertising and stakeholder	High risk to affected commercial customers

						consultations. If any objections cannot be resolved, a public hearing may be required.	

Environmental assessment: Drought management actions: Strategic Grid West

Option implementation Assessment	**Option Name**	**Options 1-13 & 15-16 (Options as numbered in table above)**
	Trigger(s) (or preceding actions)	See table above
	Deployable Output of action Ml/day unless stated otherwise	See table above
	Location Area affected or whole supply zone	See table above
	Implementation timetable Preparation time, time of year effective, duration	See table above
	Permissions required and constraints Including details of liaison carried out with bodies responsible for giving any permits or approvals	No permissions are required for this option provided operation is within all current licensed abstractions. Options 6 and 13 require negotiation with neighbouring water companies.
	Risks associated with option	See table above
Environmental Assessment	**Risk to the Environment** (High/Medium/Low or unknown)	Low as these options are all within existing abstraction licence conditions
	Summary of likely environmental impacts Include details for features of moderate and major sensitivity and minor sensitivity features from designated sites	None – we are operating all licences in accordance with licence conditions and most of the options simply involve us operating our internal network differently.
	Baseline information used	Routine monitoring of demand, flows, ecology and water quality
	Summary of additional baseline monitoring requirements	We may need extra monitoring if dis-colouration is likely to be an issue
	Mitigation measures	No environmental mitigation required but we will ensure our distribution and/ or treatment processes maintain our usual high water quality

		standards.
	Impact on other activities e.g. fisheries, industry etc	None

Option implementation Assessment	**Option Name**	**Option 14 (Consider Beechtree Lane Emergency Supply to Aqueduct)**
	Trigger(s) (or preceding actions)	See table above
	Deployable Output of action Ml/day unless stated otherwise	See table above
	Location Area affected or whole supply zone	See table above
	Implementation timetable Preparation time, time of year effective, duration	See table above
	Permissions required and constraints Including details of liaison carried out with bodies responsible for giving any permits or approvals	No permissions are required for this option provided operation is within all current licensed abstractions and there are no adverse environmental impacts (see **mitigation measures** below). If potential environmental impacts are expected, then consultation with the Environment Agency, Natural England and other key stakeholders should be undertaken in advance of the drought option.
	Risks associated with option	See table above
Environmental Assessment	**Risk to the Environment** (High/Medium/Low or unknown)	Low/ Medium – operating these sources in drought/ emergencies is within existing abstraction licence conditions. Also refer to section 3.3.7 of this plan
	Summary of likely environmental impacts Include details for features of moderate and major sensitivity and minor sensitivity features from designated sites	Low/ Medium – operating these sources in accordance with licence conditions. The quantity that we abstract is constrained by these conditions, in particular by the 5 year rolling total.
	Baseline information used	Routine monitoring of demand, flows, ecology and water quality
	Summary of additional baseline monitoring requirements	We will increase monitoring as stipulated in the abstraction licence. We may also implement extra monitoring if dis-

		colouration is likely to be an issue.
	Mitigation measures	Any environmental mitigation needed would depend upon what the monitoring showed the impact to be. We would consider the generic mitigation options shown in section 4.3 as well as any site specific ones that the monitoring shows to be appropriate. In carrying out these measures, permission may be required to access land from landowners. Habitat restoration measures may require Flood Defence Consent from the EA and for works within or adjacent to SSSIs, consent will likely be required from Natural England. Equally, consent would be required from the owners/managers for works at any locally designated wildlife sites. Fish rescue actions require agreement and FR2 Consent from the EA. Flow augmentation and freshet release mitigation options may require a discharge permit or modification to abstraction licences (dependent on the nature of the mitigation measure). Reduction in abstraction by other abstractors would require discussion and agreements with those abstractors as appropriate. To mitigate water quality risks, we will ensure our distribution and/ or treatment processes maintain our usual high water quality standards.
	Impact on other activities e.g. fisheries, industry etc	None

Option implementation Assessment	**Option Name**	**Options 17 and 18 – Level 4 demand management/ TUB/ drought permit/ drought order to restrict non essential use**
	Trigger(s) (or preceding actions)	See option implementation assessment table above
	Deployable Output of action Ml/day unless stated otherwise	See option implementation assessment table above

	Location Area affected or whole supply zone	See option implementation assessment table above
	Implementation timetable Preparation time, time of year effective, duration	See option implementation assessment table above
	Permissions required and constraints Including details of liaison carried out with bodies responsible for giving any permits or approvals	Prior to introducing a Temporary Use Ban, the details of the proposed water use restrictions need to be published on the company's website and advertised in local newspapers so that representations can be made. The company must consider any representations before confirming the implementation of the Temporary Use Ban. In advance of the River Severn at Trimpley drought permit (or order) application, consultation will take place with Environment Agency, Natural England, Natural Resources Wales and other key stakeholders/conservation bodies. If a drought order is to be sought, liaison will also be required with Defra. Demonstration to the Environment Agency that appropriate demand measures have been implemented is also required in advance of the drought permit/order application. Application for a drought permit for the River Severn at Trimpley will made to the Environment Agency, with advertising of the proposals to allow representations to be made. In the event of a drought order being required, the application would be made to the Secretary of State. The application may need to be accompanied by an Appropriate Assessment under the Habitats Regulations, depending on screening of the potential effects on the Severn Estuary European Marine Site. Application to the Secretary of State for a Drought Order to prohibit prescribed non-essential water use, with advertising of the proposed restrictions to allow representations to be made.
	Risks associated with option	See option implementation assessment table above

Environmental Assessment	**Risk to the Environment** (High/Medium/Low or unknown)	Medium/ high for drought permit/ order n/a for demand management options.
	Summary of likely environmental impacts Include details for features of moderate and major sensitivity and minor sensitivity features from designated sites	Impacts could be caused by implementation of a drought permit or drought order at Trimpley on the River Severn. See section 4 of this plan and the associated HRA. n/a for demand management options.
	Baseline information used	Routine monitoring of demand, flows, ecology and water quality. n/a for demand management options.
	Summary of additional baseline monitoring requirements	We expect to introduce extra monitoring if the EA grants this drought permit or Defra grants a drought order for Trimpley. n/a for demand management options.
	Mitigation measures	We described the environmental mitigation measures available to us in section 4 of this plan. In carrying out these measures, permission may be required to access land from landowners. Habitat restoration measures may require Flood Defence Consent from the EA and for works within or adjacent to SSSIs, consent will likely be required from Natural England. Equally, consent would be required from the owners/managers for works at any locally designated wildlife sites. Fish rescue actions require agreement and FR2 Consent from the EA. Flow augmentation and freshet release mitigation options may require a discharge permit or modification to abstraction licences (dependent on the nature of the mitigation measure). Reduction in abstraction by other abstractors would require discussion and agreements with those abstractors as appropriate.

		Agreement would need to be reached with United Utilities Water PLC and EA as to any changes to the use of the “water bank” releases from Lake Vyrnwy Reservoir. Agreement would need to be reached with the EA as to any changes to the river regulation releases from Lake Clywedog and/or Lake Vyrnwy reservoirs. Agreement would need to be reached with the Canal and River Trust as to any changes to their abstraction from the River Severn to the Gloucester and Sharpness Canal. n/a for demand management options.
	Impact on other activities e.g. fisheries, industry etc	None

Option implementation and environmental assessment: Drought management actions: Forest and Stroud WRZ

Option implementation Assessment	**Option Name**	**Options 1 to 7:** 1. lift restrictions 2. normal operation/ level 1 demand management 3. Convene DAT/ Level 2 demand management 4. Level 3 demand management/ Liaise with EA 5. Review maintenance schedule 6. Review/ remove borehole constraints 7. Re-zone/ transfer water
	Trigger(s) (or preceding actions)	DAT decision based on River Wye low flow at Redbrook - this trigger constrains our Wyelands abstraction. Groundwater levels in the WRZ could also trigger drought management actions.
	Deployable Output of action Ml/day unless stated otherwise	No DO gain expected from options 1-5 except for level 3 demand management. The benefits of this depend on extent of activity but we

		estimate saving of 0 to 2%. Benefit of options 6 and 7 depends on what the groundwater constraint is and the supplies/ demands elsewhere in our network
	Location Area affected or whole supply zone	This WRZ
	Implementation timetable Preparation time, time of year effective, duration	No lead in time for options 1-4. Approximate implementation time for options 5, 6 and 7 individually is seven days. All seven options can occur at any time of year.
	Permissions required and constraints Including details of liaison carried out with bodies responsible for giving any permits or approvals	No permissions needed but we would seek agreement from other Severn Trent teams. For example, we would carry out an internal review of alternative production scenarios. Option 4 is constrained by availability of internal and external staff.
	Risks associated with option	Options 1-5 are low risk. Options 6 and 7 are low/ medium risk – potential risk to quality/ pressure/ reliability - mitigated by ability to stop/ vary option if required
Environmental Assessment	**Risk to the Environment** (High/Medium/Low or unknown)	Low as these options are all within existing abstraction licence conditions
	Summary of likely environmental impacts Include details for features of moderate and major sensitivity and minor sensitivity features from designated sites	None – we are operating all licences in accordance with licence conditions and most of the options simply involve us operating our internal network differently.
	Baseline information used	Routine monitoring of demand, flows, ecology and water quality
	Summary of additional baseline monitoring requirements	We may need extra monitoring if dis-colouration is likely to be an issue.
	Mitigation measures	No environmental mitigation required, but we will ensure our distribution and/ or treatment processes maintain our usual high water quality standards
	Impact on other activities e.g. fisheries, industry etc	None

Option implementation Assessment		
	Option Name	**Options 8 and 9** 8. Level 4 demand management/ TUB 9. Drought order to restrict non essential use or for our Wyelands abstraction
	Trigger(s) (or preceding actions)	DAT decision based on River Wye low flow at Redbrook trigger constrains our Wyelands abstraction. Groundwater levels in the WRZ could also trigger drought management actions. We would only implement these options if the risk to supply remained high even after implementing options 1-7.
	Deployable Output of action Ml/day unless stated otherwise	TUB likely to reduce demand by 5%. We expect that a restriction on non essential use would reduce demand by a further 5%. The Wyelands drought order would prevent a loss of ~ 5 Ml/d by allowing us to continue to abstract at 45 Ml/d.
	Location Area affected or whole supply zone	The specific area affected or potentially the whole company
	Implementation timetable Preparation time, time of year effective, duration	Timetable for demand management as shown in section 5. Timetable for TUBs described in section 3.2. We have a 14 day lead in period for TUBs. We would only implement a TUB in spring, summer or early autumn. Defra can take 28 days to determine a drought order.
	Permissions required and constraints Including details of liaison carried out with bodies responsible for giving any permits or approvals	Prior to introducing a Temporary Use Ban, the details of the proposed water use restrictions need to be published on the company's website and advertised in local newspapers so that representations can be made. The company must consider any representations before confirming the implementation of the Temporary Use Ban. In advance of the Wyelands drought order application, consultation will take place with Environment Agency, Natural England, Natural Resources Wales and other key stakeholders/conservation bodies. If a drought

		order is to be sought, liaison will also be required with Defra. Demonstration to the Environment Agency and NRW that appropriate demand measures have been implemented is also required in advance of the drought order application. Application for a drought order for Wyelands will made to the Secretary of State, with advertising of the proposals to allow representations to be made. The application would need to be accompanied by an Appropriate Assessment under the Habitats Regulations as to the potential effects on the River Wye SAC and River Severn European Marine Site. Application to the Secretary of State for a Drought Order to prohibit prescribed non-essential water use, with advertising of the proposed restrictions to allow representations to be made.
	Risks associated with option	Medium/ high for drought order – restricting non essential use could impact negatively on some of our non household customers, especially those whose businesses rely on specific uses of water. Medium for demand management/ TUB – although it is several years since we have restricted customers' use we expect that a well communicated campaign will cause a reduction in demand. However, the savings in our region may be lower than those seen in other regions as our customers are already more water efficient.
Environmental Assessment	**Risk to the Environment** (High/Medium/Low or unknown)	High/ medium for drought order at Wyelands. We have provided more detail on this option in sections 3.4 and section 4 of this plan. n/a for demand management/ TUB/ non essential use ban options.
	Summary of likely environmental impacts	As the River Wye is a SAC we will need to demonstrate that our continued abstraction has

	Include details for features of moderate and major sensitivity and minor sensitivity features from designated sites	no negative impact on this HD designated site. Although we do not consider them likely it is possible that the drought order could affect ecology that is particularly sensitive to low flows. We have provided more detail on this option in sections 3.4 and section 4 of this plan and in the accompanying HRA. n/a for demand management/ TUB/ non essential use ban options.
	Baseline information used	Routine monitoring of demand, flows, ecology and water quality. For example, we describe the monitoring that we are carrying out on the R. Wye later within this section of the appendix. We have considered the information that other stakeholders have provided in section 4.1 n/a for demand management/ TUB/ non essential use ban options.
	Summary of additional baseline monitoring requirements	We will introduce extra monitoring if Defra grants a drought order for our Wyelands abstraction. n/a for demand management/ TUB/ non essential use ban options.
	Mitigation measures	We described the environmental mitigation measures available to us in section 4 of this plan. In carrying out these measures, permission may be required to access land from landowners. Habitat restoration measures may require Flood Defence Consent from the EA/NRW and for works within or adjacent to SSSIs, consent will likely be required from Natural England/NRW. Equally, consent would be required from the owners/managers for works at any locally designated wildlife sites. Fish rescue actions require agreement and FR2 Consent from the EA/NRW. Flow augmentation and freshet release mitigation options may require a discharge permit or modification to abstraction licences (dependent on the nature of the mitigation measure), with liaison with EA

		and NRW. Reduction in abstraction by other abstractors would require discussion and agreements with those abstractors as appropriate. Agreement and liaison on mitigation measures is also required with Dwr Cymru Welsh Water in relation to releases from the Elan Valley Reservoirs to the River Wye and their abstractions from the River Wye. n/a for demand management/ TUB/ non essential use ban options.
	Impact on other activities e.g. fisheries, industry etc	None expected

Option implementation and environmental assessment: Drought management actions: All other WRZs

Option implementation Assessment	**Option Name**	**Options 1 to 7:** 1. lift restrictions 2. normal operation/ level 1 demand management 3. Convene DAT/ Level 2 demand management 4. Level 3 demand management/ Liaise with EA 5. Review maintenance schedule 6. Review/ remove borehole constraints 7. Re-zone/ transfer water
	Trigger(s) (or preceding actions)	DAT decision based on water resources position: triggers include low river flows, concerns about bulk imports and low groundwater levels in the WRZ(s).
	Deployable Output of action Ml/day unless stated otherwise	No DO gain expected from options 1-5 except for level 3 demand management. The benefits of this depend on extent of activity but we

		estimate saving of 0 to 2%.. Benefit of options 6 and 7 depends on what the groundwater constraint is and the supplies/ demands elsewhere in our network.
	Location Area affected or whole supply zone	The zone or zones affected
	Implementation timetable Preparation time, time of year effective, duration	No lead in time for options 1-4. Approximate implementation time for options 5, 6 and 7 individually is seven days. All seven options can occur at any time of year.
	Permissions required and constraints Including details of liaison carried out with bodies responsible for giving any permits or approvals	No permissions needed but we would seek agreement from other Severn Trent teams. For example, we would carry out an internal review of alternative production scenarios. Option 4 is constrained by availability of internal and external staff.
	Risks associated with option	Options 1-5 are low risk. Options 6 and 7 are low/ medium risk – potential risk to quality/ pressure/ reliability - mitigated by ability to stop/ vary option if required.
Environmental Assessment	**Risk to the Environment** (High/Medium/Low or unknown)	Low as these options are all within existing abstraction licence conditions
	Summary of likely environmental impacts Include details for features of moderate and major sensitivity and minor sensitivity features from designated sites	None – we are operating all licences in accordance with licence conditions and most of the options simply involve us operating our internal network differently.
	Baseline information used	Routine monitoring of demand, flows, ecology and water quality
	Summary of additional baseline monitoring requirements	We may need extra monitoring if dis-colouration is likely to be an issue
	Mitigation measures	No environmental mitigation required, but we will ensure our distribution and/ or treatment processes maintain our usual high water quality standards
	Impact on other activities e.g. fisheries, industry etc	None

Option implementation Assessment	**Option Name**	**Options 8 and 9** 8. Level 4 demand management/ TUB 9. Drought order
	Trigger(s) (or preceding actions)	DAT decision based on water resources position: triggers include low river flows, concerns about bulk imports and low groundwater levels in the WRZ. In WRZs relying on imports from other companies we would be triggered into using these drought management options in the unlikely event of the donor company alerting us to difficulties in providing the supply. We have shown how we operate our bulk transfers in section 3.3. In the Shelton WRZ we have an abstraction from the River Severn that is not tied to any hands off flow conditions so it is extremely unlikely that this would trigger any drought management actions. However, low levels in the groundwater sources in this WRZ and in our groundwater only WRZs could trigger actions. We set out more details of our approach in the groundwater only WRZs in section 2.2. We would only implement either of these options if the risk to supply remained high even after implementing options 1-7.
	Deployable Output of action Ml/day unless stated otherwise	TUB likely to reduce demand by 5%. We expect that a restriction on non essential use would reduce demand by a further 5%.
	Location Area affected or whole supply zone	The specific area affected or potentially the whole company
	Implementation timetable Preparation time, time of year effective, duration	Timetable for demand management as shown in section 5. Timetable for TUBs described in section 3.2. We have a 14 day lead in period for TUBs. We would only implement a TUB in spring, summer or early autumn. Defra can take 28 days to determine a drought order.

	Permissions required and constraints Including details of liaison carried out with bodies responsible for giving any permits or approvals	Prior to introducing a Temporary Use Ban, the details of the proposed water use restrictions need to be published on the company's website and advertised in local newspapers so that representations can be made. The company must consider any representations before confirming the implementation of the Temporary Use Ban. Application to the Secretary of State for a Drought Order to prohibit prescribed non-essential water use, with advertising of the proposed restrictions to allow representations to be made.
	Risks associated with option	Medium/ high for drought order – restricting non essential use could impact negatively on some of our non household customers, especially those whose businesses rely on specific uses of water. Medium for demand management/ TUB – although it is several years since we have restricted customers' use we expect that a well communicated campaign will cause some reduction in demand. However, the savings in our region may be lower than those seen in other regions as our customers are already more water efficient.
Environmental Assessment	**Risk to the Environment** (High/Medium/Low or unknown)	n/a for demand management/ TUB/ drought order to restrict non essential use. There is more information on drought orders in section 3.4 of this plan
	Summary of likely environmental impacts Include details for features of moderate and major sensitivity and minor sensitivity features from designated sites	n/a for demand management/ TUB/ drought order to restrict non essential use.
	Baseline information used	n/a for demand management/ TUB/ drought order to restrict non essential use.
	Summary of additional baseline monitoring requirements	n/a for demand management/ TUB/ drought order to restrict non essential use.

	Mitigation measures	n/a for demand management/ TUB/ drought order to restrict non essential use.
	Impact on other activities e.g. fisheries, industry etc	None

Table showing the frequency that modelled storage in Tittesworth reservoir enters drought zone D

Start Date	End Date	Duration (days)
20/12/1933	13/01/1934	25
31/10/1947	11/11/1947	12
03/10/1949	17/10/1949	15
30/09/1959	12/11/1959	44
23/10/1975	14/11/1975	23
17/10/1995	13/11/1995	28
18/12/1995	20/12/1995	3
02/10/1996	18/10/1996	17

Table showing the frequency that modelled storage in the Elan Valley group enters drought zone D

Start Date	End Date	Duration (days)
06/07/1921	05/08/1921	31
17/10/1921	04/11/1921	19
24/11/1921	29/12/1921	36
26/03/1929	07/05/1929	43
01/07/1929	07/08/1929	38
18/09/1929	04/10/1929	17
22/03/1932	27/03/1932	6
22/12/1933	12/01/1934	22

19/02/1934	14/03/1934	24
10/05/1938	29/05/1938	20
07/05/1944	31/08/1944	117
07/10/1949	16/10/1949	10
27/06/1976	11/10/1976	107
09/07/1984	19/09/1984	73
03/08/1989	21/09/1989	50
27/09/1989	20/10/1989	24
09/12/1995	21/12/1995	13
27/12/1995	08/01/1996	13
29/01/1996	09/02/1996	12
14/10/2003	01/11/2003	19
08/11/2003	13/11/2003	6
24/11/2003	12/12/2003	19

Table showing the frequency that modelled storage in the Derwent Valley group enters drought zone D

Start Date	End Date	Duration (days)
30/09/1921	03/10/1921	4
06/10/1921	05/11/1921	31
12/11/1921	26/12/1921	45
26/09/1929	29/09/1929	4
03/10/1933	09/10/1933	7
03/10/1949	10/10/1949	8
16/10/1949	17/10/1949	2
21/09/1959	18/11/1959	59
06/11/1975	30/11/1975	25

23/12/1975	31/12/1975	9
03/11/1995	11/02/1996	101
19/08/1996	23/08/1996	5
07/09/1996	03/11/1996	58

Table showing the frequency that modelled storage in Carsington and Ogston enters drought zone D

Start Date	End Date	Duration (days)
17/09/1929	04/10/1929	18
09/09/1934	08/12/1934	91
29/12/1975	01/01/1976	4
10/08/1976	05/10/1976	57
06/10/1996	04/11/1996	30

Agreed annual monitoring plans

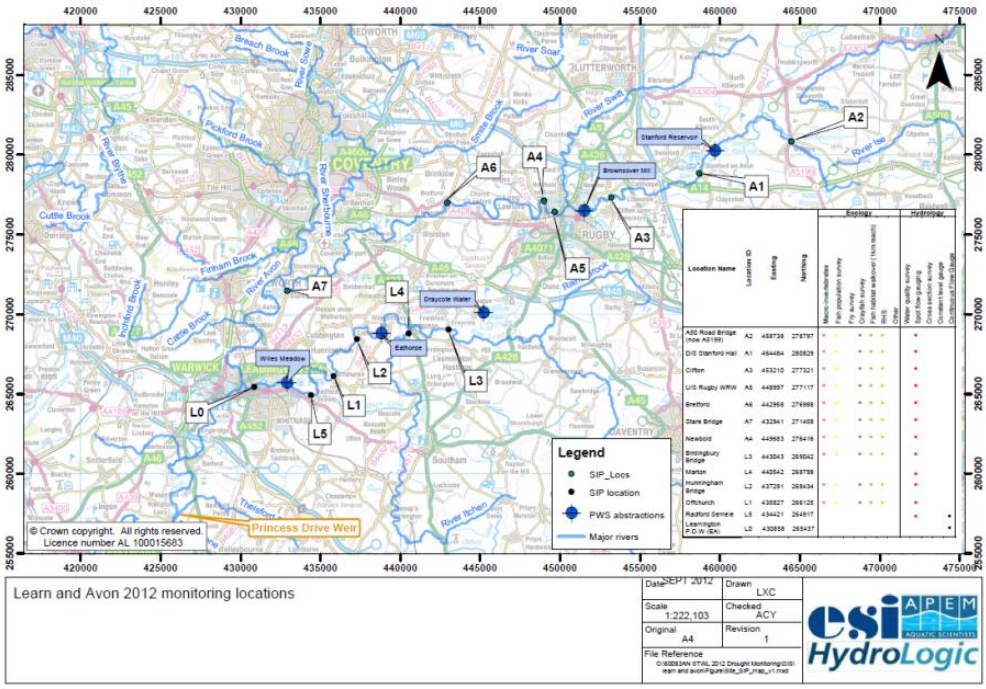
The 2012 agreed annual monitoring plan for the Avon and Leam is called the:

Leam and Avon Drought Monitoring site investigation plan (SIP) and it describes the baseline monitoring being carried out in support of this drought plan - specifically the drought permit site at Eathorpe on the River Leam (and the associated abstraction from the River Avon at Brownsover). The following table and map are from this SIP:

Monitoring	Location(s)	Frequency	Date/period
Fish habitat walkover survey	**3** stretches of River Leam (each approx 1km in length). **7** stretches of River Avon (each approx 1km in length)	Single survey	**9** stretches in 2011, **2** stretches in 2012.
Fish surveys	**3** sites (River Leam) **7** sites (River Avon)	One survey per year in late summer/early autumn	2011 – 2013

Monitoring	Location(s)	Frequency	Date/period
Fry survey	**3** sites (River Leam) **7** sites (River Avon)	One-off survey	2013 (rained off in 2012)
Crayfish	**3** sites (River Leam) **1** site (River Leam)	One-off survey One-off survey	2011 (Standard) 2012 (Trapping)
Macro- invertebrates	**3** sites (River Leam) **7** sites (River Avon)	Three seasons per year (spring, summer and autumn)	2011-2013
Spot flow gauging (including spot water quality samples at each site)	**5** sites (River Leam) **7** sites (River Avon)	Monthly, until sufficient data collected, then continuing on Leam only.	2011-2012**
Continuous flow monitoring	Canal overflow at Radford Semele, EA weir at Princess Drive		2012

*See map;
Shading indicates repeated monitoring;
** Until sufficient data have been collected to complete rating curves.

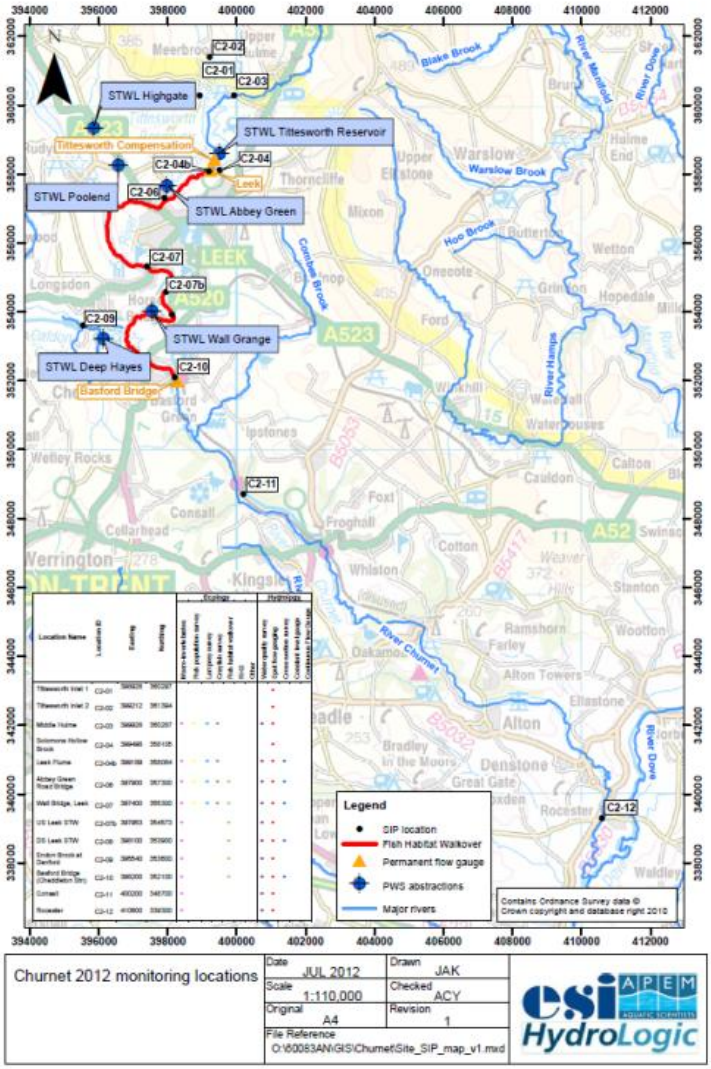


The 2012 agreed annual monitoring plan for the Churnet is called the:

Churnet Drought monitoring site investigation plan (SIP) and it describes the baseline monitoring being carried out in support of this drought plan - specifically the drought permit site at Tittesworth Reservoir on the River Churnet. The following table and map are from this SIP:

Monitoring	Location(s)	Frequency	Date/period
Fish habitat walkover survey	**1** stretch of River Churnet between Basford Bridge and Tittesworth Reservoir	Single survey	2010
Lamprey surveys	**4** sites (River Churnet)	Single survey	2011
Crayfish surveys	**4** sites (River Churnet)	Single survey	2011
Fish surveys	**4** sites (River Churnet)	One survey per year in late summer/early autumn	2011 – 2013
Macro- invertebrates	**9** sites (River Churnet) **1** site (Endon Brook)	Three seasons per year (spring, summer and autumn)	2010-2012
Spot flow gauging (including spot water quality samples at each site)	**9** sites (River Churnet) **1** site (Endon Brook)	Until sufficient range of flows covered	2011-2012**

*See map;
Shading indicates repeated monitoring;
** Until sufficient data have been collected to complete rating curves.



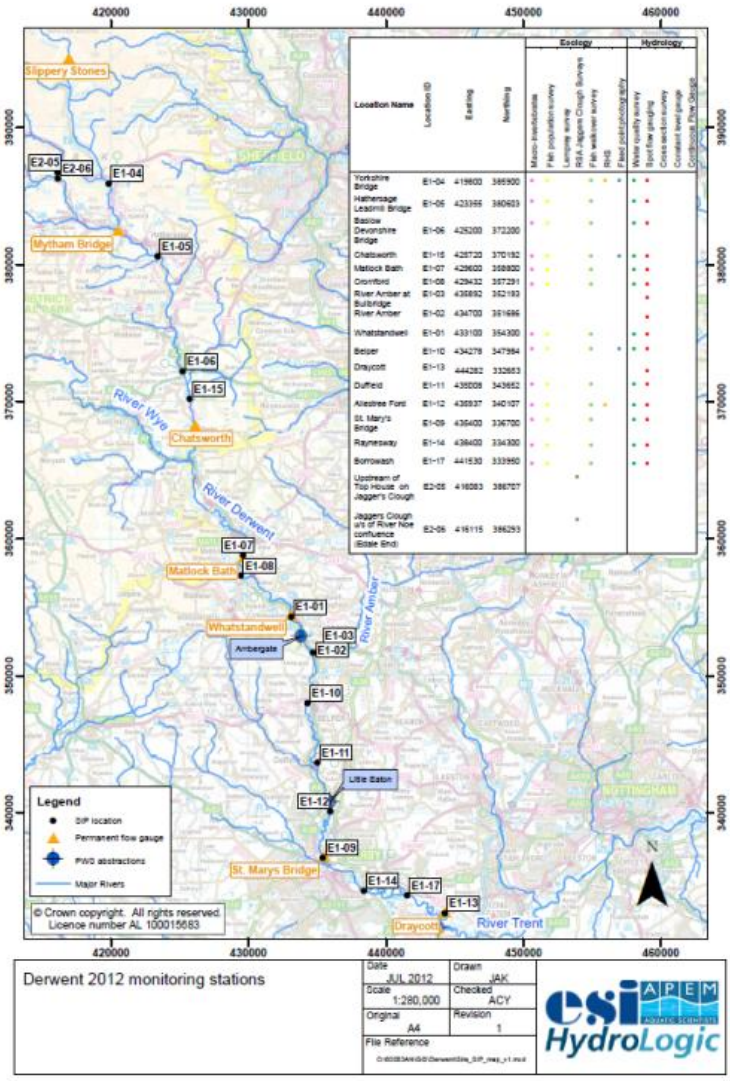
The 2012 agreed annual monitoring plan for the Derwent is called the:

Derwent Drought monitoring site investigation plan (SIP) and it describes the baseline monitoring being carried out in support of this drought plan - specifically the two drought permit sites associated with the River Derwent: Derwent Valley Reservoirs and River Derwent at Ambergate. The following table and map are from this SIP:

Monitoring	Location(s)	Frequency	Date/period
Fish habitat walkover survey	**9** stretches approx 1km in length	Single survey	2010
RHS	**2** sites	Single survey	2011 or 2012
Fixed Point Photography	**3** sites	Single survey	2012

Monitoring	Location(s)	Frequency	Date/period
Fish surveys	**9** sites (River Derwent)	One survey per year in late summer/early autumn	2010 - 2012
Lamprey - future	**TBC****	TBC**	TBC**
Lamprey - historical	**6** sites (River Derwent)	Single summer survey	2011
Macro- invertebrates (including water quality physico-chemical parameters temp, pH, DO and conductivity)	**9** sites (River Derwent)	Three seasons per year (spring, summer and autumn)	2010-2012
Spot flow gauging	**11** sites	Until sufficient range of flows covered	2011-2012***
Water Quality	**5** sites	Monthly	2011-2012

*See map;
Shading indicates repeated monitoring;
** Sites being reviewed by EA during 2012 for discussion in 2013 monitoring meeting.
*** Until sufficient data have been collected to complete rating curves.



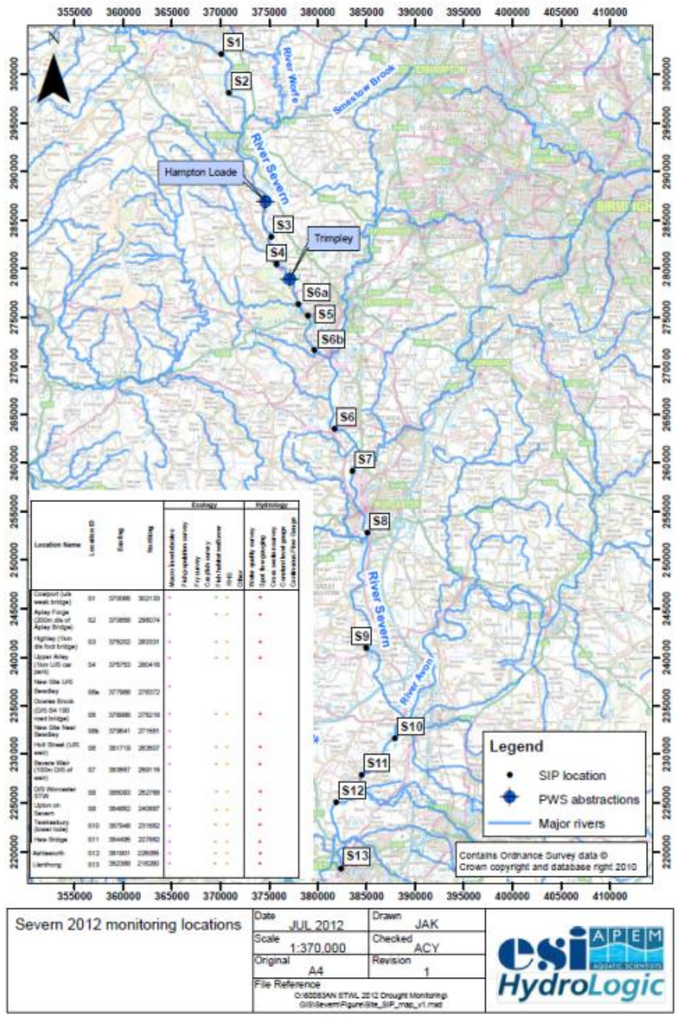
The 2012 agreed annual monitoring plan for the Severn is called the:

Severn Drought Monitoring site investigation plan (SIP) and it describes the baseline monitoring being carried out in support of this drought plan specifically the drought permit/ order site at Trimpley on the River Severn. The following table and map are from this SIP:

Monitoring	Location(s)	Frequency	Date/period
Fish habitat walkover survey	**13** stretches of River Severn (each approx 1km in length).	Single survey	2012
RHS	**13** sites	Single survey	2012
Macro- invertebrates	**13** sites (River Severn)	Three seasons per year (spring, summer and	2012 – 2014

Monitoring	Location(s)	Frequency	Date/period
		autumn)	
Fish surveys	**13** sites (River Severn)	One survey per year in late summer/early autumn	2013-2015
Spot flow gauging (including spot water quality samples at each site)	**13** sites (River Severn)	Monthly	2011-2012**

*See map;
Shading indicates repeated monitoring;
** Until sufficient data have been collected to complete rating curves.

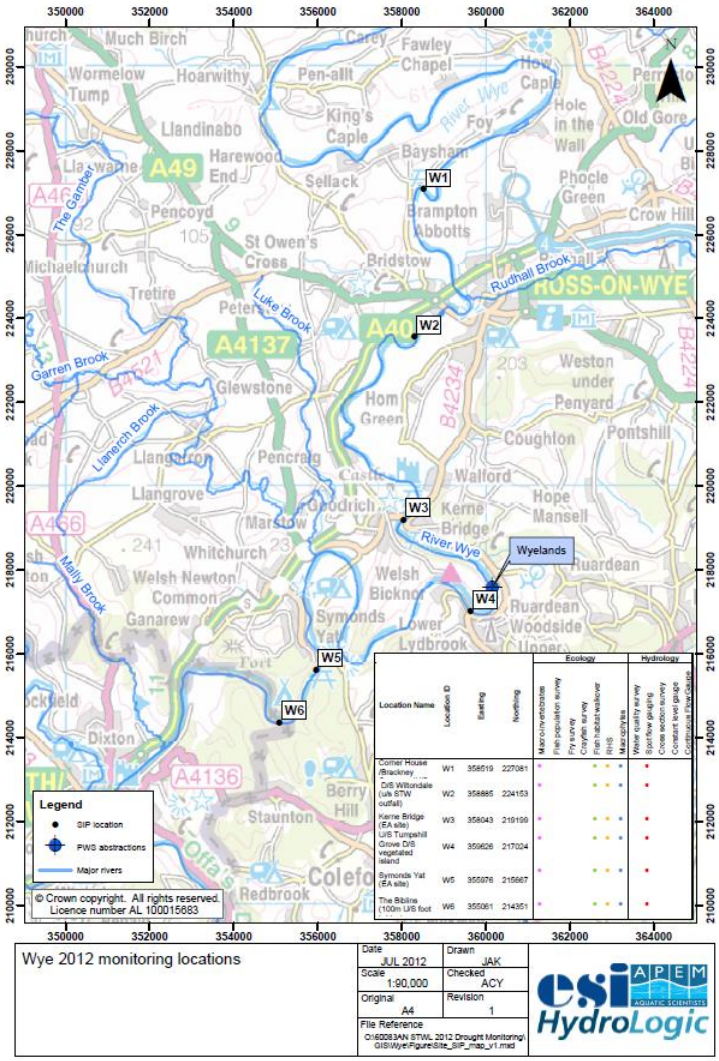


The 2012 agreed annual monitoring plan for the Wye is called the:

Wye Drought monitoring site investigation plan (SIP) and it describes the baseline monitoring being carried out in support of this drought plan - specifically the drought order site at Wyelands (aka Mitcheldean or Lower Lydbrook) on the River Wye. The following table and map are from this SIP:

Monitoring	Location(s)	Frequency	Date/period
Fish habitat walkover survey	**6** stretches of River Wye (each approx 1km in length).	Single survey	2012
RHS	**6** sites (River Wye)	Single survey	2012
Macrophytes	**6** sites (River Wye)	Single survey	2012
Macro- invertebrates	**6** sites (River Wye)	Three seasons per year (spring, summer and autumn)	2012 – 2014
Fish surveys	6 sites (River Wye)	One survey per year in late summer/early autumn	2013-2015
Spot flow gauging	**6** sites (River Wye)		2011-2012**

*See map;
Shading indicates repeated monitoring;
** Until sufficient data have been collected to complete rating curves.



The figure below shows the letter we sent as part of the pre-consultation phase of preparing this drought plan

27 March 2013

SEVERN TRENT WATER

Severn Trent Water Limited

Severn Trent Centre
PO Box 5309
Coventry
CV3 9FH

Letter sent by email

SEVERN TRENT WATER'S STATUTORY DROUGHT PLAN: PRE-CONSULTATION PHASE

We are beginning the process of updating our statutory Drought Plan for submission to the Secretary of State by February 2013. The timing of this update is due to the statutory process for producing Drought Plans, and is not linked to the current dry period of weather. Our current Drought Plan was published in February 2010 and can be found on our website at:

http://www.stwater.co.uk/upload/pdf/Final_Drought_Plan_2010v2.pdf.

We expect to publish a draft of our updated Drought Plan for public and stakeholder consultation in Summer 2012. As one of our key stakeholders we are seeking your early views on the issues dealt with by our current Drought Plan, and in particular whether there are any new issues or drought management measures that you think should be considered as we prepare our update.

The main changes we expect to include in our revised Drought Plan will include:

- Revisions to reflect the latest Environment Agency drought planning guidelines issued in June 2011.
- Updated drought management actions which build on our dry weather experiences during 2011 and 2012.
- Updates to the environmental reports and ongoing monitoring that would be needed to support future drought permit applications at the sites identified within the plan.
- Revisions to our demand management activities to take account of the changes in legislation around the use of temporary usage restrictions.

We would be pleased to receive your early views on the issues that you would want to see addressed by our Drought Plan by no later than 11 May 2012. Once we have updated our Drought Plan and have agreement from the Secretary of State, you will have a further opportunity to comment once we publish a draft for full consultation later this summer.

Please send your comments to Marcus O'Kane, our Water Resources Strategy Manager, either at the address above or by email at marcus.okane@severntrent.co.uk.

Yours faithfully

Andy Smith
Water Services Director

Registered in England & Wales, Registration No. 2366686, Registered Office: Severn Trent Centre, 2 St John's Street, Coventry CV1 2LZ

Table showing stakeholder responses to drought plan pre- consultation

Stakeholder	Response date/ format	Summary of response	Where it is incorporated in the draft plan
Ofwat	Letter dated 13	set out clearly what a drought is and what steps will be followed to manage it;	Executive summary, sections 1 and 3

	April 2012	set out clearly what levels of service, in terms of restrictions on use, customers can expect to receive, and for these to be consistent with those funded in your 2009 Final Determination;	Section 1.3
		demonstrate that the proposed drought management actions strike a balance between meeting the needs of consumers, those of the environment and shareholders;	Section 1 and throughout the plan
		set out your company's liability for payments of compensation associated with drought permits, ordinary drought orders and emergency drought orders;	Covered by the industry wide guaranteed standards scheme (GSS) – referred to in section 3.2
		take account of the impact of drought on your bulk imports of water and exports of water between zones;	Section 3.3
		be easily accessible to customers; and include Ofwat in your company's communications plan.	Executive summary and throughout plan, communications specifically dealt with in section 5
Environment Agency	Letter dated 10 May 2012	<u>General points:</u> Our plan should account for lessons learned during the 2010-12 drought.	Section 5.3
		Our plan should be accompanied by updated environmental reports	Section 4.1
		We should liaise with neighbouring companies regarding existing bulk transfers and future import/ export options	Sections 3.3.1 to 3.3.6
		We should refer to Drought and demand (ref. 07/WR/02/2) and the 2011 drought permit/ order guideline	Section 3 and 3.4

		Specific points: There were also 18 specific and more detailed points in the annex	These have been addressed throughout the plan and we provided the EA with a revised version on 10 July 2012. We have also provided further draft versions of this plan to the EA prior to publishing our draft plan in May 2013.
Consumer Council for Water (CCWater)	Email sent on 11 May	**Structure and format of the Drought Plan** - We will want to ensure that the Drought Plan is customer friendly and, in particular, we will focus on the non-technical summary as this is an opportunity for Severn Trent to increase potential public participation in the drought planning process. We would expect the summary to explain clearly the company's drought strategy and cover the issues of relevance to customers.	Executive summary and section 1
		Consultation - We expect the consultation to be as wide as possible, particularly engaging with those most likely to be affected by the actions in the plan. As part of the draft Drought Plan consultation it is important that the wider powers introduced by the Floods and Water Management Act 2010 are explained and contrasted with the previous approach for hosepipe bans that customers may have been more familiar with until recent events. The differences in procedure should be brought to their attention and Severn Trent should set out clearly how it expects to use these powers, including the water uses the company expects to prioritise through phasing in of restrictions, and the concessions it expect to grant.	Sections 1 and 3

		Overall Drought Management Strategy – The plan should set out the various demand management activities which will be implemented to reduce demand and how these actions will be prioritised, together with information on what has informed this i.e. customer and stakeholder engagement, research, lessons learnt from the current drought that we are experiencing etc.	Demand management in section 3, 3.1 and 3.2. Action prioritisation in sections 2 and 7.3 Lessons learned in section 5.3
		Drought Communication Plan – This should provide for liaison with CCWater so that we can provide comment in the media and ensure that our Consumer Relations colleagues are briefed to enable them to advise customers appropriately.	Section 5 (comms)

The figures below have been taken from the 2012 ESI/ HydroLogic/ APEM report '*STWL Derwent Drought Permit Non Technical Summary*'. They illustrate how we assess the potential impacts on the environment as described in section 4.

Have Drought Permits, Drought Orders or Licence Variations been required previously at these sites?

Previously, Severn Trent Water Ltd applied for the following Drought Orders and licence variations:

- Drought Order (DO) for the Derwent in 1976
- DO for reducing compensation flows from Ladybower Reservoir in 1989/90
- DO relating to refilling of Derwent Valley and Carsington in 1995/96Between April 1983 and December 1993 compensation flow to the River Derwent downstream of Ladybower Reservoir, was reduced to 39Ml/d at times when the flow at Derby St Mary's Bridge was greater than 340Ml/d. This was associated with Carsington Reservoir construction/filling and was formalised as a licence variation in January 1987.

The following Drought Permits were also applied for:

- Applications were made in 1996 for the Derwent catchment, but the application was withdrawn due to changed weather conditions.
- Similarly, in 2003, applications were made but were withdrawn due to rainfall.

How often will Drought Permits be required at these sites?

Detailed hydrological modeling was carried out using rainfall records for the last 87 years. This indicated that Drought Permits might be required on the Derwent on 3 to 4 occasions during this period. This is consistent with the three hosepipe bans per century suggested in Severn Trent Water's Drought Report. For the Ambergate abstraction, a Drought Permit would be very rarely required due to the combination of the large storage now available in Carsington Reservoir and the flow restrictions applied at Derby, St Mary's Bridge. Because of the nature of the rules controlling these abstractions it is very unlikely that both Drought Permits would be applied at the same time.

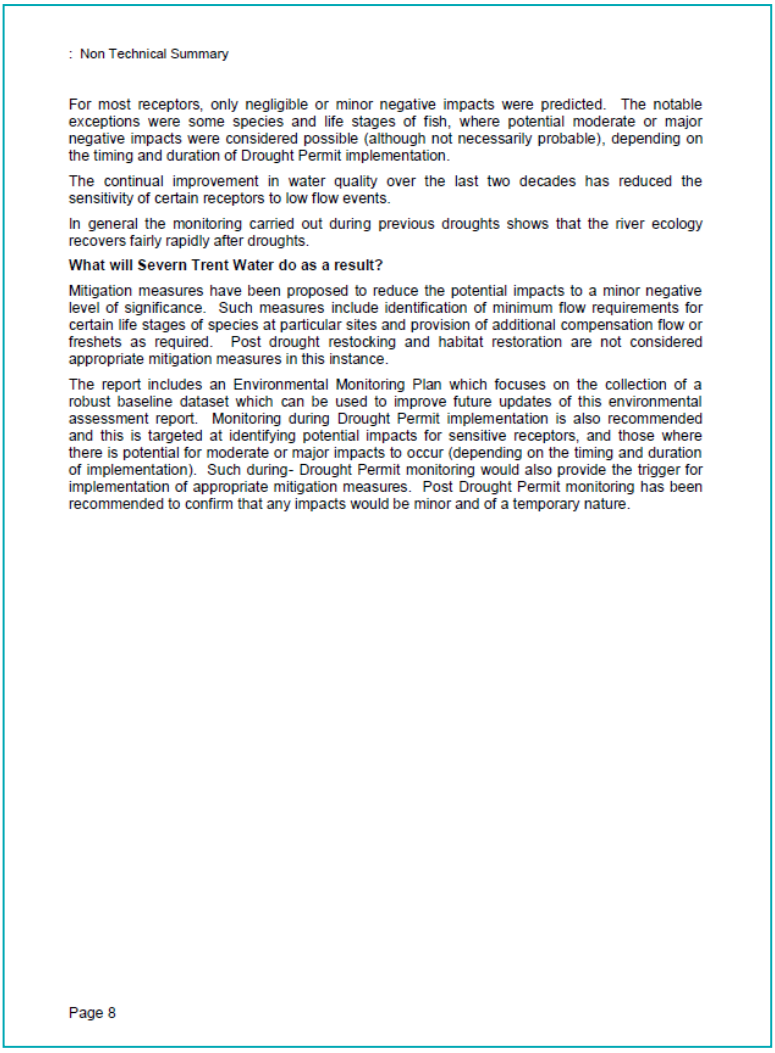
What analysis was carried out?

The report reviewed all the available flow, water quality and ecological data available to define the baseline conditions and, in particular to analyse the response of the water environment to previous droughts and Drought Permits. This allowed a detailed model of the sensitivity of the water environment and associated ecology (macroinvertebrates and fish) to low flow conditions. This model was then combined with the results of the hydrological modeling to predict the potential impacts of the proposed Drought Permits.

What were the results?

The results of the hydrological modelling and analyses have been used to assess baseline data and predict potential impacts for the following receptors:

- Water Quality
- River Habitats
- Macroinvertebrates
- Fish Habitats, Populations and Recruitment
- Fish Migration
- Amenity and Leisure
- Protected Rights
- Humber Estuary SAC



: Non Technical Summary

For most receptors, only negligible or minor negative impacts were predicted. The notable exceptions were some species and life stages of fish, where potential moderate or major negative impacts were considered possible (although not necessarily probable), depending on the timing and duration of Drought Permit implementation.

The continual improvement in water quality over the last two decades has reduced the sensitivity of certain receptors to low flow events.

In general the monitoring carried out during previous droughts shows that the river ecology recovers fairly rapidly after droughts.

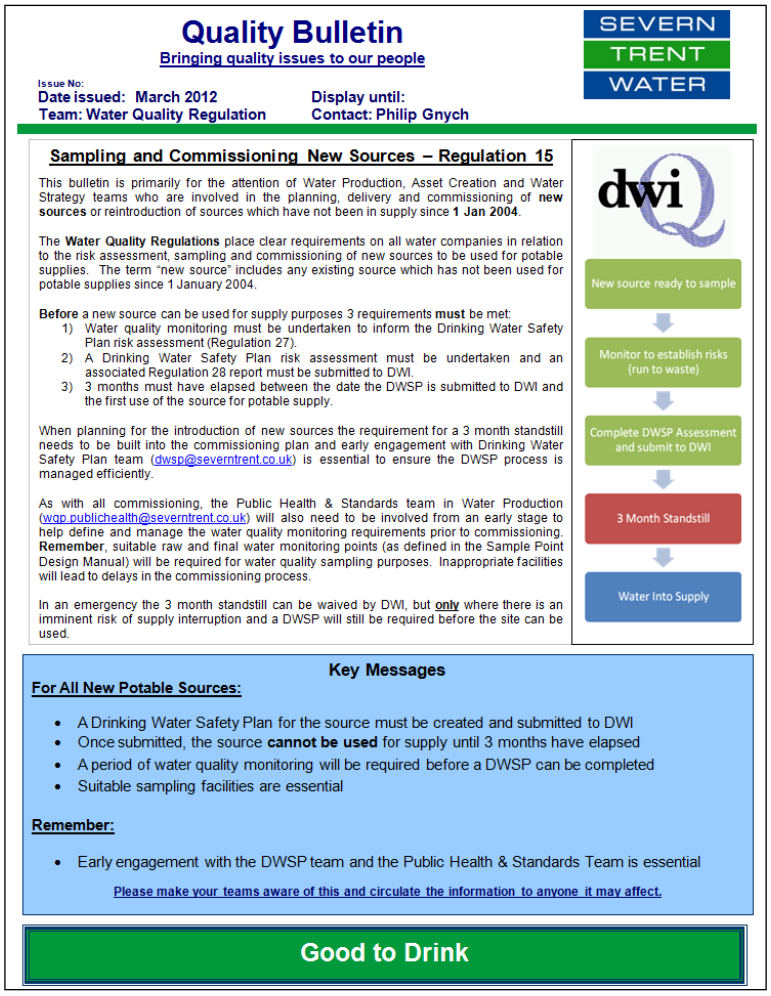
What will Severn Trent Water do as a result?

Mitigation measures have been proposed to reduce the potential impacts to a minor negative level of significance. Such measures include identification of minimum flow requirements for certain life stages of species at particular sites and provision of additional compensation flow or freshets as required. Post drought restocking and habitat restoration are not considered appropriate mitigation measures in this instance.

The report includes an Environmental Monitoring Plan which focuses on the collection of a robust baseline dataset which can be used to improve future updates of this environmental assessment report. Monitoring during Drought Permit implementation is also recommended and this is targeted at identifying potential impacts for sensitive receptors, and those where there is potential for moderate or major impacts to occur (depending on the timing and duration of implementation). Such during- Drought Permit monitoring would also provide the trigger for implementation of appropriate mitigation measures. Post Drought Permit monitoring has been recommended to confirm that any impacts would be minor and of a temporary nature.

Page 8

The figure below shows an internal water quality bulletin. The crucial information on here is that if we re-commission a source, it can not be used for supply until 3 months has elapsed.



Quality Bulletin

Bringing quality issues to our people

SEVERN TRENT WATER

Issue No:
Date issued: March 2012 **Display until:**
Team: Water Quality Regulation **Contact: Philip Gnych**

Sampling and Commissioning New Sources – Regulation 15

This bulletin is primarily for the attention of Water Production, Asset Creation and Water Strategy teams who are involved in the planning, delivery and commissioning of **new sources** or reintroduction of sources which have not been in supply since **1 Jan 2004**.

The **Water Quality Regulations** place clear requirements on all water companies in relation to the risk assessment, sampling and commissioning of new sources to be used for potable supplies. The term "new source" includes any existing source which has not been used for potable supplies since 1 January 2004.

Before a new source can be used for supply purposes 3 requirements **must** be met:

1) Water quality monitoring must be undertaken to inform the Drinking Water Safety Plan risk assessment (Regulation 27).
2) A Drinking Water Safety Plan risk assessment must be undertaken and an associated Regulation 28 report must be submitted to DWI.
3) 3 months must have elapsed between the date the DWSP is submitted to DWI and the first use of the source for potable supply.

When planning for the introduction of new sources the requirement for a 3 month standstill needs to be built into the commissioning plan and early engagement with Drinking Water Safety Plan team (dwsp@severntrent.co.uk) is essential to ensure the DWSP process is managed efficiently.

As with all commissioning, the Public Health & Standards team in Water Production (wqp.publichealth@severntrent.co.uk) will also need to be involved from an early stage to help define and manage the water quality monitoring requirements prior to commissioning. **Remember**, suitable raw and final water monitoring points (as defined in the Sample Point Design Manual) will be required for water quality sampling purposes. Inappropriate facilities will lead to delays in the commissioning process.

In an emergency the 3 month standstill can be waived by DWI, but **only** where there is an imminent risk of supply interruption and a DWSP will still be required before the site can be used.

dwi

Key Messages

For All New Potable Sources:

- A Drinking Water Safety Plan for the source must be created and submitted to DWI
- Once submitted, the source **cannot be used** for supply until 3 months have elapsed
- A period of water quality monitoring will be required before a DWSP can be completed
- Suitable sampling facilities are essential

Remember:

- Early engagement with the DWSP team and the Public Health & Standards Team is essential

Please make your teams aware of this and circulate the information to anyone it may affect.

Good to Drink

The table below has been taken directly from 2011 UKWIR report entitled '*Code of practice and guidance on water use restrictions'*

Table 3.1 – Legislation governing formal demand restrictions

Demand management measure	Legislation	Sections	Supplementary statutory instrument
Temporary ban on water use	WIA 1991	76 (as amended by section 36 of the FWMA 2010)	The Water Use (Temporary Bans) Order 2010
Ordinary drought order	WRA 1991	73-81 and Schedules 8 and 9	Drought Direction 2011
Emergency drought order	WRA 1991	73-81 and Schedules 8 and 9	-

Table showing the purpose of the other plans we produce that could affect our ability to manage drought

The table below shows the different types of plan that we produce that relate in some way to drought planning. It also summarises the purpose of each of these reports:

Plan	Purpose of plan	Comment
Business plan	This plan sets out what we expect to invest across the business over the next 5 years and beyond. It covers clean water, waste water, customer service and it shows what the impact of our proposed investment programme would have on customers' bills and company profits. We submit these plans to Ofwat for them to make a determination on what to allow within price limits. This means that they decide on how much we can charge our customers in the next 5 years. Supply demand and resilience to events like droughts are components within our company wide business plan.	We update these every 5 years
Climate change adaptation (ARP) plan	This includes a detailed risk assessment of all of our operations, activities and services using the latest climate change projections. It also explains our approach for appraising options to manage those risks and our next steps for responding to climate change in our operations. The impact on flows and the frequency of droughts is one of several risks considered in this plan.	We update these every 5 years

Drought plan	This is an operational plan to show how we will manage supplies and demands for water in a prolonged dry period.	We review these annually and update them within 3 years and 6 months.
Emergency plans	These plans describe what we will do in an emergency situation. This may be caused by a more extreme drought than we have ever experienced but could also become applicable after a major flood, asset failure and potential loss of services to customers. This plan includes arrangements to use emergency measures such as tankers and bottled water.	These plans are not published in the public domain due to their sensitivity.
Water resources management plan (WRMP)	The plan explains our proposals for making sure we have enough water available, in the right place and at the right time to supply our customers in an affordable and sustainable way over the next 25 years. Although there is an overlap between a WRMP and a drought plan, the WRMP is a more strategic longer term plan.	We update these every 5 years

7.5 Glossary

AMP – Asset Management Plan
AMP5 - The asset management plan covering the period 2010 to 2015
APEM – an Aquatic sciences environmental consultancy
Aquator – a water resources modelling software package produced by Oxford Scientific Software
CaRT (Canal and Rivers Trust) – the organisation, formerly known as British Waterways,
CEH – Centre for Ecology and Hydrology
DAPWL - Deepest Advisable Pumped Water Level
DAT – drought action team
DCWW – Dŵr Cymru Welsh Water
Defra - Department for Environment, Food and Rural Affairs
Designated sites – in this plan these are sites with environmental designations and not sites designated for other reasons (such as being critical national infrastructure)
DO - deployable output or drought order
DP – drought permit
DV – Derwent Valley
DWI – Drinking Water Inspectorate
EA – Environment Agency
EAR – environmental assessment report
ESI - independent scientific and environmental consultancy
EV – Elan Valley

Groundwater - water located beneath the earth's surface in soil pore spaces and in the fractures of rock formations.
GSS - guaranteed standards scheme
HD – habitats directive
HydroLogic - Consultancy services for hydrometry, field monitoring, water resources and hydrology
IROPI – imperative reasons of overriding public interest
JR- June return
Ml – Mega litre (one million litres)
Ml/d – Mega litres per day
NRW- Natural Resources Wales/ Cyfoeth Naturiol Cymru
Ofwat (The Water Services Regulation Authority) – the economic regulator of the water and sewerage industry in England and Wales
PR14 – periodic review of the water industry pricing in 2014
RHS - river habitats survey
RSA - Restoring Sustainable Abstraction – a programme lead by the Environment Agency
SAC – special area of conservation (under the HD)
SGS – Shropshire Groundwater Scheme
SIP – site investigation plan
SMD - soil moisture deficit
SoSI – security of supply index
STWL – Severn Trent Water Ltd
Summer – 1 April to 31 October (in terms of whether we would implement a TUB on domestic users of water)
Target headroom - a buffer between supply and demand designed to cater for specified uncertainties
TUB – temporary use ban (previously referred to as a hosepipe ban)
UKWIR – United Kingdom Water Industry Research
UU – United Utilities
WAG – Welsh Assembly Government - now called WG (Welsh Government)
Water UK - the representative organisation which brings together all of the UK's water and wastewater utilities
WFD – water framework directive
WRPGs - water resources planning guidelines
WRMP - water resources management plan
WRZ – water resource zone
WTW – water treatment works

7.6 References

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- Esi/ APEM/ Hydrologic/ Severn Trent, April 2012 – Drought Permit Environmental Assessment Report: River Derwent at Ambergate and Derwent Valley Reservoirs: STWL Derwent Drought Permit Main Report 60083J R1_FINAL - already shared with EA – internal report
- Esi/ APEM/ Hydrologic/ Severn Trent, April 2012 – STWL Derwent Drought Permit Non Technical Summary
- Esi/ APEM/ Hydrologic/ Severn Trent, March 2013 – Avon & Leam Environmental report
- Esi, February 2013, draft Drought monitoring 2012: River Severn
- Ofwat, 2011, glossary of terms http://www.ofwat.gov.uk/aboutofwat/gud_pro_ofwatglossary.pdf
- Ofwat, 2010, 2009-10 service and delivery report http://www.ofwat.gov.uk/regulating/reporting/rpt_los_2009-10.pdf
- Ofwat, 2010, 2009-10 service and delivery report supporting information http://www.ofwat.gov.uk/regulating/reporting/rpt_los_2009-10supinfo.pdf

- Ofwat, 2012, Information Notice IN 12/06 http://www.ofwat.gov.uk/regulating/prs_in1204weff.pdf
- Ofwat, 2010, Focus report – Resilient supplies http://www.ofwat.gov.uk/publications/focusreports/prs_web_1011resilience.pdf
- Ofwat, 2008 GSS guidance http://www.ofwat.gov.uk/mediacentre/informationnotes/gud_pro_gss08.pdf
- UKWIR: Code of practice and guidance on water use restrictions. Updated in Spring 2013 incorporating lessons from 2011-12 drought. Ref. UKWIR USE ONLY. This version may not yet be publicly available.
- UKWIR: Drought and demand: potential for improving the management of future droughts. Report Ref. No. 07/WR/02/2, 2007
- UKWIR: Drought and demand: modelling the impact of restrictions on demand during drought. *Report Ref. No. 07/WR/02/3, 2007*
- UKWIR: Unified Methodology for the Determination of Deployable Output (00/WR/18/1) 2000
- UKWIR: Duggin, James; Hickox, Diana; Piper, Ben; O'Connor, Charlotte. *Code of practice and guidance on water use restrictions*, 2011 *Report Ref. No.* 11/WR/33/3

- Severn Trent Water, 2013, Annual performance 2012-13 – can be downloaded at: http://www.stwater.co.uk/media/news-releases/what-a-year!
- Severn Trent Water, 2012, Ofwat Annual return 2012 – http://www.stwater.co.uk/upload/pdf/B8267%20Ofwat%20annual%20return%2022_06.pdf
- Severn Trent Water, 2012, 'Making the right choices' http://www.stwater.co.uk/upload/pdf/015313_SevernTrent_Making%20the%20right%20choices_Final1.pdf

- Severn Trent Water climate change adaptation report, 2010 http://www.stwater.co.uk/about-us/environment/climate-change/adapting-to-climate-change/

- Severn Trent Water, 2010, Drought Plan http://www.stwater.co.uk/upload/pdf/Final_Drought_Plan_2010v2.pdf
- Severn Trent Water revised draft WATER RESOURCES MANAGEMENT PLAN (WRMP) 2013) - HTTP://WWW.SEVERNTRENT.COM/FUTURE/FUTURE-PLANS-AND-STRATEGY/WATER-RESOURCES-MANAGEMENT-PLAN
- Severn Trent Water WATER RESOURCES MANAGEMENT PLAN (WRMP) FINAL VERSION (JUNE 2010) - http://www.stwater.co.uk/upload/pdf/Final_WRMP_2010.pdf
- Severn Trent Water/ Ernst & Young, 2011, Changing course through water trading – How water trading can make a contribution to solving future water scarcity to the benefit of customers and the environment http://www.stwater.co.uk/conWebDoc/2204
- South Staffordshire Water/ ESI, 2012 Hampton Loade DP/DO Environmental Assessment Report Update
- Thames water website, 2012, http://www.thameswater.co.uk
- UU revised draft drought plan,
- Yorkshire Water Draft drought plan 2012, January 2012

- Waterwise drought report, July 2013
  http://www.waterwise.org.uk/data/2013_Waterwise_Drought_Report.pdf

7.7 Environment Agency guidance on 'exceptional shortage of rain'

The guidance below was shared by EA via Water UK email network on 19 April 2012:

Environment Agency

Exceptional shortage of rain

Principles for the assessment of drought orders and permits

Background

The legal criteria that must be met in granting a drought order or permit include:

'If the Secretary of State / Agency is satisfied that, by reason of an exceptional shortage of rain, a serious deficiency of supplies of water in any area exists or is threatened…..'

It is not appropriate to set a prescriptive approach to assessing the exceptional shortage of rain. Each drought and each situation is unique. Previous drought order and permit hearings and inquiries have confirmed that there should be no set definition of exceptional shortage of rain.

Matters to consider in the assessment

Technical analysis methods - methods can include return period analysis, such as using Tabony tables and extreme value analysis, Standardised Precipitation Index and other indices, rainfall deficits as percentages of long term average and as cumulative deficits. Comparisons may be made to other drought events and ranking of deficits. Pattern, timing and effectiveness of rainfall may all feature.

Period of analysis - should reflect the conditions that have led to the supply shortfall. It should take into consideration the starting point of the drought and its effects on the water supply situation. This could include distinct periods within the longer timescale of the event.

Geographic extent of analysis - the rainfall deficit must be relevant to the catchment area of the public supply sources that require the drought permit.

Other meteorological and hydrometric measures - the legislation is clear, but the effectiveness of rainfall as shown by secondary measures, such as temperature, soil moisture deficit, river flows, groundwater levels, can also be relevant. Statistics and analysis should clearly make the link between the two, for example winter rainfall deficits leading to exceptionally low groundwater levels; high winter temperatures leading to dry soils and lack of runoff for reservoir refill. However these measures must not detract from deciding that the reason for serious deficiency is exceptional shortage of rain.

Relationship to the serious deficiency question - a deficiency of supplies may be threatened and the exceptional shortage of rain may be marginal but if the situation worsens and actions become more extreme/damaging or worst case public supply runs out. In such a situation, an assessment of the risk of supplies worsening can form part of the case but should not be the primary consideration.

Relationship to water company system - the analysis should consider the company's supply system critical period and its customer levels of service in broad terms. It should show that the exceptional shortage of rain analysis is appropriate to the type of system, seasonality and deployable output as outlined in the company's water resources management plan and drought plan.

Other sources of information - consider previous inspector's decisions, advice from technical colleagues and neighbouring regions / companies.

Presentation - the analysis should be technically rigorous. A plain English summary and explanation of the case that can be understood by 3rd party interests is desirable.

environment-agency.gov.uk

7.8 Useful Links

Severn Trent

Our main website:

www.stwater.co.uk

Visit http://www.stwater.co.uk/about-us/lets-talk-water/water-forum/ to learn more about our Water Forum

Visit http://www.severntrent.com/future/plans-and-strategy/your-choices to learn more about our PR14 business plan consultation

Visit http://www.severntrent.com/2020-plan to view the business plan we submitted in 2013

Visit www.stwater.co.uk/savewater for tips, information and free products to help you save water.

www.moretoexperience.co.uk
Looking for a great day out? Take at look at our visitor's centre website.

Regulators and industry bodies

Ofwat - www.ofwat.gov.uk

Defra - www.defra.gov.uk

Consumer Council for Water - www.ccwater.org.uk
Environment Agency - www.environment-agency.gov.uk/

Natural Resources Wales/ Cyfoeth Naturiol Cymru – www.naturalresourceswales.gov.uk

UK Water Industry Research (UKWIR) - www.ukwir.org

Other

Government ministers - www.defra.gov.uk/corporate/about/who/ministers/

Welsh Government ministers –
www.wales.gov.uk/topics/environmentcountryside/?lang=en

Anglian Water – www.anglianwater.co.uk

Dŵr Cymru Welsh Water - www.dwrcymru.com

South Staffordshire Water – www.south-staffs-water.co.uk

Thames Water - www.thameswater.co.uk

Yorkshire Water - www.yorkshirewater.com

The Wye and Usk Foundation - www.wyeuskfoundation.org