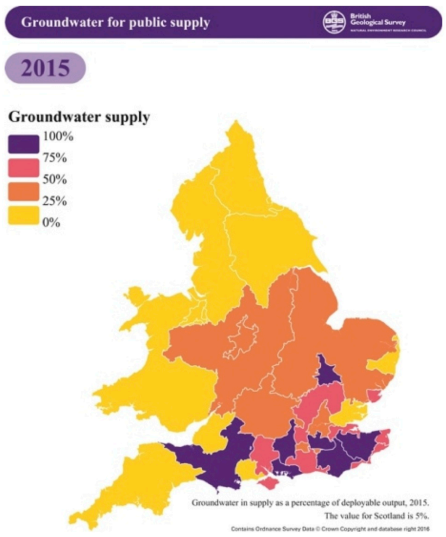
Water Resources – Balancing the Books in the South East

Town Bridge Chesham, April 2017

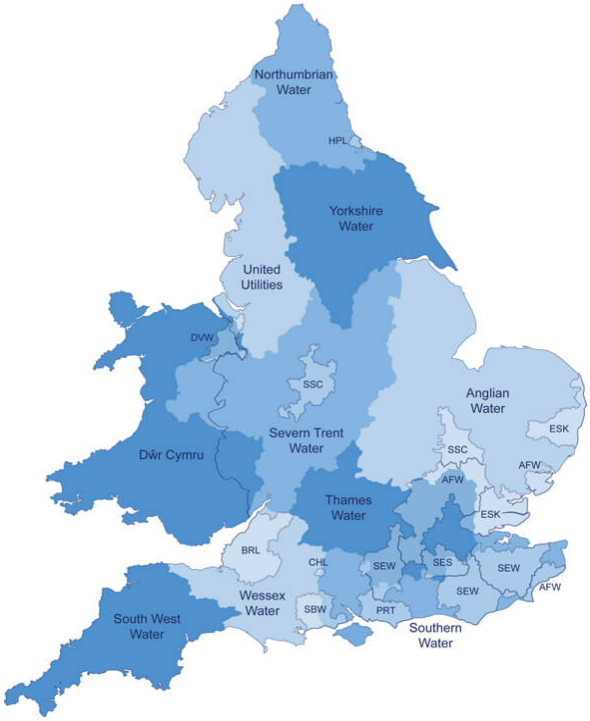
In the South East of England, we have the largest population living in the driest corner of the UK. So, it should not be a surprise that we regularly find ourselves in a water stressed situation. With the unpredictable extremes in weather we now experience we face a very uncertain future. Although it may seem hard to believe, London has lower rainfall than all the major Australian cities. Across the UK supply of domestic water comes from surface water - *reservoirs and rivers*, or groundwater *from the subsurface aquifers*; both are dependent rainfall. In the South East we are more dependent on groundwater for our domestic supply ***(see figure 1 below)*** than other parts of the UK. In this area we also have the largest concentration of chalk rivers. These rivers are dependent on water from the chalk aquifer for their flow. So this dependency on groundwater for public supply puts the water companies in competition with these chalk rivers for their water.



Source: British Geological Survey Figure 1

Across the South East region there are a number of large water suppliers: Affinity, Anglian, Essex and Suffolk, South East Water, Southern Water, Sutton and East Surrey Water and Thames. The dependence on abstraction as a source of water varies across these companies with Affinity, South East Water, Southern and Sutton and East Surrey requiring greater than 60% of their water to come from the aquifer.

Water Company Areas



Source: Ofwat

With this patchwork of suppliers in the South East there is a need for these water companies to work closely together to address the regional water supply constraints. For a solution to be found there is a need to create a more integrated infrastructure so water resources can be distributed more evenly and reduce the reliance on abstracted groundwater from the chalk aquifer. Only with this approach will we be able to reduce the impact on our rare chalk river ecosystems.

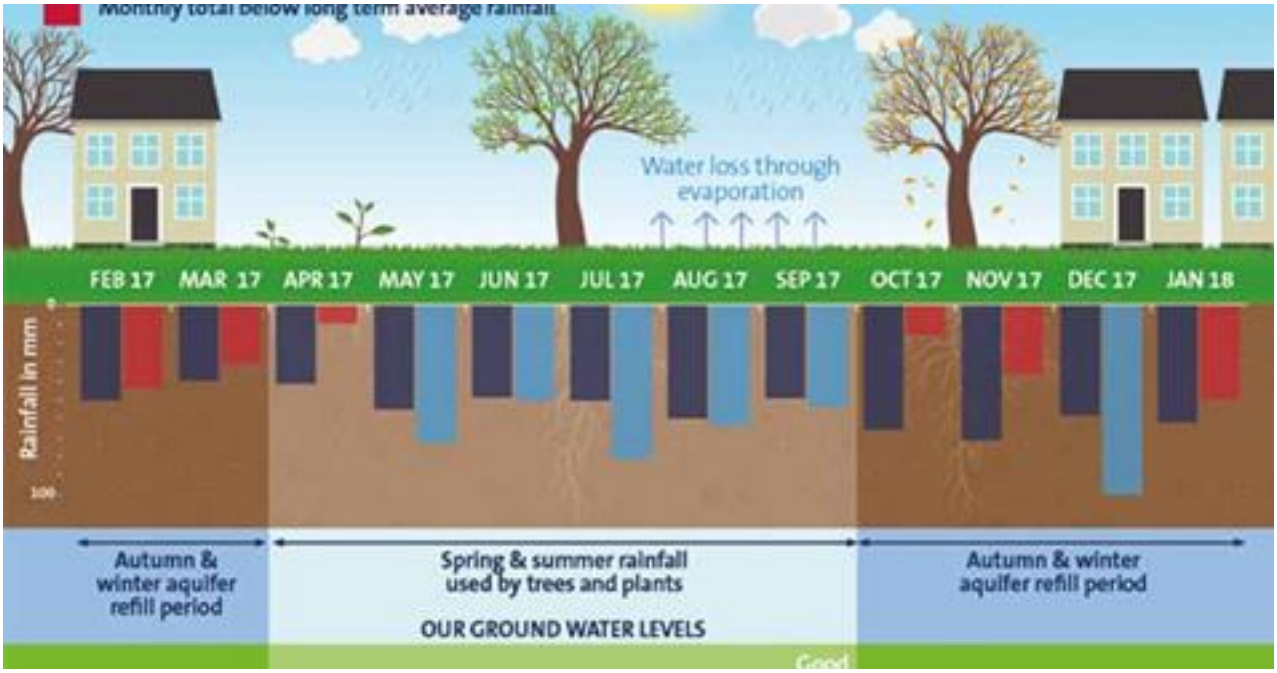
The Chilterns

It has been long recognised that the Chiltern Chalk Streams are the worst affected from abstraction in England; they are on the front line.

In the Chilterns our chalk rivers, the Wye, Misbourne, Chess, Gade, Bulbourne and Ver have been under stress for years and in the last two years large sections have been dry. There has been some minor recovery in recent months, but there are still dry sections at a time of year when we should be seeing maximum flow. This will continue to happen as long as we have unreliable weather patterns and groundwater is being abstracted for domestic supply. The problem the water companies have is there are few alternative supplies of water currently available to substitute for this abstracted source. There are also economic constraints; most water abstracted from chalk comes pre-filtered so requires

minimum processing and it is abstracted at the heads of catchments so can be delivered to customers mainly using gravity. This makes it cheap.

Efforts have been made to reduce abstraction, but more needs to be done as our rainfall patterns become more variable and unreliable. The River Chess in Chesham was dry between October 2016 and April 2018, but the Environment Agency and Affinity Water refused to recognise this as an environmental drought. We have seen record low groundwater levels in the catchment in October, November and December 2017 with a slight improvement in January and March 2018 to the category of 'below normal'. We are told that the Environment Agency are not allowed to use the "D" word, well whatever you want to call it, it was a drought and the river habitat was significantly damaged. For Affinity, the penny has eventually dropped and even after the return of flow they are predicting water use restrictions by the end of summer 2018. The recent rains of March and early April have allowed water to flow in Chesham but judging from the low groundwater levels this will not last for long. Calling a drought is not popular with DEFRA and the Environment Agency who appear to be burying their heads in the sand or are hoping for a 2012-style summer deluge to save them.



Source: Affinity Water

The Chess has three main sub-catchments, Missenden Road, Pednor Vale and Chesham Vale. Missenden Road and Pednor Vale are now flowing. They meet at the 1897 Pednor Tennis Club and go on to flow past the Queen's Head. The biggest of the catchments, the Chesham Vale is still dry. This might be due to the fact that the three main abstraction pumping stations in the Chess catchment are located in the Chesham Vale. These abstractions supply water to the towns of Chesham and Tring. In the upper River Chess, catchment water is abstracted from boreholes at Alma Road, Chartridge and on the road to Hawridge by Affinity Water and Thames Water. There is an indication in their draft "Water Resource Management Plan 2019" that Thames Water are considering a significant reduction of abstraction from Hawridge boreholes but this still needs to be approved by Ofwat and the Environment Agency. If this happens we will see an improvement in flow in the Chess, drying events will become more infrequent and for less time and the impact on the environment will be reduced and recovery periods will be shorter.

So What Can Be Done?

Water Resource Management Plans

The water companies are currently consulting on their Water Resource Management Plans. These are prepared every five years. They set out how they can provide a reliable and sustainable supply of water to customers. In this cycle the plans address long-term issues with Affinity looking out 60 years and Thames 80 years; this is a new approach and much appreciated. Key features of these plans are population growth, effects of climate change, demand management, infrastructure and water supply.

Population growth – the South East is already one of the most densely populated parts of the country, and the number of people living and working here is forecast to grow significantly. In the Thames Water region alone by 2045 they forecast that there will be an extra 2 million people living in the area, all requiring water.

It is expected there will be an increase in the frequency and severity of droughts in the future due to changes in weather patterns, so any plan needs to provide greater resilience to cope with severe drought events. In 2012 we were saved from a drought by a very wet summer, which gave us a very rare but much needed summer recharge of the aquifer. The consequences of a severe drought would be significant for us all, the environment and the economy. Studies have estimated that a severe drought could cost London's economy alone up to £330 million every day. This shock in 2012 set in motion government led plans to address this risk, but after two subsequent wet winters all these plans seemed to have been shelved. As we come to the end of our second successive dry winter and record low groundwater levels it must be time to dust off those plans.

So what's in the *Water Resource Management Plans*

- Utilising water more efficiently, demand management, reducing leakage, use of smart meters, which provide information on water usage, helps to reduce water use and also provide information to help manage the water supply network, including identifying leaks. They also promote efficient use of water through education programmes with schools and local communities.
- Demand management will not be enough to match supply constraints, new water sources are needed. Studies have been undertaken to examine new water sources, these include transferring water from the River Severn; a new reservoir in Oxfordshire, and treating effluent from sewage works. To meet the deficit a combination of solutions will be needed.

This is important work but the impact on water supply and demand is uncertain and can only be estimated. If these efforts are not effective and there is a risk that this could be the case, where are we? Possibly 5 – 10 years down the road with an even more pressing need for supply infrastructure. Considering the critical importance of a reliable water supply we should be looking at projects that will give us a more predictable outcome; this is why new reservoirs as part of an integrated South East supply system is needed.

Abingdon Reservoir

To provide additional and alternative sources of water for this stressed region and provide the tolerance, resilience and capacity needed to protect against climate change we will need more reservoir capacity.

Thames Water have carefully assessed options and have proposed a new reservoir near Abingdon. This would be the largest reservoir they operate. They have examined a number of sites before settling on Abingdon.

The proposal is to take water from the River Thames downstream of Abingdon at times of high flow and store it in the reservoir. Water could then be released from the reservoir into the River Thames at times of low flow and then abstracted downstream to supply areas of the South East and reduce the reliance on groundwater, taking pressure off our chalk streams.

This could yield up to ~ 300 Ml/d for this water stressed region.

Abingdon reservoir - Facts and figures for 150 Mm3 reservoir (the largest potential size)

Volume	150 Mm^3 or 150 billion litres - note reservoirs of different sizes were considered from 75 – 150 Mm^3
Depth	33 metres (when full)
Embankments (height)	Between 15 and 25 m in height above ground level.
Surface area	6.7 km^2 (about 1650 acres or 670 hectares).
Area of the site	1700 hectares

- Fully bunded reservoir
- Conveyance tunnel and intake / discharge at Culham on the River Thames to (i) fill reservoir by abstracting raw water from the River Thames, and (ii) support flows in River Thames by discharging water stored within the reservoir.
- ~ 15 years lead time of which ~ 8 years construction - there would be disruption to some local communities - Traffic and noise during construction, more visitors after construction, loss of farmland and some properties.
- Less than 30 properties would be directly impacted. Compensation would be paid. This would have to be agreed with affected residents.
- Reservoir lies within a floodplain and will result in the loss of btw 150-200 ha of existing natural flood plain. Compensation flood storage will be provided to mitigate the loss of any existing flood plain
- As well as providing the water customers need, the reservoir will provide a valuable opportunity to benefit the environment and create a recreational resource. The reservoir design would take into consideration the views of local communities.

Source: Thames Water.

Work on the Abingdon reservoir needs to start now. We appreciate there will be local resistance to this plan but for the greater good of the South East and its Chalk Rivers this needs to happen.