Derwent Valley Drought Permit Application

October 2022

WONDERFUL ON TAP

SEVERN TRENT

Executive Summary

A critical feature of the UK's regulatory framework is the use of drought permits to protect future supplies to customers and the environment during drought. We are making an application for a drought permit to support our Derwent Valley reservoirs, located in the north of the Severn Trent Region, to support recharge over the autumn-winter period and continue to supply customers, while protecting the environment over spring/summer of 2022. This will be our first drought permit in this region for over a quarter of a century.

The basis for our drought permit is the exceptionally dry weather we have experienced this year. In the upper Derwent for example, we have experienced the driest 7-month period for 131 years (since 1891) and the 5th driest period in the whole Derwent catchment over the same period. At the same time, temperature records have been set in England with the first ever Red Extreme Heat warning and a new maximum temperature being recorded. Combined, these factors have put significant pressure on our water supply system, resulting in inflows and storage that are much lower than normal for this time of year.

Since early spring our Drought Action Team has been monitoring the situation and has carried out an enormous amount of activity to protect raw water supplies in the Derwent. This has allowed us to delay the need for any drought permit and ultimately protect river flows through the peak of summer. For example:

Supply

We have created 58.6 days of extra capacity at our Upper Derwent Water Treatment Works Water Treatment Works by: (i) increasing overall supplies by 114 Ml/d over and above what was assumed in our WRMP19/drought plan through better outage management; and (ii) reducing output at our Upper Derwent Water Treatment Works when our reservoirs were still in Level 1, saving 5,575 Ml compared to last year.

Leakage

We are finding and fixing 40% more leaks than last year (28,000 versus 20,000 last year) and fixing customer reported leaks faster. Our speed of response for finding and fixing significant customer reported leaks has reduced by around 17%. August's average was 4.7 days compared to 5.7 days for August last year and our year-to-date average is 4 days this year compared to 4.8 days at this point last year. We have achieved this by increasing the number of teams focused on leakage (30 extra technicians and 70 new apprentices), so that we remain on track for our leakage target this year, despite the increase in leaks driven by soil moisture deficits this summer. That would make it 11 out of 12 years in which we have achieved or outperformed our leakage regulatory target (the exception being 2017/18 due to the 'Beast from the East').

Demand

We have delivered our largest ever programme of encouraging behavioural change by customers, helping to deliver both: (i) a 6% reduction in demand in August and September; and (ii) a foundation for reductions in future years. This foundation is key because climate change means we will experience more extreme weather like this year's. To maximise the amount of water we leave in the environment, we have been working with experts such as Professor Vlaev and the Behavioural Group at Warwick University and Professor Easthope to ensure our demand-side actions are repeatable and avoid diminishing returns. At the heart of our approach to demand management is working with our customers as partners, giving them the motivation and means to make sustainable demand reductions, rather than shorter-term restrictions.

Our programme of engagement has involved many elements, including millions of SMS text messages to customers, radio adverts, emails to customers and high users, water efficiency advice and social media interactions. All of these have been amplified through our proactive engagement with the press and the use of

other voices, such as social media influencers and suppliers. We can see through August that behaviours had changed:

- Diurnal water use patterns confirm no night-time peaks from early August showing outdoor use had fallen - our drought plan identified night-time peak being an indicator of outdoor usage– Figure 1 (Changes in diurnal Patterns)
- Comparisons with Hafren Dyfrdwy, which didn't have the demand management programme, show a sustained divergence in demand from August with demand being lower for Severn Trent – Figure 2 (Consumption - STW vs HDD)
- Comparisons between temperature and water into supply show a sustained divergence with lower water in supply from August for a given temperature – Figure 3 (Demand Vs Temperature).

Figure 1 (Changes in diurnal Patterns)

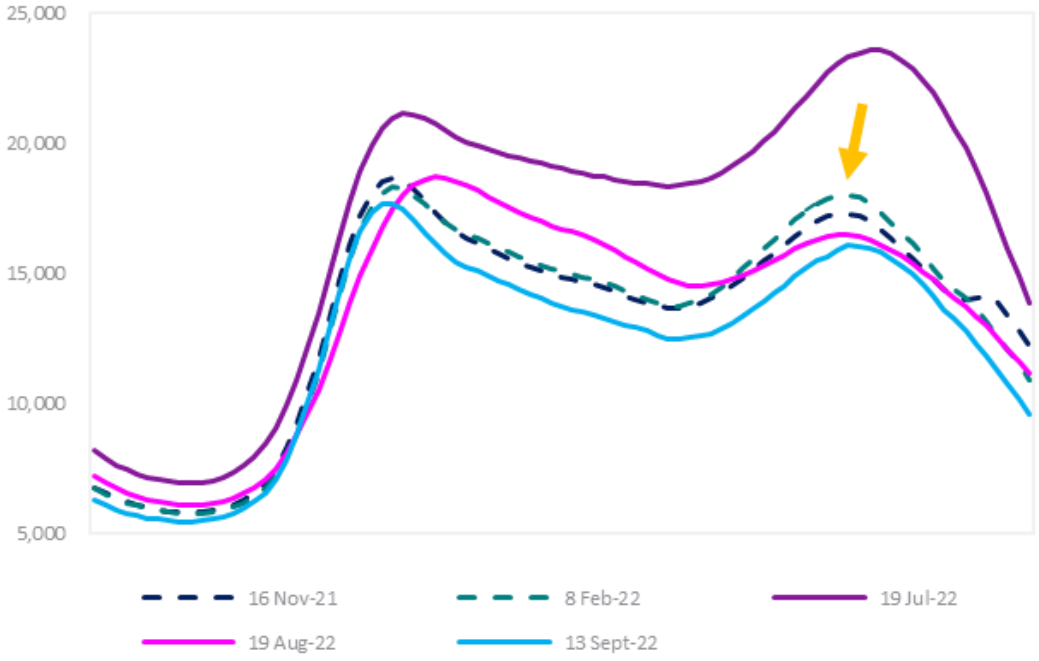
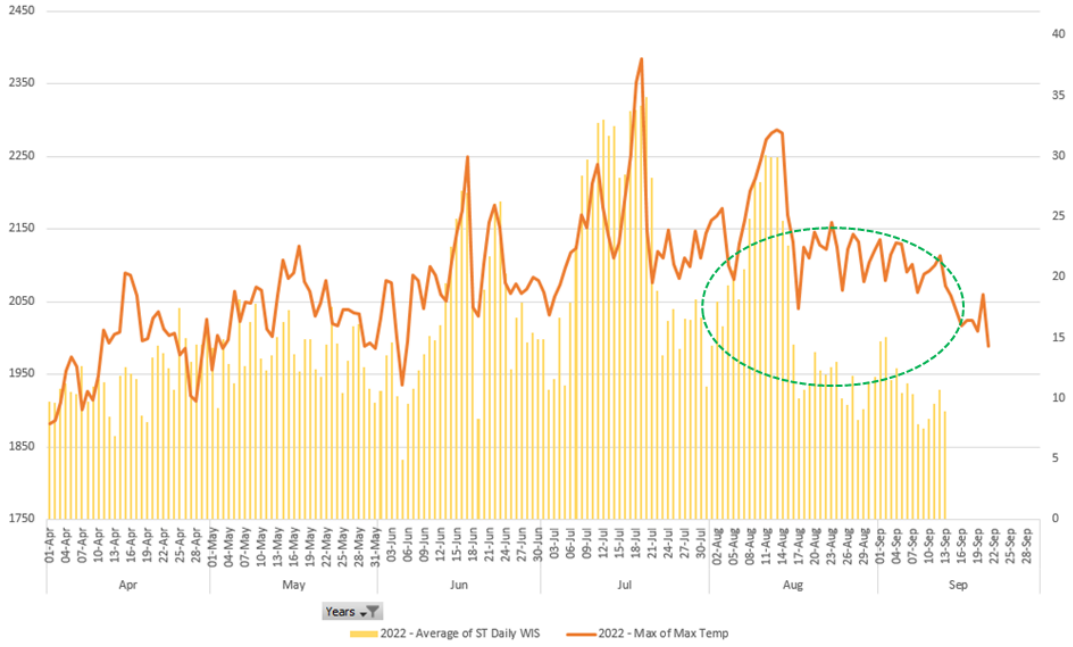


Figure 2 (Consumption - STW vs HDD)

Figure 3 (Demand Vs Temperature)



We recognise that our approach over the summer contrasts with other companies, particularly in the South-East that relied on temporary usage bans to bring down demand. Driving behaviour change through partnerships is undoubtedly harder and more expensive - we have already spent 6 times more than some companies on media campaigns this summer and are forecast to spend £75m more than our water TOTEX allowance this year. Instead of sustaining our demand management programme, when storages in the Derwent Reservoir crossed into level 2 on 19th August, we could have subsequently imposed a temporary use ban (TUB). This is an option we considered very carefully in the context of the demand patterns we were observing.

Although TUBs are an important part of our toolkit, they need to be deployed cautiously, reflecting the fact that: (i) they only tackle a limited number of uses outdoors (see p. 36 of our Drought Plan); and (ii) they, by their temporary nature, are not designed to bring about sustained behavioural change. When we crossed into level 2, demand patterns indicated that we had already motivated customers to stop their outdoor water use and were having success reducing indoor usage, with plans to do even more over the winter. In our view, applying a TUB in this context would have had the unintended consequence of putting more pressure on the environment given: (i) it would not have delivered any savings over and above our approach; and (ii) it would have prevented us from undertaking our winter demand programme (I.e., creating a perception of us acting as enforcers policing rather than acting as partners).

Since we crossed into level 2, we have maintained demand at winter levels. However, given the continued low levels of inflow, to ensure we can continue to supply our customers and protect the environment over the spring/summer of 2022 we consider additional action is needed. We are focused on two key areas to secure our supplies for customers and the environment next summer: – a drought permit and the UK's first large scale winter demand programme, we discuss these below.

Drought permit

We are making the request for a drought permit which would allow us to reduce the amount of water we release from Ladybower Reservoir from 54 Ml/d to 34 Ml/d per day, and to hold that saved water back in the reservoirs over the winter. Crucially, we are doing this when the risk of downstream environmental impacts is minimised because river levels are naturally higher. Over the life of the permit this would deliver 3,360Ml of retained

storage within the reservoir, this is the equivalent of approximately 35 days' supply from our upper Derwent WTW.

Winter demand

We are launching the UK's first ever large-scale winter demand reduction programme, designed to reveal the best tools for bringing down demand over winter. This will involve both: (i) a mass winter campaign creating 200 million touch points from TV, radio, texts, emails and the press; and (ii) trialling at scale four types of interventions on customer doorsteps in Derbyshire and Leicestershire to reveal which activities are the most effective at bringing down consumption.

We have already recruited 23 water saving champions and have redeployed other teams in the meantime to drive our water efficiency messages and leakage support on the doorstep. Despite being very early in the programme we have already visited almost 1,000 homes for water efficiency audits and engaged another 413 customers through our community pop-up events. At the same time our adverts are in production, and we have received the first director's cut for screening on TV.

We think our approach will deliver two positive environmental outcomes:

- First, by having a drought permit in autumn-winter (when river levels are higher), it means our reservoirs are more likely to recharge with minimal impact on the environment and sufficiently refill for the summer of 2023. This will protect public water supplies and enable river support during the higher risk summer period.
- Secondly our large-scale winter demand reduction programme will be testing a range of interventions (cost and impact) which we will share the r with the industry. This insight will give the sector additional tools to support winter recharge and reduce reliance on drought permits in future years.

We recognise that granting a drought permit is not without risk because we are seeking to reduce compensation flows. We have carried out an environmental appraisal of the potential effects of the permit and we are confident that there are minimal environmental impacts if we did this. As a precautionary measure, we will put additional environmental monitoring in place along the River Derwent throughout the duration of the permit, and we will have the ability to quickly return the flows from the reservoir back to normal should we need to.

Overall, we consider our approach to both this summer and the upcoming winter has and will deliver the best outcome for our customers and the environment. It will also reveal a host of new insight that will strengthen the sector's ability to respond and adapt to climate change in a way that protects the environment and supplies to customers.

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1. Introduction

This is an application by Severn Trent to the Environment Agency for a Drought Permit under s.79A of the Water Resources Act 1991. The permit relates to abstraction licence 03/28/38/0018 (Derwent Valley impounding reservoirs).

Severn Trent is one of the largest of the 11 regulated water and wastewater companies in England and Wales, covering the Heart of England from the Bristol Channel to the Humber and from Shropshire to the East Midlands. We serve 4.6 million homes and businesses.

We are a leading water and waste company, committed to delivering high quality services to our customers, both today and in the future.

The environment we live and work in is central to everything we do. We take our name from the two main rivers, the Severn, and the Trent, which run through our region - two of the biggest rivers in the UK. To us, the health of rivers represents the health of the whole landscape and the communities that they exist alongside. From abstracting raw water and providing clean drinking water to our customers, to safely returning treated wastewater, everything we do is intrinsically linked to rivers and other water bodies in our region. We work hard to play our part in protecting them, working with others to protect and improve their catchments.

For further information about our business, please visit www.stwater.co.uk.

The Derwent Valley reservoir system, located in the Peak District, comprises three impounding reservoirs, Howden, Derwent and Ladybower, situated, on the upper River Derwent. Inflows to these reservoirs are augmented by catchwaters on the River Noe, River Ashop and Jagger's Clough. We abstract water from the Derwent Valley reservoirs to supply parts of Derbyshire and onwards into our regional Strategic Grid. The reservoirs also provide a raw water export to help Yorkshire Water supply their customers in the south Yorkshire area.

The spring and summer of 2022 have been exceptionally dry with unprecedented high temperatures over the course of the summer. As a result, inflows to the Derwent Valley Reservoir have been lower than normal impacting water levels. Whilst the hot weather has passed, dry weather continues, and we have seen below average rainfall in the Derwent catchment for all the last six months. The long-range forecast is variable but near term above average rainfall is unlikely. We are therefore focussing our attention on how we can responsibly refill our reservoirs ahead of next spring/summer. This is important so that we can secure our customers' water supplies throughout 2023 and can continue supporting the flows in the River Derwent through next summer.

Since April our Drought Action Team has been monitoring the situation and has directed an enormous amount of activity to protect raw water supplies in the Derwent. Many of these actions form part of our statutory Drought Plan, which we publicly consulted on last year when we updated our 2022-2027 plan. Section 3 of this document sets out our action management plan in addition to this permit. A copy of our Drought Plan can be found on our website at https://www.severntrent.com/about-us/our-plans/.

We have already significantly reduced our abstraction from the Derwent Valley reservoirs, and we are protecting storage by not abstracting our full Derwent Valley licence allowance, saving 5,575 Ml compared to last year. We will continue to minimise the amount we take whenever possible to support reservoir recovery this winter. We have reconfigured our wider network and taken several operational actions that will allow us to use alternative sources of supply while we minimise our use of the Derwent Valley sources. We have also taken steps to increase

the flows into the reservoirs from the River Noe. In 2018, we carried out work that allows the river Noe to once again flow into Ladybower and help with refill over the winter.

Whilst we have carried out these proactive steps, to protect security of supply to our customers in 2023 we are applying for a Drought Permit at the Derwent Valley reservoirs.

A drought permit is a drought management power that, if granted, can allow more flexibility to manage water resources and the effects of drought on public water supply and the environment. The Water Resources Act 1991, as amended by the Environment Act 1995 and the Water Act 2003 empowers the Environment Agency to grant a drought permit on condition of the following criteria:

- a serious deficiency of supplies of water in any area exists or is threatened; and that
- The reason for the deficiency is an exceptional shortage of rain.

The scope of this permit and the potential effects on the downstream river are described in our statutory Drought Plan which was published earlier this year. The evidence to support our application for a Drought Permit is set out in this Justification of Need document. This document sets out:

- How the permit would work and our assessment of environmental impacts.
- Details on the exceptionally low rainfall we have experienced this year.
- Operational measures we have undertaken including our leakage activities.
- How we have engaged our customers and are trialling new methods of reducing demand.

We have also produced a separate Environmental Assessment Report which describes the likely environmental impacts of making the required flow changes and explains how we will monitor and mitigate for these effects throughout the duration of the permit being in place.

Applying for a Drought Permit at Derwent Valley is a very unusual event, and it reflects the exceptionally low rainfall we have experienced this year. The last time Severn Trent required a Drought Order at Derwent Valley Reservoirs was over 25 years ago in the severe drought of 1995-96.

The Upper Derwent Valley dam pictured in September 2022 with its lower than typical water levels for the time of year

The Drought Permit would allow us to reduce the amount of water we release from Ladybower Reservoir from 54 million litres per day to 34 million litres per day, and to hold that saved water back in the reservoirs over the winter.

We believe our customers can help us to reduce demand, but we need to do more in some areas across our region. To make sure we have enough water across winter and spring, we believe the best time to reduce the flows from the reservoirs is during the autumn and winter months when customer demand for water is at its lowest and crucially, when the risk of downstream environmental impacts is minimised because river levels are naturally higher and temperatures lower.

We recognise that granting a drought permit is not without risk because we are seeking to reduce compensation flows. We have carried out an environmental appraisal of the potential effects of the permit and we are confident that there are minimal environmental impacts if we did this. As a precautionary measure, we will put additional environmental monitoring in place along the River Derwent throughout the duration of the permit, and we will have the ability to quickly return the flows from the reservoir back to normal should we need to.

In addition, the drought permit will allow us to continue to provide support to Yorkshire Water during their drought situation, by moving the abstraction point for water that is supplied from the Derwent Valley to Yorkshire. It will not, however, result in any increase in the abstraction volumes or supply to Yorkshire nor present additional risk to the Eastern Peak District Moors SSSI, the circumstances of this abstraction point change are aligned to that authorised by the Environment Agency in 2018.

2. The Drought Permit

The terms of the drought permit being sought are as follows:

- Amend licence 03/28/38/0018, which includes reference to the Derwent Valley Water Acts 1899, 1901, 1920, 1944 and 1956, to:
    - Reduce the aggregate quantity of compensation water in the Derwent below the Noe confluence 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.
- Add a new abstraction point for the purpose of supply and onwards transfer of water to Yorkshire Water from Ladybower Reservoir at SK 20 86. Which will not increase overall abstraction.
- Restrict abstraction to 3600Ml on a 30-day rolling average during the life of the permit.

The licence changes for compensation implemented under the Drought Permit compared to normal operation are shown in Table 1 (Derwent Valley reservoirs proposed Drought Permit variation). A copy of the draft permit we are requesting is included within the appendix. The final permit content is still to be finalised with the EA.

Table 1 (Derwent Valley reservoirs proposed Drought Permit variation)

System	Mean daily flow controls at Derby St Mary's Bridge (Ml/d)		Permissible Abstractions (Ml/d)	Total Upper Derwent compensatory flow requirements (Ml/d)			
	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

Our application is for the permit to come into force on 14th October 2022 and to remain in place for a period of up to 25 weeks to 31 March 2023. If the conditions do not significantly change, we may choose to apply to the Environment Agency for a permit extension for a further 6 months. Figure 4 (Map showing the maximum extent of the area that could be affected) illustrates the extent of the river reach that has the potential to be affected by the flow changes.

Figure 4 (Map showing the maximum extent of the area that could be affected)

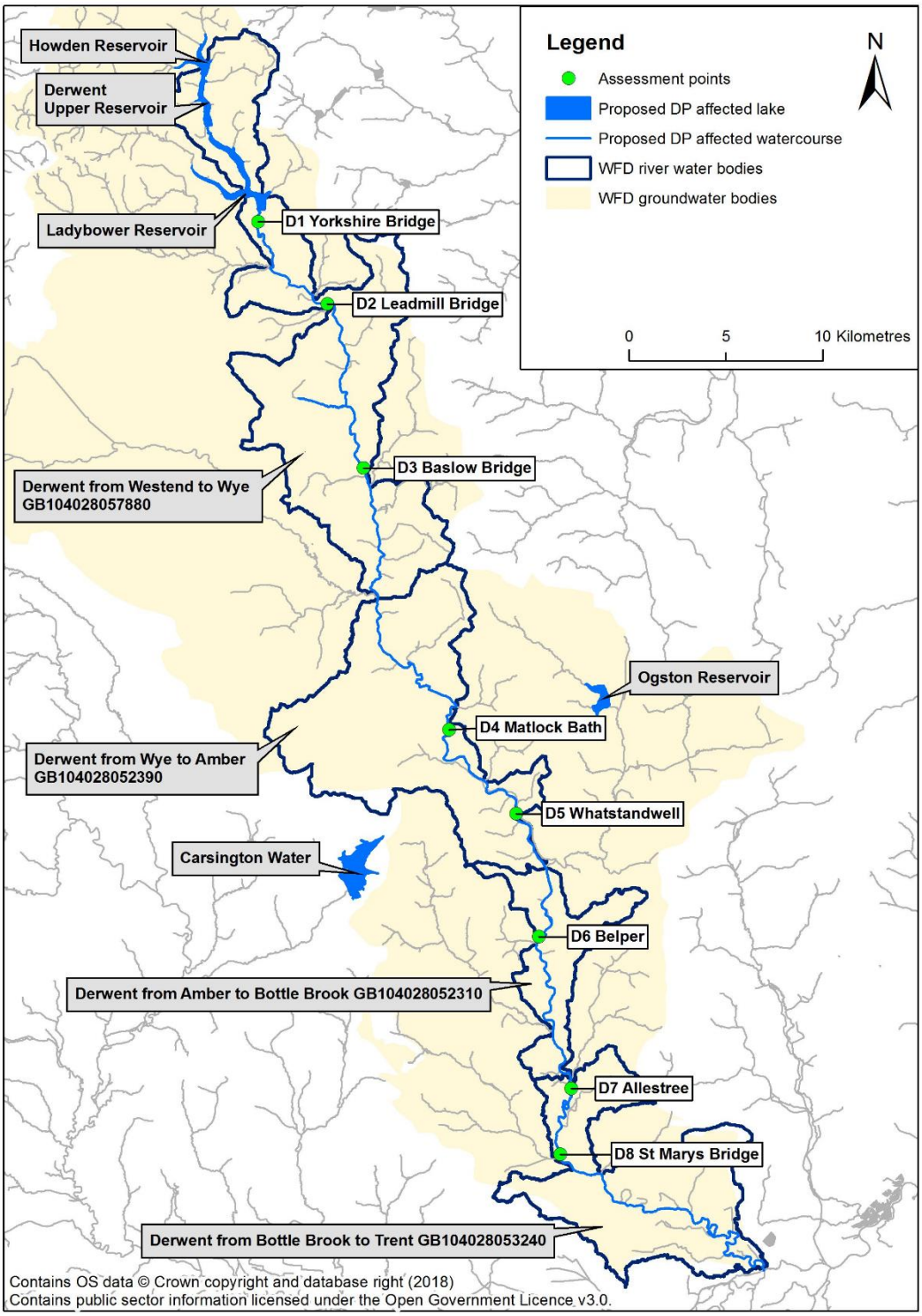
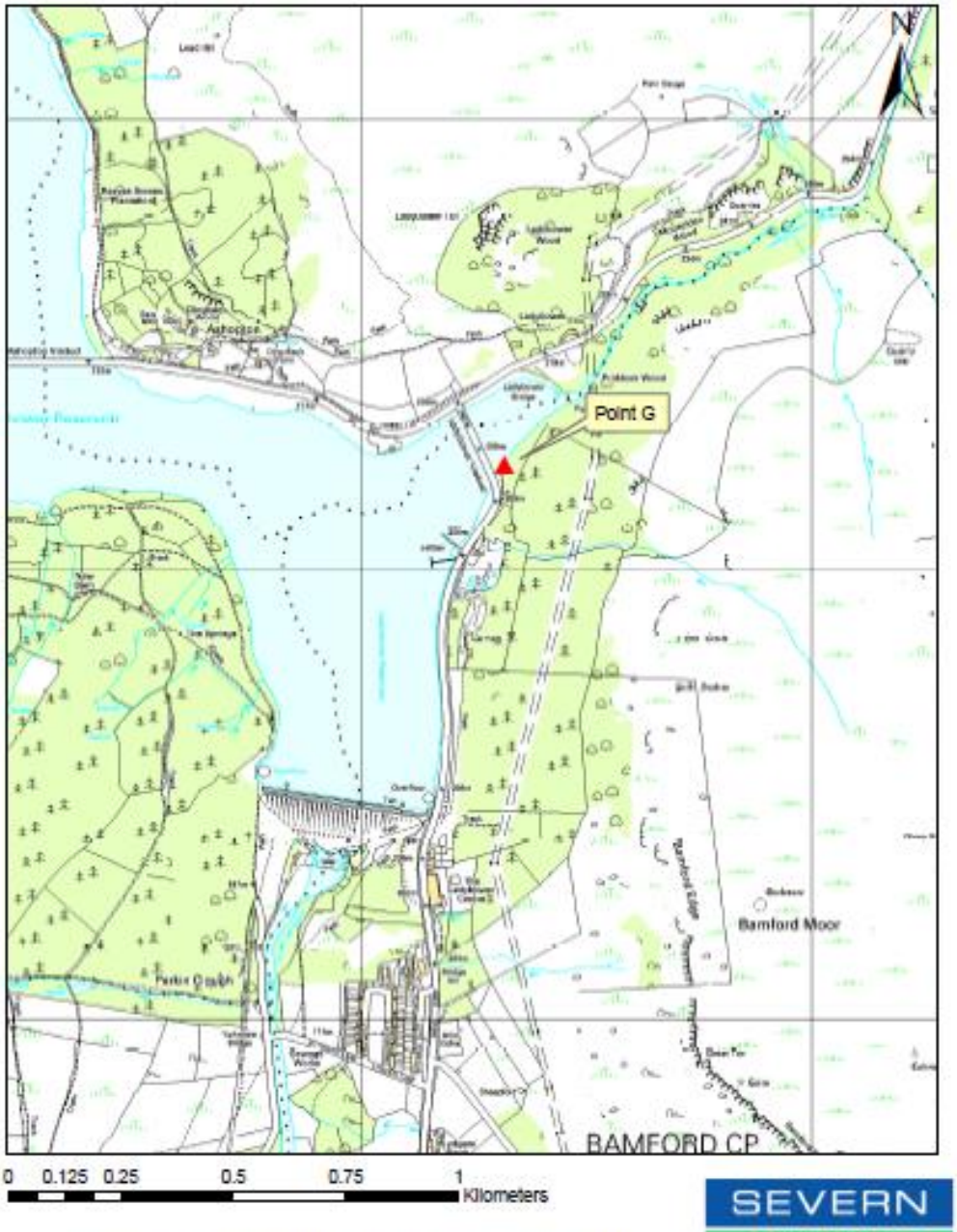


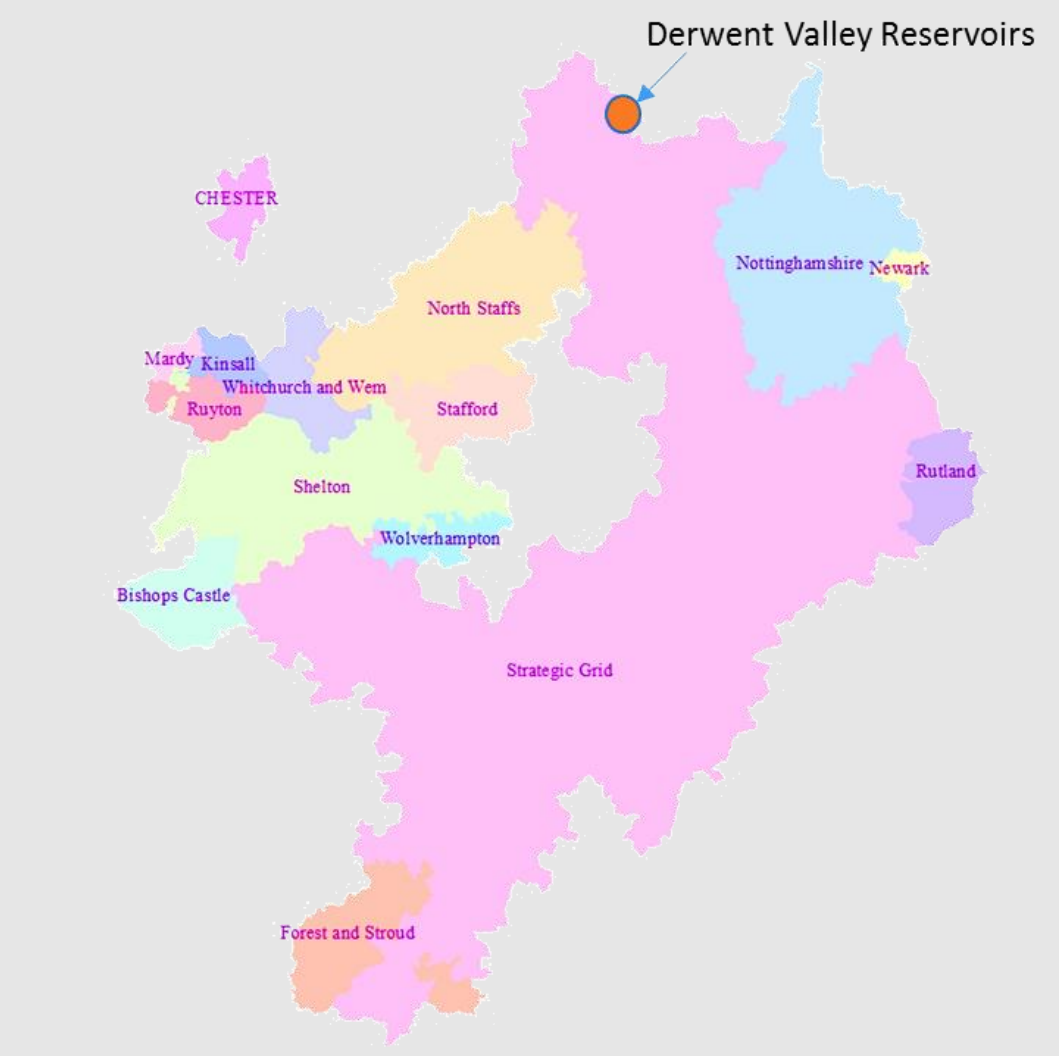
Figure 5 (Map showing additional point of abstraction at Ladybower reservoir)



3. Justification of Need

The Derwent Valley reservoirs form part of a wider network of strategic reservoirs, river abstractions and groundwater sources that supply our Strategic Grid Water Resource Zone. The Strategic Grid is the largest of our 15 water resource zones, and it serves over 5.5m people with drinking water supplies. Figure 6 (Severn Trent's Water Resource Zones) illustrates the extent of the Strategic Grid Water Resource Zone relative to our other zones.

Figure 6 (Severn Trent's Water Resource Zones)



3.1. The hot and dry weather of 2022 means that storage at several of our reservoirs are below normal.

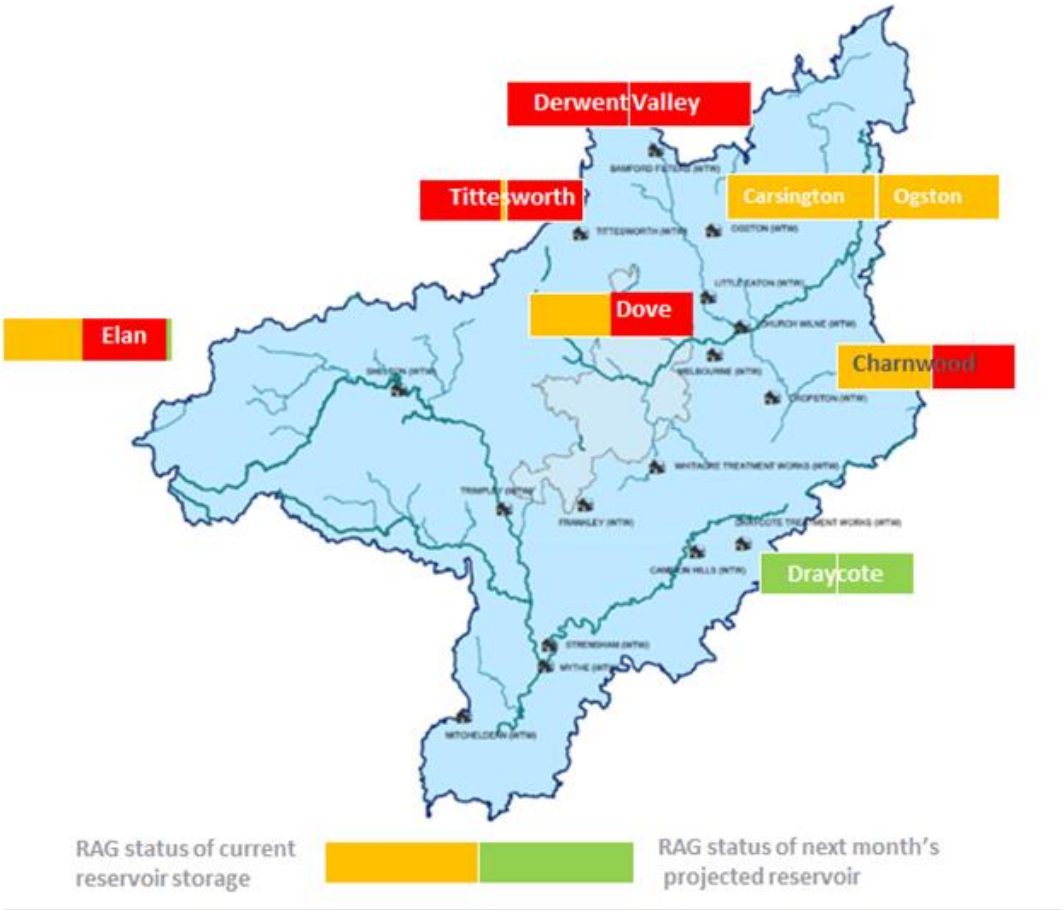
The exceptionally hot and dry summer of 2022 preceded by a particularly dry spring, means that water levels in a number of our reservoirs are lower than we would normally expect for this time of year. Across the Severn Trent region the period March to August 2022 was one of the driest on record, and we have experienced below average rainfall in every one of the past seven months.

Our Drought Action Team has been meeting weekly since April 2022 to manage the water storage risks and to take proactive steps to ensure security of supplies and the water environment are protected. Despite our proactive actions, the dry weather has particularly affected those sources situated in Derbyshire and

Leicestershire and we are now having to take further steps over the coming autumn/winter to ensure our water resources are sufficiently recovered in time for spring 2023.

Figure 7 (Water availability status as of September 2022) illustrates the water availability status of our reservoir sources as at in September 2022 and illustrates the water resources risk at our key reservoirs using a 'red / amber / green' status indicator. If reservoir storage is shown as 'green' then this is within the normal range for the time of year, but if it is shown as 'red' then storage has crossed one or more of our drought indicators.

Figure 7 (Water availability status as of September 2022)



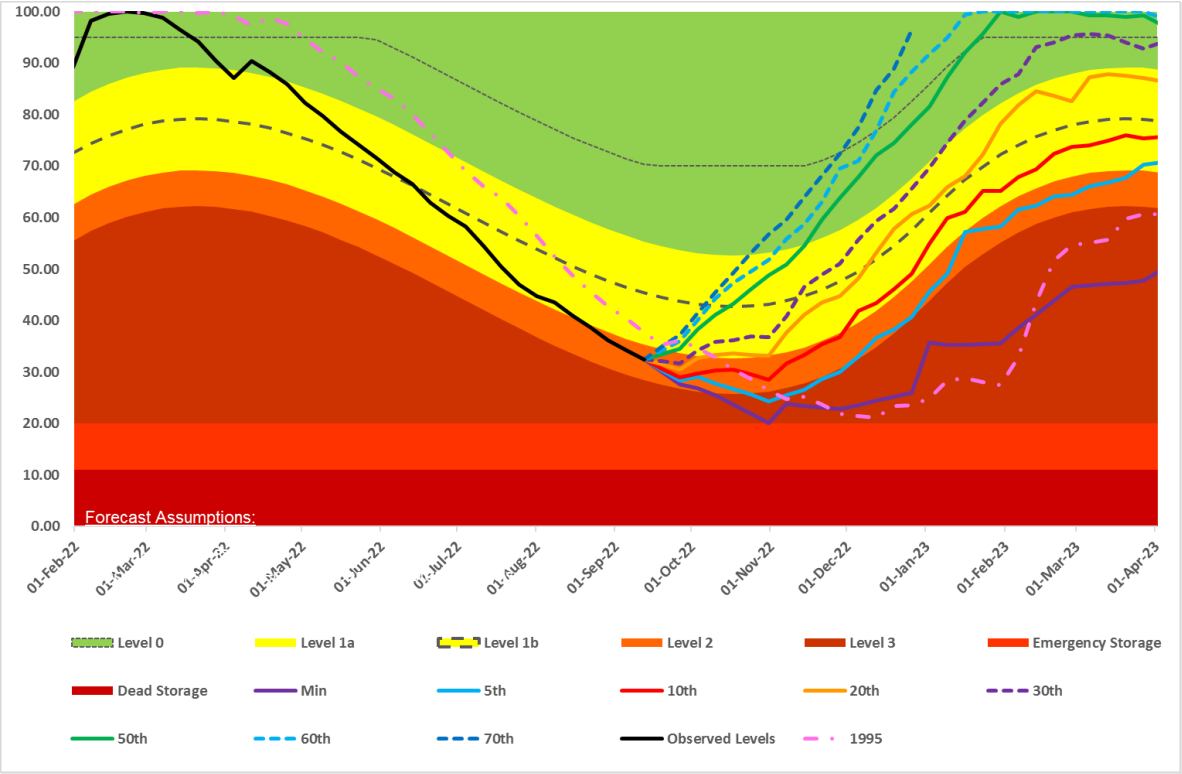
The Derwent Valley reservoir sources operate in conjunction with the other water sources in our strategic grid. The strategic grid and the ability to operate sources in conjunction gives us great flexibility to manage risks to customers' supplies. However, it also means that the operation of our different assets and sources can be affected by risks and issues that occur many miles away, and not just locally. For example, the proactive drought management actions we are having to take at our Charnwood reservoirs then have consequences for our ability to change how we operate our Derwent Valley and Dove reservoirs sources.

Whilst some areas are still within the normal range for the time of year (such as Draycote - pumped storage winter filled reservoir with a maximum supply of around 30 Ml/d into the Strategic Grid), we still need to take steps to refill the Derwent Valley to protect security of supply for our customers next year.

3.2. We need to act now to protect security of supply and the river environment for 2023.

We continuously monitor our strategic raw water storage reservoirs, and throughout the year we make storage projections based on our 100-year record of river flows. As storage changes, we follow the triggers and actions described in our Drought Plan. Throughout the spring, summer and autumn of 2022, storage in the Derwent Valley reservoirs, shown in Figure 8 (Derwent Valley reservoir projections from 15 September 2022), has tracked along the "minimum" projection which is based on the driest scenario from our record.

Figure 8 (Derwent Valley reservoir projections from 15 September 2022)



Since April 2022 total storage in the Derwent Valley reservoirs has been lower than we recorded in the severe drought of 1995-96, which was the last year we had to resort to a Drought Order to support the reservoirs.

Our probabilistic reservoir refill projections, illustrated in Figure 8 (Derwent Valley reservoir projections from 15 September 2022), show that if we continue to follow this minimum inflow pattern over the coming winter, then reservoir storage would be unlikely to recover above 50% by the time we go into April 2023.

In addition to making projections based on our record of past stream flows, we are also generating refill projections using different rainfall scenarios for the coming winter.

In summary, the exceptional shortage of rain has resulted in below normal reservoir storage across a number of our Midlands sources, and in particular at the Derwent Valley reservoirs which in turn risks a serious deficiency in supplies in our Strategic Grid Water Resource Zone. This means we need the drought permit to help the Derwent Valley reservoirs recover their storage levels over the coming winter and secure supplies into next year.

The purpose of the Drought Permit is to help maximise the Derwent Valley reservoirs refill over the coming winter in order to secure customers' water supplies throughout 2023 and ensure we are able to support the

downstream river system come the higher risk months of the year. Our customers would expect that during a drought period, as well as actively reducing demand by helping customers to use less water, and targeting leakage, that we would plan ahead and consider proactive measures as well as providing advance warning to consumers and clear communications about the impact.

If we cannot sufficiently refill the Derwent Valley Reservoir complex over the coming winter, then customers' 2023 security of supply will be put at risk due to the increased vulnerability of supplies to the 98,100 customers directly supplied from the Derwent Valley reservoirs North of Ambergate. The system also provides water to 5.5m customers within our Strategic Grid water resource zone.

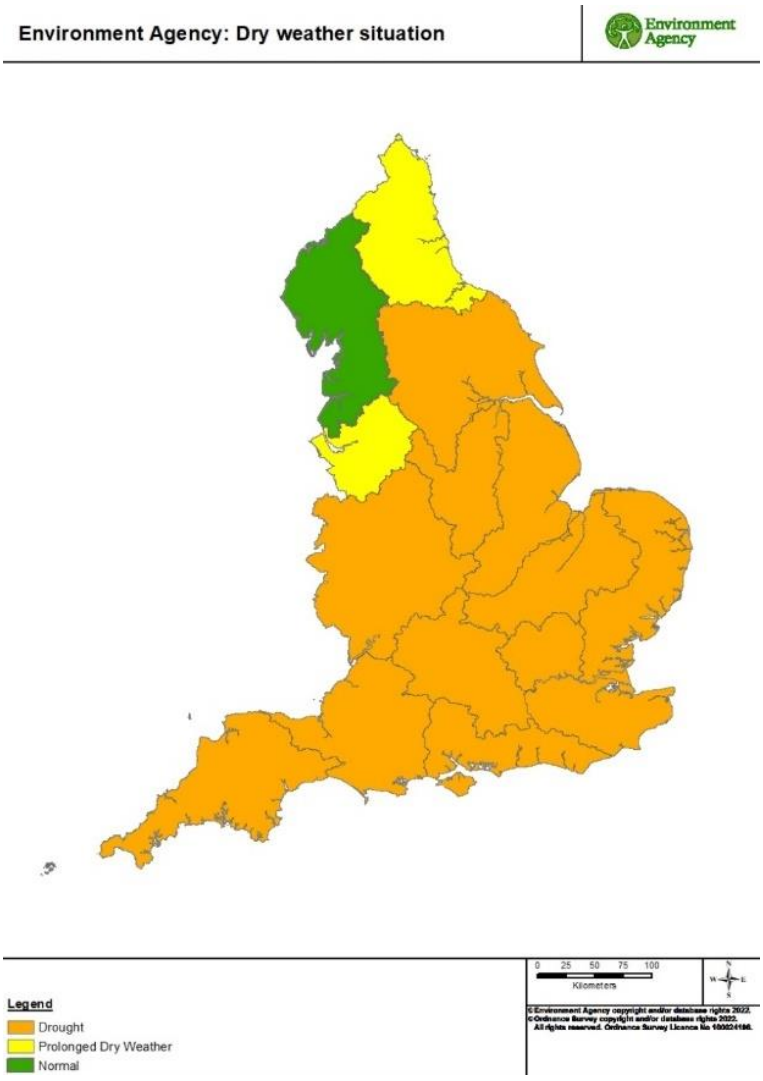
Applying this Drought Permit over the winter period will also help protect the river environment during 2023. If reservoir storage does not recover over the winter, then it will make it more likely that we would need to seek a summer Drought Permit in 2023, which we understand may potentially be more environmentally damaging due to the lower river flows that naturally occur at that time of year. Taking proactive action now to maximise reservoir refill over the winter months will minimise the risk of more environmentally damaging actions being needed in 2023.

4. We have seen an exceptional shortage of rainfall

The spring and summer of 2022 have seen deviations from average conditions across the United Kingdom, notably:

- Six consecutive months (March – August) with below average rainfall across England. (EA, 2022);
- The driest year so far for both the UK and England since 1976, ranking 15th driest (for the UK) and 5th driest (for England) since 1836 (Met Office, 2022);
- Driest July in England since 1935 (Met Office, 2022)
- Driest summer period June-August across England since 1995 (EA, 2022);
- The first ever Red Extreme Heat warning for parts of England and an Amber Extreme heat warning, covering much of England, Wales and southern Scotland. (Met Office, 2022);
- A new U.K. record breaking temperature of 40.3C in Lincolnshire, England in July (Met Office, 2022)
- 11 out of 14 EA hydrological areas, including all of Severn Trent region at EA Drought Status (see figure below).

Figure 9 (EA Drought Status)



The Severn Trent region has received less than the long-term average (LTA) rainfall in each of the 6 months from March to August 2022, ranging between 41.3% – 84.5%.

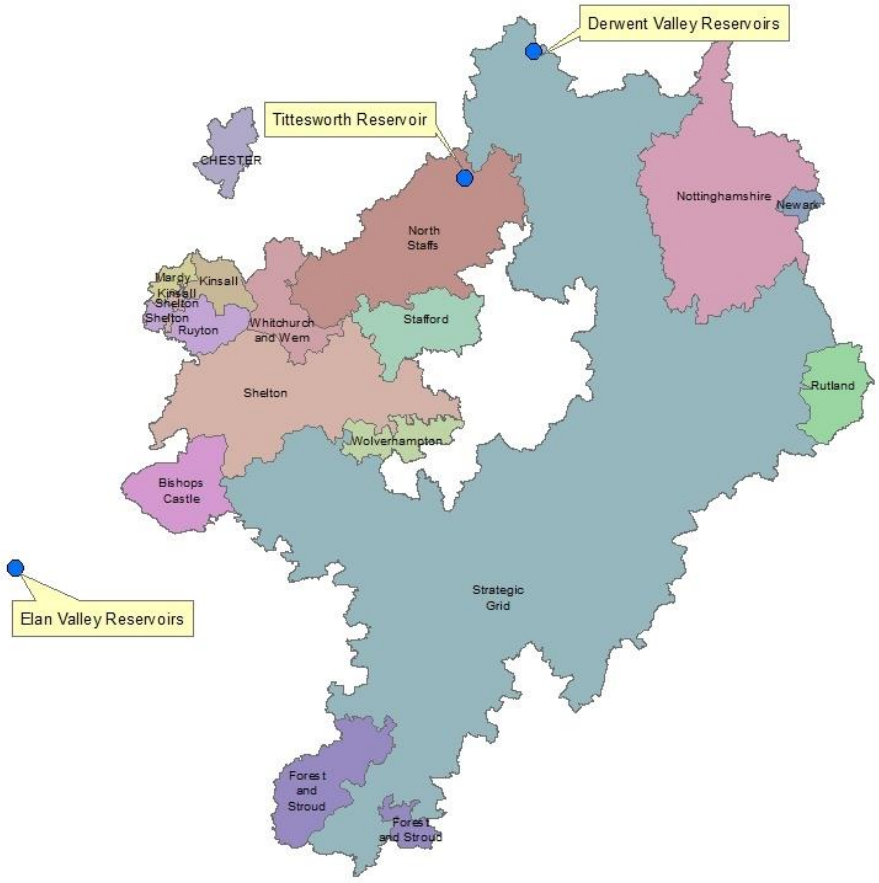
The Derwent Valley reservoirs are located within the River Derwent catchment. The reservoirs reached 100% storage during the second week of February 2022 due to above average rainfall falling that month, however, since then the catchment has been severely affected by low rainfall and we started our drawdown of the reservoirs early in March 2022. We have therefore looked at rainfall from March 2022 onwards in detail.

The Derwent valley reservoirs help support our Strategic Grid Water Resource Zone. The Strategic Grid is the largest of our 15 water resource zones, and it serves over 5.5m people with drinking water supplies. The Reservoir complex also directly feeds 96,000 customers.

The low rainfall has affected our water supplies across both the East and West of our region, most notably:

- The Derwent Valley reservoirs in the Derwent Catchment;
- The Tittesworth reservoir in the Churnet/Dove Catchment;
- The Elan Valley reservoirs in the Elan catchment in Wales.

Figure 10 (Locations of the Derwent Valley, Tittesworth and Elan reservoirs)



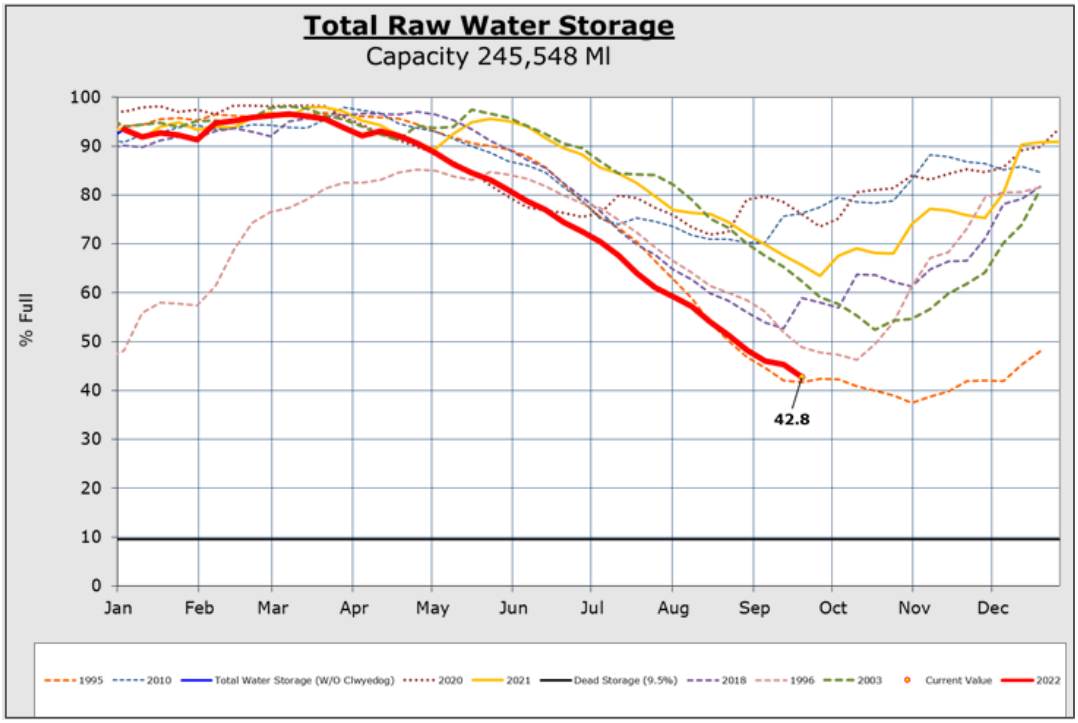
4.1. Overview of supply situation and hydrological context

Every month since March 2022 has seen lower than average rainfall for the Severn Trent area. Prior to this, February had been extremely wet and had helped replenish levels; alongside our winter refill plan which is designed to ensure our reservoirs across the company started out the year in a very strong position.

Since March 2022 the low rainfall seen across our region has resulted in all the reservoirs that feed water into our Strategic Grid drawing down quickly across the summer.

Our overall company raw water storage has dropped at a rate similar to the drought year of 1995. Since June reservoir stocks have remained lower for the time of year than any year since then as can be seen in Figure 11 (Company Storage for 2022 and other dry years) which shows overall company storage alongside some other key dry years.

Figure 11 (Company Storage for 2022 and other dry years)



The low rainfall has also affected storage at the Elan Valley Reservoir complex which also feeds water from DCWW in Wales into our Strategic grid with the reservoir at times being lower for the time of year than at any time since 1976.

The flows within the rivers that support our strategic grid have been exceptionally low, the River Severn for example on the west of our grid has been in regulation for over 112 days so far this year and remain in regulation at present. Clywedog reservoir and Shropshire groundwaters have been used to support base river levels. Similarly, to the East of the grid the River Derwent has been low since June, requiring us to make releases from our reservoir at Carsington of up to 130 Ml/d to enable continuity of abstraction downstream. A further emergent risk is the river Dove and associated reservoirs that are now also becoming low, affecting the volumes that can be abstracted.

Whilst these challenges have constrained some of our options to balance flows and reduce pressure on the Derwent Valley reservoirs, we have been able to take a balanced approach, in some cases taking more treated water storage risk to allow our Upper Derwent WTW to remain at low flow.

As described in sections below the exceptionally low rainfall and increased soil moisture deficits have not only contributed to reduced stored water levels to date, but they will also extend winter refill as rivers' responses and inflow will be altered as soil moisture deficits adjust. This has been especially evident in Derwent Valley where September's improved rainfall position has only marginally improved inflow.

4.2. There has been a prolonged period of exceptionally low rainfall in the Derwent catchment

Howden, Derwent and Ladybower reservoirs, the Derwent Valley reservoirs, are located in the River Derwent catchment. We operate these reservoirs in conjunction with our other sources of water in the Midlands to supply our Strategic Grid water resource zone. The low rainfall, increased sunshine hours and hotter temperatures experienced in the catchment during the summer has led to both decreased inflow into the reservoirs and increased demand from the Derwent Valley reservoirs and other our other sources throughout the Severn Trent Strategic grid zone.

We have used Met Office National Climate Information Centre (NCIC) final rainfall data for the Derwent Midlands catchment. This data uses information from a large number of gauging stations to create 5km^2 fixed area rainfall averages at a monthly time step for specific areas. The data covers the period from 1891 to 2020. As the NCIC final data only runs to the end of 2020, from January 2021 the data we use is from the EA daily rainfall tool data (DRT) for the same area. For September's data we have used actual DRT data up to the 18th of September. From the 19th to the 21st this is radar data and from the 22nd to the 30th of September this is average forecasted data provided by our meteorological provider Weatherquest.

Actual monthly rainfall totals for the Derwent catchment are shown in Table 2 (2022 Monthly rainfall (in mm) Derwent Mids catchment [based on HADUK NCIC & EA DRT data), with Figure 12 showing the monthly rainfall totals as a percentage of Long-Term Average (LTA) (based on the Met Office standard LTA period of 1961-1990) for the Severn Trent region and the Derwent catchment.

Table 2 (2022 Monthly rainfall (in mm) Derwent Mids catchment [based on HADUK NCIC & EA DRT data)

Month	Total rainfall (mm)	LTA (1961-90)	Percentage of long term average (%)	Percentage of 3-month long term average (%)	Percentage of 6-month long term average (%)	Percentage of 7-month long term average (%)
Jan	46.3	102.6	45%	84%	87%	95%
Feb	195.6	76.3	256%	137%	113%	107%
Mar	45.9	85.1	54%	109%	109%	106%
Apr	36.6	73.8	50%	118%	99%	102%
May	54.2	69.8	78%	60%	103%	97%
Jun	44.7	73.1	61%	63%	88%	97%
Jul	33.5	65.1	51%	64%	93%	84%
Aug	41.1	82.2	50%	54%	57%	86%
Sep	79.9	81.9	98%	67%	65%	63%

Figure 12 (Actual rainfall as percentage of Long-Term Average (Derwent Mids Catchment) based on HADUK NCIC & EA DRT data)

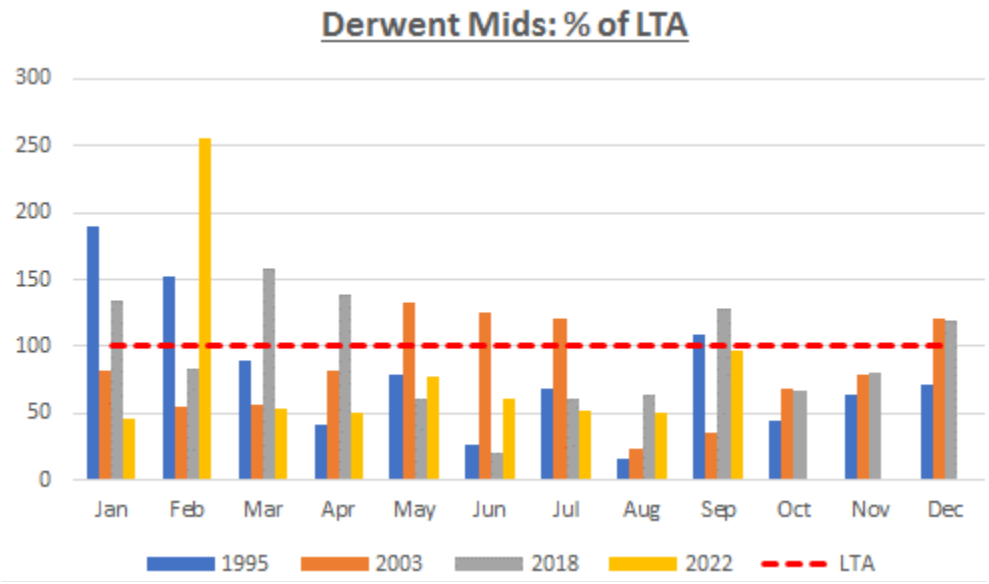
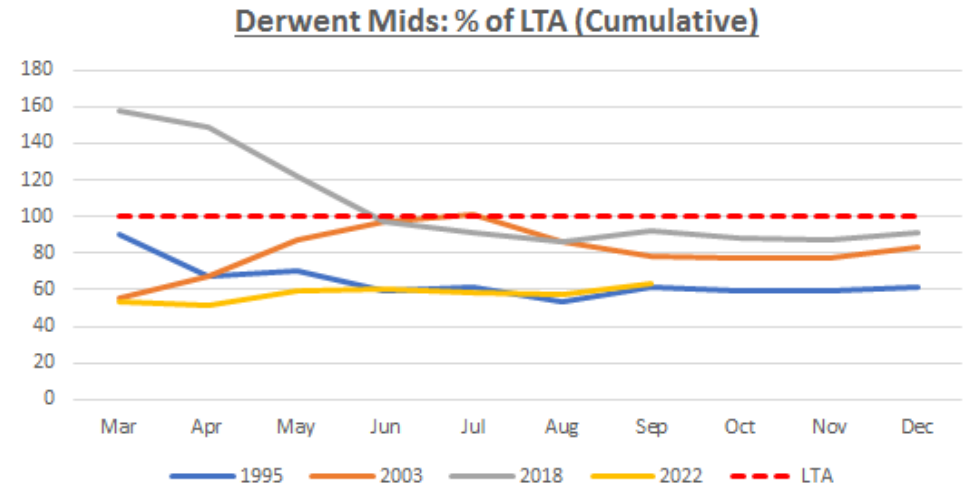


Figure 13 (Actual rainfall as percentage of cumulative Long-Term Average (Derwent Mids Catchment) based on HADUK NCIC & EA DRT data)



Since January 2022 the Derwent catchment has received below average rainfall in every month except for February which was exceptionally high and September which was normal. Rainfall in the catchment was notably low in July and August at 51% and 54% of LTA respectively. Since March when the reservoirs were full, rainfall totals in the catchment have been below normal - at 63% of the LTA for the 7-month period.

A comparison of rainfall as a percentage of the cumulative LTA is shown in Figure 13 (Actual rainfall as percentage of cumulative Long-Term Average (Derwent Mids Catchment) based on HADUK NCIC & EA DRT data), illustrating that the catchment has consistently received below average rainfall since March. When compared to previous dry years this is lower than 2018 and 2003 figures, lower than the 1995 figures March-June and similar to the 1995 figures June-September, indicating that rainfall as a percentage of the cumulative LTA is the lowest out of the 4 recent notable dry years for the Derwent catchment.

Table 3 (Derwent Mids catchment 1891 to 2022 Rainfall Rankings (1 = driest)) below shows the rank of each month during the period of storage drawdown at the Derwent Reservoirs from January to September 2022, against the 131-year record for periods of 1 to 7 months for the whole Derwent catchment. Monthly totals across July, August and September were ranked very low, i.e., very dry.

The July & August 5-month total (March to July) were ranked the 3rd driest in the 131-year record. The August 6 month (March to August) was also ranked 3rd driest for this period. The September 7-month (March to September) total was also very dry, ranked 5th in 131-years.

Table 3 (Derwent Mids catchment 1891 to 2022 Rainfall Rankings (1 = driest))

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept
1 month	13	129	33	24	53	36	14	14	81
2 month	59	114	126	13	28	25	12	6	35
3 month	39	117	91	109	16	15	9	5	16
4 month	48	102	107	73	101	13	5	5	14
5 month	49	102	88	88	66	88	3	3	13
6 month	31	100	95	76	80	52	53	3	8
7 month	52	86	88	80	70	73	27	31	5

Standardised Precipitation Index

To give an indication of whether a drought is emerging it is useful to use mechanisms such as the Standardised Precipitation Index (SPI). SPI normalises rainfall based on a historic record, enabling the comparison between geographic areas and across different time periods to determine how dry it has been relative to a standard measure.

Table 3 (Derwent Mids catchment 1891 to 2022 Rainfall Rankings (1 = driest)) shows the SPI as calculated by the EA using the NCIC data from 1891 to December 2020 and Daily Rainfall Tool data from January 2021 onwards. Each column represents a month or series on months, e.g., April SPI-1 represents the individual month of April 2022, April SPI-2 represents the cumulative 2 months March and April, April SPI-3 represents the cumulative 3 months February to April and so on. The size of the SPI denotes how wet or dry the period has been. These SPI definitions are shown in Table 11 (Number of days with zero rainfall (Upper Derwent & Strategic Grid).

Table 4 illustrates the SPIs across the summer showing that it was extremely dry, with July and August SPI-5 being 'Extremely Dry' and August SPI-6 being 'Extremely Dry' (<=-2.0). The August SPI-6 was -2.33, meaning that in the 6- month period since the storage at our Derwent reservoirs began to drawdown there had also been extremely dry conditions for the whole Derwent catchment.

September SPI-7 classifies the months March to September at the top end of 'Severely Dry' with a value of -1.93. September SPI-6 is also 'Severely Dry' at -1.74. Please note September data for the last 2 weeks is forecasted data.

Table 4 (Derwent HADUK NCIC data & EA DRT data deriving SPI)

Month	SPI-1	SPI-2	SPI-3	SPI-4	SPI-5	SPI-6	SPI-7	SPI-8	SPI-9
Dec-21	0.93	0.22	0.34	0.19	-0.16	0.13	-0.26	0.43	-0.02
Jan-22	-1.38	-0.06	-0.53	-0.32	-0.39	-0.70	-0.36	-0.69	-0.01
Feb-22	1.97	1.06	1.25	0.83	0.85	0.69	0.41	0.60	0.26
Mar-22	-0.65	1.48	0.62	0.92	0.52	0.58	0.45	0.18	0.38
Apr-22	-0.76	-1.13	1.01	0.20	0.58	0.21	0.30	0.20	-0.05
May-22	-0.22	-0.84	-1.21	0.77	0.02	0.44	0.09	0.19	0.10
Jun-22	-0.52	-0.82	-1.27	-1.51	0.38	-0.28	0.18	-0.13	-0.02
Jul-22	-1.36	-1.37	-1.49	-1.83	-2.05	-0.18	-0.77	-0.23	-0.49
Aug-22	-1.16	-1.80	-1.73	-1.84	-2.12	-2.33	-0.64	-1.14	-0.58
Sep-22	0.29	-0.59	-1.22	-1.35	-1.45	-1.74	-1.93	-0.52	-0.97

Table 5 (SPI definitions)

SPI value	SPI Category
>=2.0	Extremely wet
+1.5 to +1.99	Severely wet
+1.0 to +1.49	Moderately wet
-0.99 to + 0.99	Near normal
-1.0 to -1.49	Moderately dry
-1.5 to -1.99	Severely dry
<=-2.0	Extremely dry

4.3. There has been a prolonged period of exceptionally low rainfall locally at the Derwent Valley reservoirs

We have carried out analysis of the rainfall for the upper Derwent catchment to understand how the rainfall this year has compared to previous years on a more local level. The upper Derwent catchment area is that area which directly flows into the Howden, Derwent and Ladybower reservoirs, along with the area that can have flows diverted into the reservoirs.

Overall, the data for the upper Derwent catchment is a more precise indicator of inflow into the reservoirs and how this has impacted storage this year. Please note September data for the last 2 weeks is forecasted data.

Table 6 below shows total rainfall with 1, 3 and 6 month percentages of LTA. Since March 2022 the Upper Derwent catchment has received below average rainfall in every month up to September. The lowest rainfall totals for the catchment were 40% and 49% in March and July, respectively. Rainfall in the catchment has been consistently low since the above average rainfall (290%) in February 2022 at which point the reservoirs were full. The 3-month LTA percentages indicate above average values until May 2022 due to the influence of the February rainfall data. Furthermore, this influence is also apparent in the 7-month LTA percentages until August 2022. For the 7 months from March-September there was notably low rainfall (57% of the 7-month LTA).

Table 6 (2022 Monthly rainfall (in mm) Upper Derwent catchment based on Met Office NCIC data + EA DRT Data)

Month	Total rainfall (mm)	LTA (1961-90)	Percentage of long term average (%)	Percentage of 3-month long term average (%)	Percentage of 6-month long term average (%)	Percentage of 7-month long term average (%)
Jan	71.8	150.1	48%	86%	86%	93%
Feb	303	104.3	290%	143%	115%	109%
Mar	49.6	124.2	40%	112%	110%	105%
Apr	55.4	101.7	54%	124%	102%	104%
May	58.7	86.8	68%	52%	104%	99%
Jun	57.8	94.9	61%	61%	90%	99%
Jul	44	90.5	49%	59%	94%	85%
Aug	57	113.7	50%	53%	53%	87%
Sep	93.7	118.3	79%	60%	61%	57%

Figure 14 (Actual rainfall as percentage of Long-Term Average (Upper Derwent Catchment) based on HADUK NCIC & EA DRT data) below highlights that excluding February 2022 every month of the year has seen below LTA rainfall in the Upper Derwent catchment. Since March 2022 cumulative rainfall (Figure 14) has been consistently below that of previous drought years (1995,2003 & 2018). The nearest comparable drought year was 1995 which saw 68% of LTA over the 7 months from March – September. This figure is 11 percentage points higher than the 2022 figure of 57%.

Figure 14 (Actual rainfall as percentage of Long-Term Average (Upper Derwent Catchment) based on HADUK NCIC & EA DRT data)

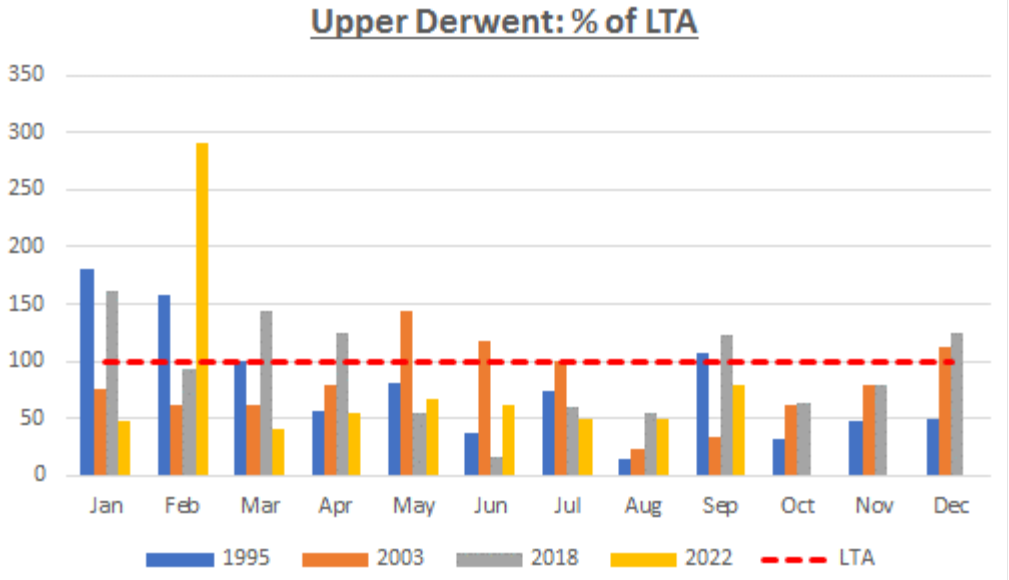
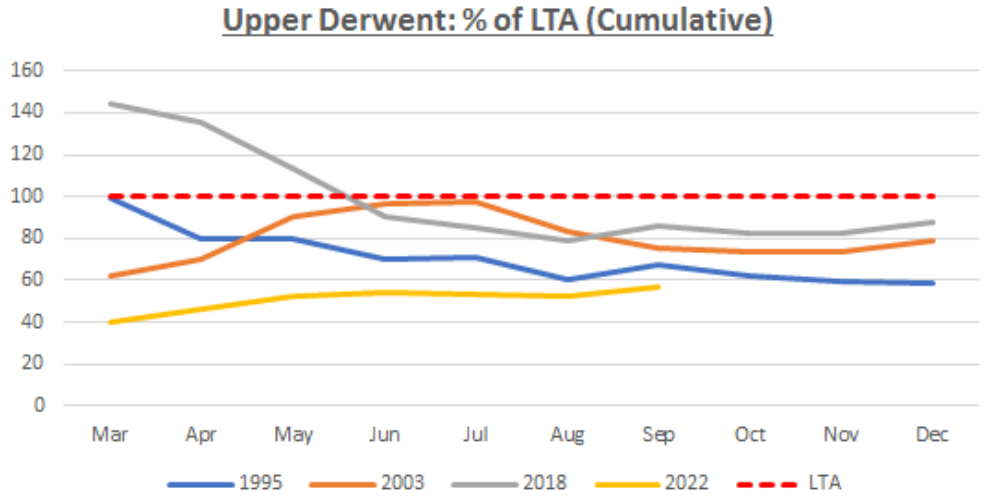


Figure 15 (Actual rainfall as percentage of cumulative Long-Term Average (Upper Derwent Catchment) based on HADUK NCIC & EA DRT data)



Upper Derwent Standardised Precipitation Index

SPI was also calculated for the upper Derwent catchment. Table 7 (Upper Derwent HADUK NCIC data & EA DRT data deriving SPI) illustrates similar SPI results to the whole Derwent catchment, the results indicate that the upper Derwent was even drier. The SPIs across the summer show that it was extremely dry in the headwaters of the catchment, with July & August SPI-4 and SPI-5 being 'Extremely Dry' and August & September SPI-6 being 'Extremely Dry' (<=-2.0). The most notable being the August SPI-6 at -2.77.

September SPI-7 classifies the months March to September as 'Extremely Dry' with a value of -2.46, in comparison to the September SPI-7 for the whole catchment this was 'Severely Dry' at -1.93. This again shows that in the period since the storage at our Derwent reservoirs began to drawdown there had also been extremely dry conditions for the upper Derwent catchment. Please note September data for the last 2 weeks is forecasted data.

Table 7 (Upper Derwent HADUK NCIC data & EA DRT data deriving SPI)

Month	SPI-1	SPI-2	SPI-3	SPI-4	SPI-5	SPI-6	SPI-7	SPI-8	SPI-9
Jan-22	-1.32	-0.13	-0.45	-0.33	-0.45	-0.70	-0.42	-0.80	-0.24
Feb-22	2.08	1.23	1.33	1.02	0.97	0.76	0.53	0.66	0.29
Mar-22	-1.16	1.51	0.65	0.89	0.59	0.59	0.41	0.20	0.35
Apr-22	-0.69	-1.45	1.08	0.27	0.58	0.32	0.34	0.19	-0.01
May-22	-0.53	-1.01	-1.71	0.80	0.03	0.39	0.14	0.18	0.05
Jun-22	-0.55	-1.08	-1.47	-1.97	0.42	-0.26	0.16	-0.06	-0.02
Jul-22	-1.40	-1.43	-1.76	-2.08	-2.54	-0.16	-0.75	-0.24	-0.43
Aug-22	-1.14	-1.80	-1.77	-2.05	-2.34	-2.77	-0.62	-1.12	-0.57
Sep-22	-0.02	-0.84	-1.46	-1.57	-1.81	-2.09	-2.46	-0.64	-1.07

Table 8 (2022 against the 131-year record for the Derwent headwaters) shows the rank of each month in 2022 against the 131-year record for periods of 1 to 7 months for the Derwent headwaters. The 7-month period from March through to September is ranked as the 1st driest comparable calendar period in the whole 131-year record. Furthermore, the July 5-month and August 6-month totals were also ranked the 1st driest for these periods on record. Compared to the ranking for the whole Derwent catchment (Table 3), this indicates that the Derwent headwaters were even drier and thus shows clearly that the lack of inflow experienced since March to the Derwent Valley Reservoirs and subsequent drawdown is due to an exceptional shortage of rainfall.

Table 8 (2022 against the 131-year record for the Derwent headwaters)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept
1 month	13	130	17	30	41	35	10	13	62
2 month	60	118	126	9	21	21	9	6	22
3 month	43	120	96	115	8	8	5	5	9
4 month	47	110	104	78	104	6	3	3	11
5 month	43	107	90	91	66	90	1	4	6
6 month	31	100	96	83	86	53	60	1	3
7 month	44	90	84	85	73	73	28	35	1

We have used the rankings shown in Table 8 to create rainfall return periods for each month shown in Table 9. The 5-month total for July, 6-month total for August & the 7-month total for September all have a return period of 1 in 132 years. The 4-month total for July & August both have a return period of 1 in 44 years as well. This long-term trend illustrates that it was exceptionally dry across the spring and summer and is continuing this trend into the start of Autumn.

Table 9 ((Upper Derwent catchment Return period based on NCIC + DRT monthly ranking (1 = normal year)))

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept
1 month	10	1	8	4	3	4	13	10	2
2 month	2	1	1	15	6	6	15	22	6
3 month	3	1	1	1	17	17	26	26	15
4 month	3	1	1	2	1	22	44	44	12
5 month	3	1	1	1	2	1	132	33	22
6 month	4	1	1	2	2	2	2	132	44
7 month	3	1	2	2	2	2	5	4	132

Table 10 has used the Cunnane (1978) 1 plotting position which calculates the probability of one of the ranked values being lower than expected and categorises rainfall data into descriptive categories. This shows the single and cumulative months results for the Upper Derwent catchment, as illustrated the single months for March, July and August are classified as 'NL' (Notably Low). When looking at cumulative values the categorisation shows 'EL' (Exceptionally Low) from June to September in at least one month from months of cumulative rainfall 2-7.

Table 10 (Upper Derwent catchment rainfall probabilistic ranking using Cunnane (1978) Banding)

Period (Months) of Cumulative Rainfall	Period Ending in Month											
	Oct 21	Nov 21	Dec 21	Jan 22	Feb 22	Mar 22	Apr 22	May 22	Jun 22	Jul 22	Aug 22	Sep 22
1	148.2	107.9	208.8	71.8	303.0	49.6	55.4	58.7	57.8	44.0	57.0	93.7
	N	N	AN	NL	EH	NL	BN	N	BN	NL	NL	N
	113%	74%	136%	48%	291%	40%	54%	68%	61%	49%	50%	79%
2	234.1	256.1	316.7	280.6	374.8	352.6	105.0	114.1	116.5	101.8	101.0	150.7
	N	N	N	N	NH	EH	NL	BN	BN	NL	EL	BN
	94%	92%	106%	93%	147%	154%	46%	61%	64%	55%	49%	65%
3	312.2	342.0	464.9	388.5	583.6	424.4	408.0	163.7	171.9	160.5	158.8	194.7
	N	N	N	N	NH	AN	NH	NL	NL	EL	EL	NL
	86%	86%	108%	86%	143%	112%	124%	52%	61%	59%	53%	60%
4	449.3	420.1	550.8	536.7	691.5	633.2	479.8	466.7	221.5	215.9	217.5	252.5
	N	BN	N	N	AN	AN	N	AN	EL	EL	EL	NL
	99%	82%	100%	92%	125%	119%	100%	112%	54%	58%	56%	61%
5	472.6	557.2	628.9	622.6	839.7	741.1	688.6	538.5	524.5	265.5	272.9	311.2
	BN	N	N	N	AN	N	N	N	N	EL	EL	EL
	86%	93%	95%	89%	122%	109%	109%	95%	102%	53%	56%	62%
6	649.6	580.5	766.0	700.7	925.6	889.3	796.5	747.3	596.3	568.5	322.5	366.6
	N	BN	N	BN	AN	AN	N	N	N	N	EL	EL
	102%	83%	102%	86%	115%	110%	102%	104%	90%	94%	53%	61%
7	667.8	757.5	789.3	837.8	1003.7	975.2	944.7	855.2	805.1	640.3	625.5	416.2
	N	N	N	N	N	N	N	N	N	BN	BN	EL
	91%	97%	93%	93%	109%	105%	104%	99%	99%	85%	87%	57%
8	807.6	775.7	966.3	861.1	1140.8	1053.3	1030.6	1003.4	913.0	849.1	697.3	719.2
	N	BN	N	BN	AN	N	N	N	N	N	BN	BN
	94%	88%	103%	86%	113%	101%	100%	101%	95%	94%	81%	86%
9	927.1	915.5	984.5	1038.1	1164.1	1190.4	1108.7	1089.3	1061.2	957.0	906.1	791.0
	N	N	N	N	N	N	N	N	N	N	BN	BN
	96%	91%	95%	96%	106%	105%	97%	98%	97%	91%	89%	80%

4.4. We experienced an above average number of no rainfall days across the summer

Over the spring and summer, we have experienced exceptionally hot and dry periods. The number of no rainfall days with exception to May has remained elevated. Table 11 (Number of days with zero rainfall (Upper Derwent & Strategic Grid) and Figure 10 below show that in most months between March and August illustrate this. there was a high number of days without rainfall. Furthermore Figure 16 (Showing dates with no rainfall) shows that these days without rainfall were often consecutive dry days.

Table 11 (Number of days with zero rainfall (Upper Derwent & Strategic Grid)

Number of days without rainfall		
Month	Upper Derwent	Strategic Grid
February	1	3
March	15	13
April	14	12
May	8	6
June	11	9
July	11	12
August	14	16
September -Actual	2	3
September - Forecast	3	2
Total	79	76

Figure 16 (Showing dates with no rainfall)

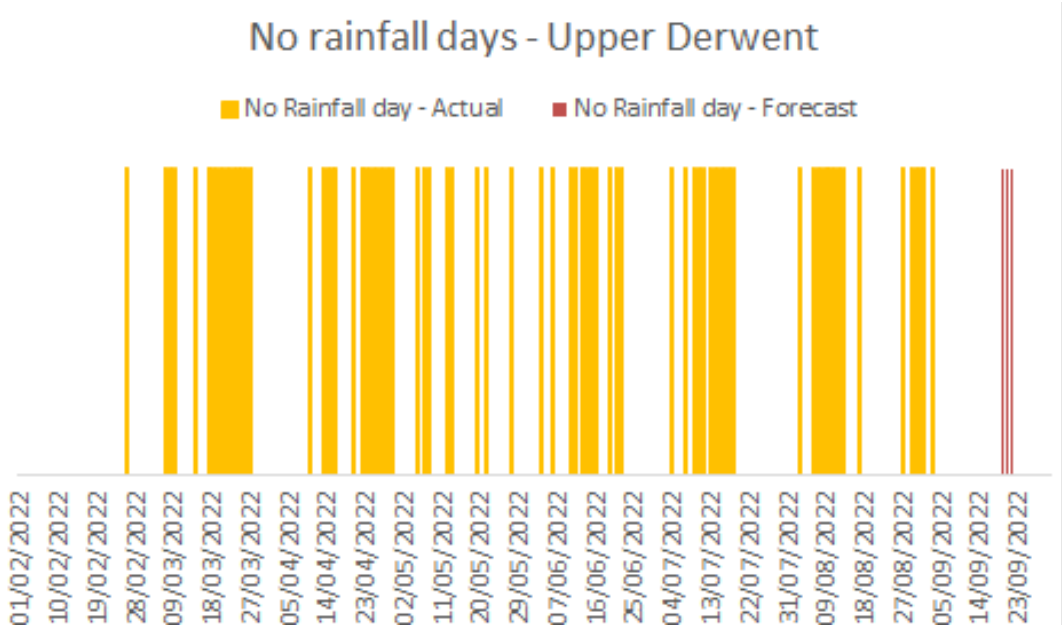


Figure 17 (Rainfall (mm) in Upper Derwent catchment)

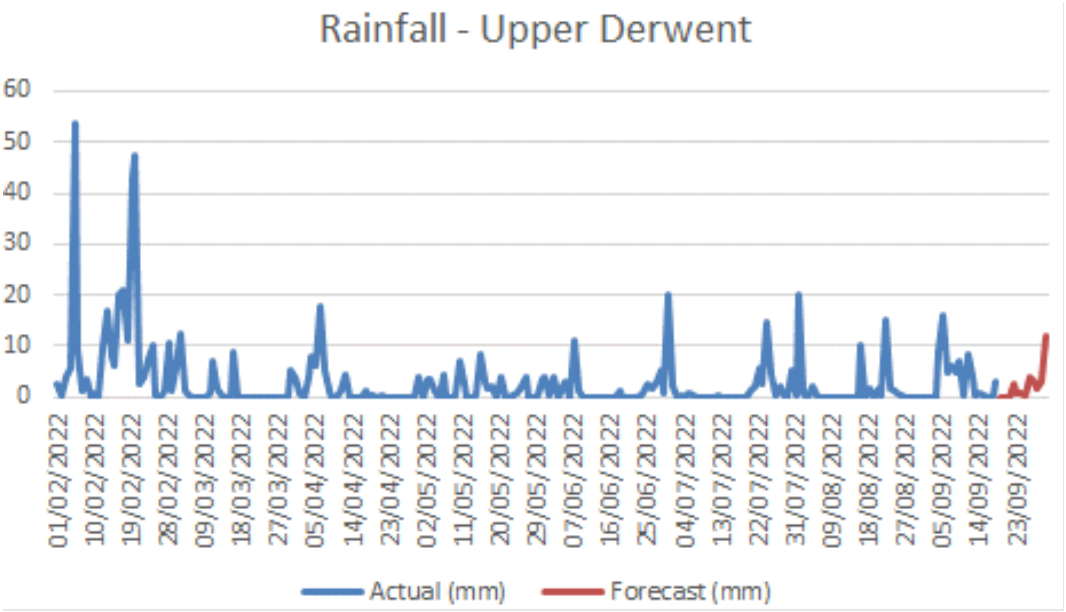
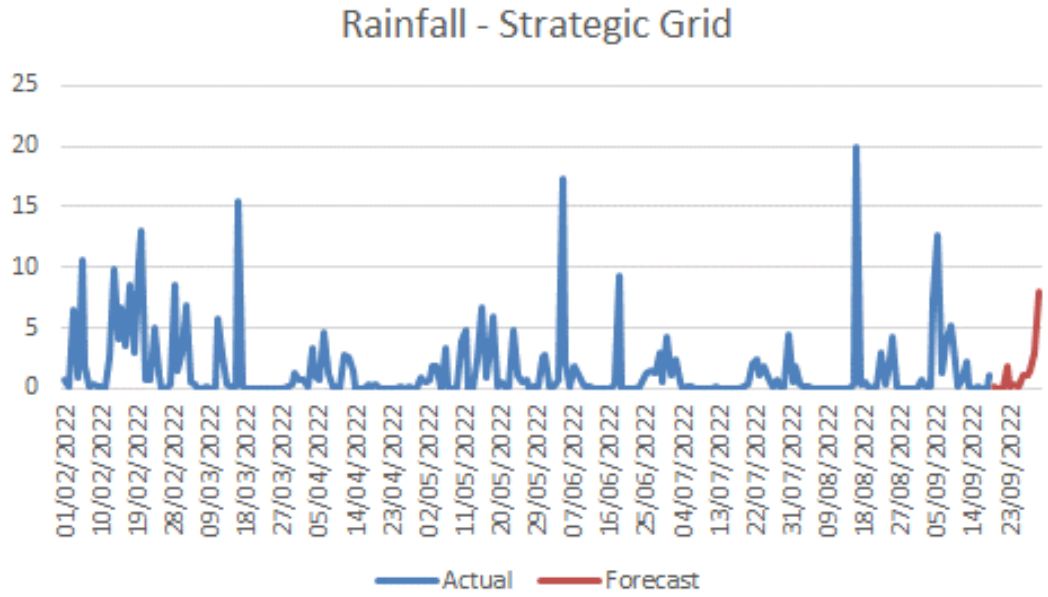


Figure 18 (Rainfall (mm) in Strategic Grid catchment)



As illustrated in Figures 16 & 17, when rainfall has occurred during the summer it has been heavy and short-lived. The majority of the rainfall experienced in July in the upper Derwent catchment fell during the last week following the end of the extremely high temperatures. The impact this has had on soil moisture deficit and runoff in the catchment is described in section 4.5.

4.5. A high soil moisture deficit has led to exceptionally low run off into the Derwent Valley reservoirs

Storage at the Derwent Valley reservoirs has been affected by the exceptionally low rainfall experienced since the start of March 2022. Soil Moisture Deficit increased throughout the summer, meaning that when rainfall occurred it was soaked up by the soil. Runoff into the reservoirs has been lower than normal since March, after the high intensity rainfall that occurred during February.

One effect of the exceptionally low rainfall was to generate extreme soil moisture deficits (SMD). Figure 19 (East Midlands Soil Moisture Deficit source: EA Monthly water situation report Aug 2022) taken from the EA's August water situation report, shows SMD across the East of the Severn Trent region compared with the LTA, and the historic extremes. From March 2022, SMD was tracking below the LTA and were approaching historic minimums between June and August. The extremely low SMD for East Midlands meant the rainfall events through June to August were retained in the ground and did not translate into meaningful runoff into the Derwent Valley reservoirs. As illustrated even with rainfall in August this did not help SMD get back to LTA values and receded again by the end of the month. Therefore, even near average rainfall in September has not translated into meaningful runoff.

Figure 19 (East Midlands Soil Moisture Deficit source: EA Monthly water situation report Aug 2022)

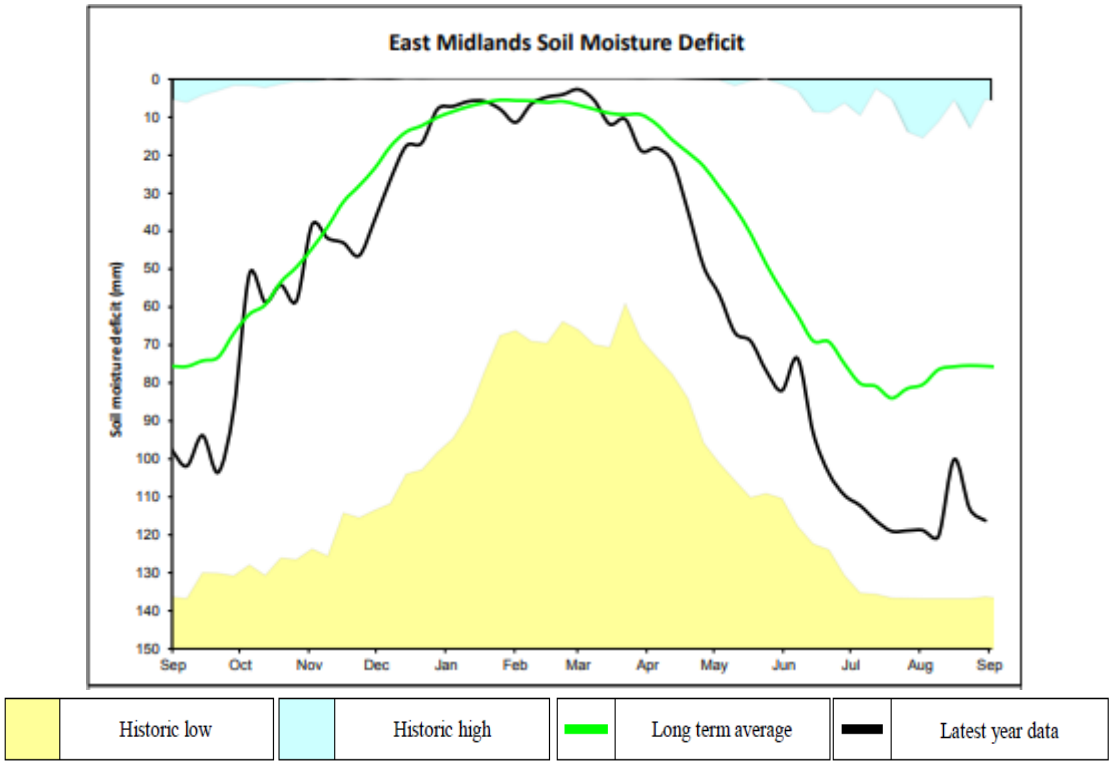


Figure 20 (Soil moisture deficit map source: EA Monthly water situation report Aug 2022)

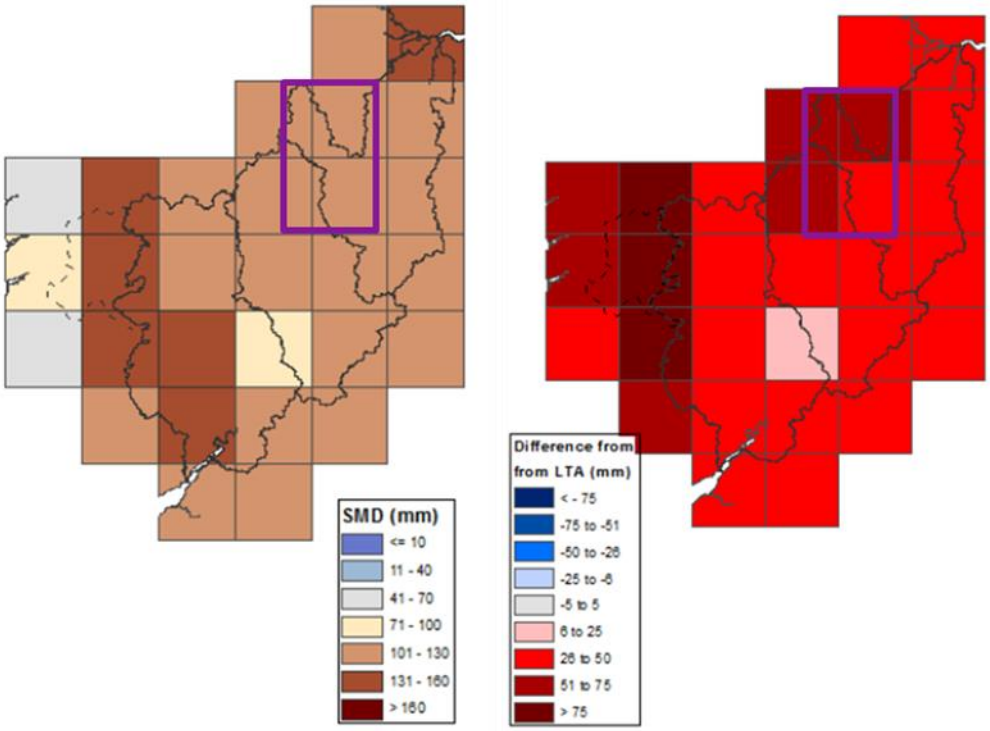
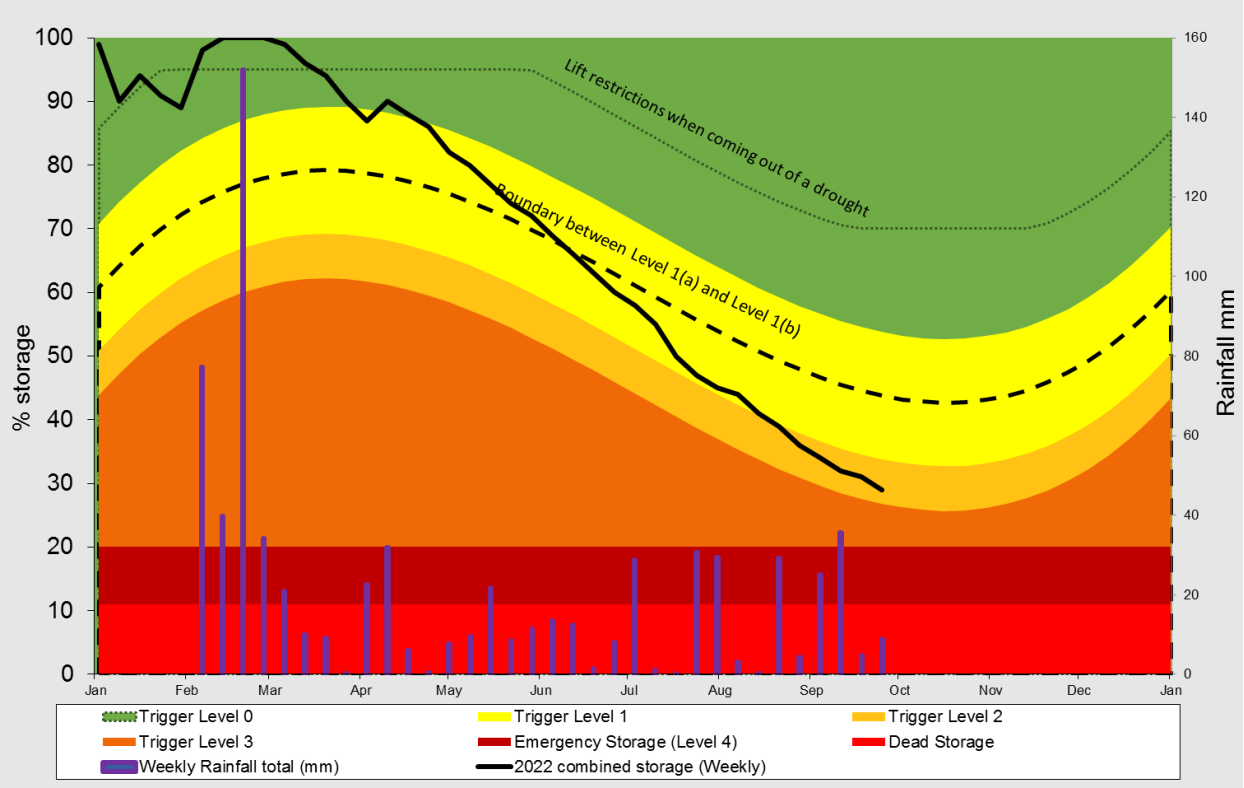


Figure 21 (Derwent Valley reservoirs total weekly storage and weekly rainfall)



Key points to note:

1) The Derwent Valley reservoirs reached full capacity during the second week of February 2022 and remained full into March 2022.
2) Following the extremely wet February, March recorded very low rainfall with only 40% of the LTA.
3) April, May and June 2022 saw between 54% - 68% of LTA.
4) July and August rainfall was 49% and 50% of LTA

4.6. Long Term Frequency Analysis

We have undertaken a frequency analysis of the rainfall data for Upper Derwent catchment. We have looked specifically at the frequency of levels of cumulative rainfall in mm for the 6-month period March to August from 1891 to 2021. We have then looked at where on the distribution rainfall in from 2022 sits.

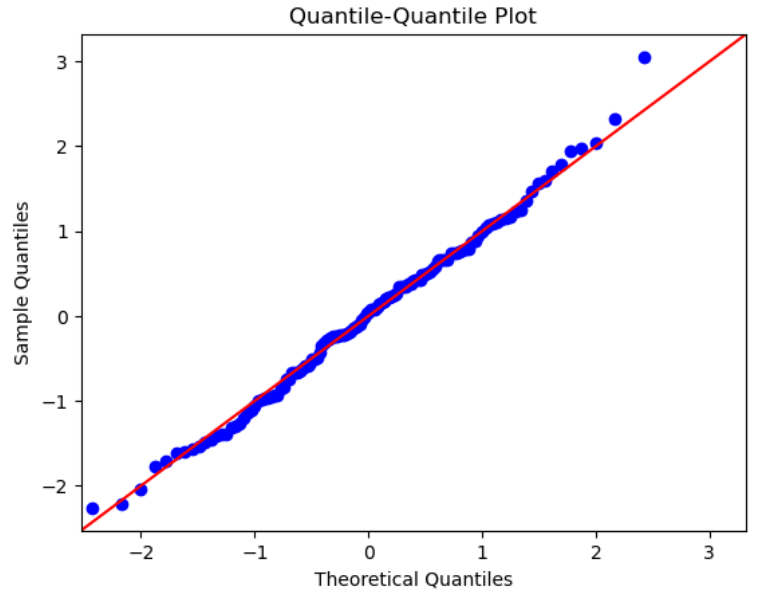
We have tested for Normality of the distribution of data:

Although there is no direct statistical test for whether a sample follows a normal distribution, the Shapiro-Wilks test can provide some confidence that the March-August rainfall dataset is normally distributed. The null hypothesis of this test is that the data follows a normal distribution, and the alternative is that it does not. The test provides evidence to reject the null hypothesis (i.e., there is evidence that the dataset is not normally distributed if the p-value is less than the 0.05 threshold. The p-value for the Mar-Aug dataset is 0.874, way above the threshold, providing no evidence that it is not normally distributed.

This can be supported visually, by considering the qq-plot below. In the plot, the red line represents a perfect normal distribution, and the blue points are our dataset. The points follow the same shape as the line, providing further evidence that it is normally distributed.

At the extremes, there may be the odd outlying point, but this not enough to warrant suspicion on the distribution, as the sample size is limited. We have made a small standard correction to the applied normal distribution to account for this.

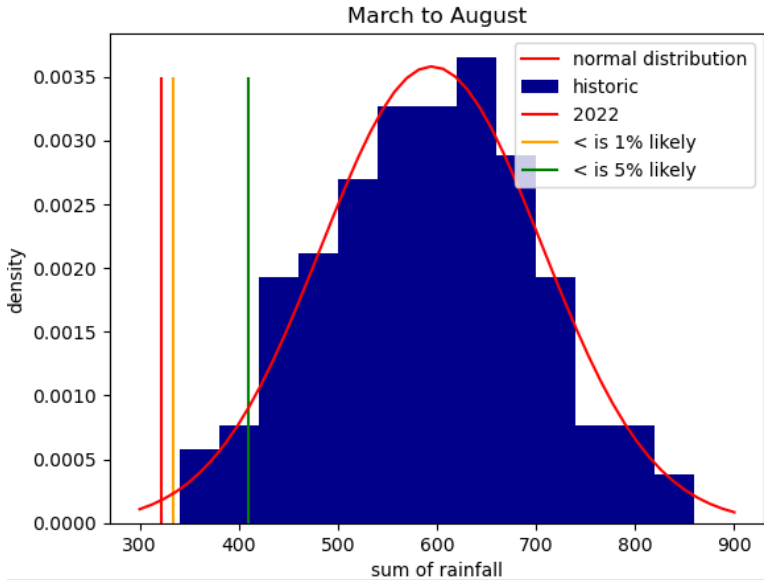
Plot 1 (GG plot of sample quantiles)



Test for "Dry Year":

Now that we have evidence to support the normal distribution, we can compare 2022 to it. The figure below shows that to get the level of rainfall seen in 2022 is less than 1 percent likely. So is in the top 1% of dry years. The actual probability for 2022 was calculated 0.008 or 0.8% which equates to a return period of around 1 in 130.5 years.

Plot 2 (Distribution Plot with showing position of 2022 Mar to Aug rainfall in the 131-year period)



4.7. The shortage of rainfall has affected many of our water sources

Table 13 shows the rainfall deficit for each month of 2022 (Yellow bars), as a percentage difference from LTA. Rainfall deficits for 1995 (Blue bars), 2003 (Orange bars) and 2018 (Grey bars) are also included for reference as 1995 was the last time we implemented a Drought Order at Derwent Valley. In 2003 we applied for a Drought Permit at Derwent Valley but withdrew the application as storage subsequently improved. Rainfall patterns across the 4 years were quite different, however, dry conditions in the summer (1995) and autumn (1995 and 2003) put the reservoirs at 23% (1995) and 43% (2003) by the end of November.

Table 12 (2022 Monthly rainfall (in mm) Strategic Grid catchment based on Met Office NCIC data + EA DRT Data)

Month	Total rainfall (mm)	LTA (1961-90)	Percentage of long term average (%)	Percentage of 3-month long term average (%)	Percentage of 6-month long term average (%)	Percentage of 7-month long term average (%)
Jan	25.1	66.1	38%	68%	86%	92%
Feb	99.8	51.3	194%	109%	106%	98%
Mar	39.8	58.2	68%	94%	102%	101%
Apr	20.8	53.8	39%	98%	81%	94%
May	49	57.9	85%	65%	88%	82%
Jun	46	59.2	78%	68%	81%	87%
Jul	18.8	53.2	35%	67%	82%	75%
Aug	34	67.0	51%	55%	60%	77%
Sep	56.5	60.7	93%	60%	64%	65%

Figure 22 below highlights that excluding February 2022 every month of the year has seen below LTA rainfall in our Strategic Grid water resource zone. Since March 2022 cumulative rainfall (Figure 23) has been consistently below that of previous drought years (1995,2003 & 2018).

Figure 22 (Strategic Grid Catchment Rainfall as a percentage of Long-Term Average based on EA NCIC and Daily Rainfall Tool data)

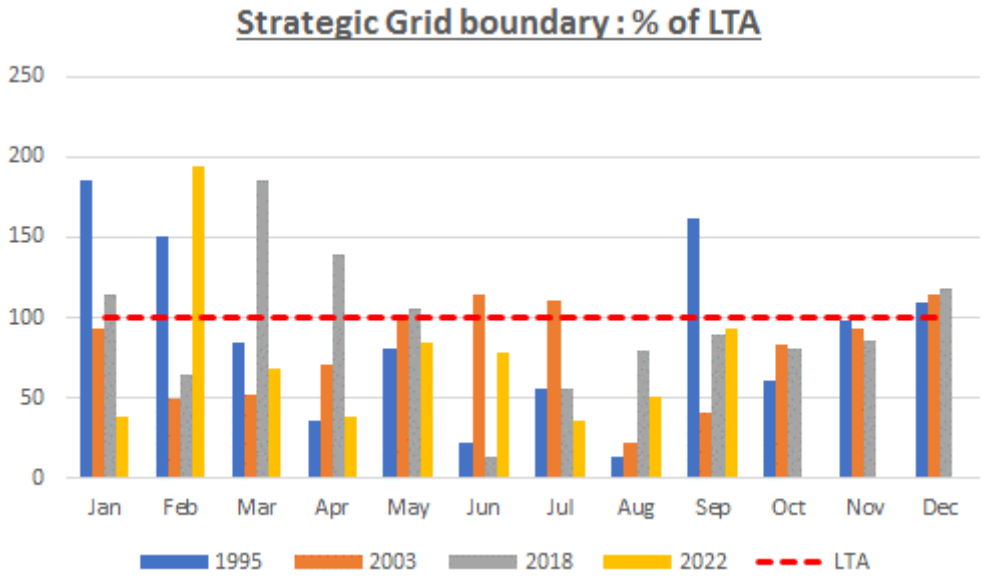


Figure 23 (Strategic Grid Catchment cumulative rainfall based on EA NCIC and Daily Rainfall Tool data)

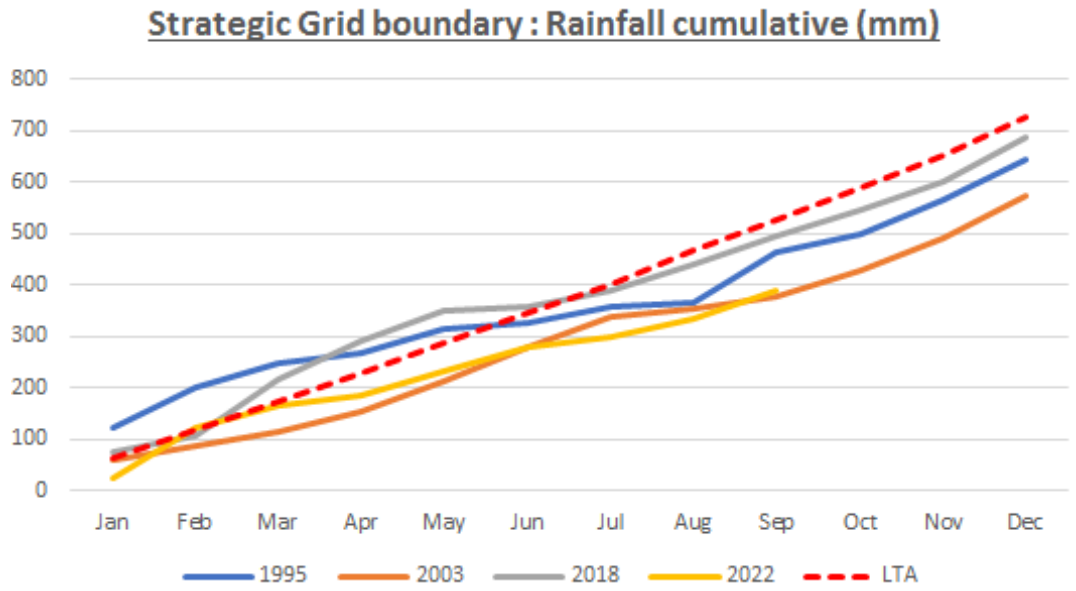


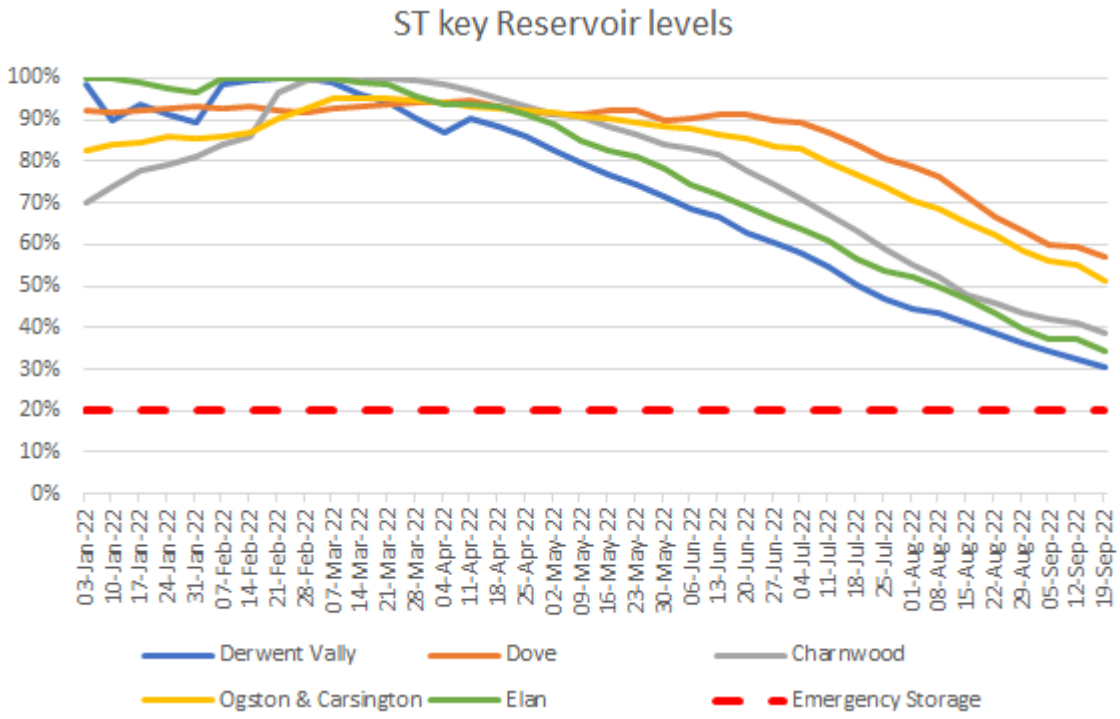
Table 13 shows the single and cumulative months results for our Strategic Grid water resource zone. The single 1-month rainfall for March and August are classified as 'NL' (Notably Low) and 'EL' (Exceptionally Low) for July. When looking at cumulative values the categorisation shows 'EL' (Exceptionally Low) from July to September in at least one month from months of cumulative rainfall 2-6.

Table 13 (Strategic Grid catchment rainfall probabilistic ranking using Cunnane (1978) Banding)

Period (Months) of Cumulative Rainfall	Period Ending in Month											
	Oct 21	Nov 21	Dec 21	Jan 22	Feb 22	Mar 22	Apr 22	May 22	Jun 22	Jul 22	Aug 22	Sep 22
1	102.5	31.2	82.2	25.1	99.8	39.8	20.8	49.0	46.0	18.8	34.0	56.5
	AN	EL	N	NL	NH	N	NL	N	N	EL	NL	N
	169%	48%	113%	38%	195%	68%	39%	85%	78%	35%	51%	93%
2	161.9	133.7	113.4	107.3	124.9	139.6	60.6	69.8	95.0	64.8	52.8	90.5
	AN	N	BN	BN	N	AN	NL	BN	N	NL	EL	BN
	133%	106%	82%	77%	106%	127%	54%	62%	81%	58%	44%	71%
3	198.8	193.1	215.9	138.5	207.1	164.7	160.4	109.6	115.8	113.8	98.8	109.3
	N	N	N	NL	N	N	N	NL	BN	NL	EL	NL
	106%	103%	109%	68%	109%	94%	98%	65%	68%	67%	55%	60%
4	273.7	230.0	275.3	241.0	238.3	246.9	185.5	209.4	155.6	134.6	147.8	155.3
	N	N	N	BN	N	N	BN	N	BN	EL	NL	NL
	113%	91%	106%	91%	93%	99%	81%	95%	68%	60%	62%	65%
5	309.2	304.9	312.2	300.4	340.8	278.1	267.7	234.5	255.4	174.4	168.6	204.3
	N	N	N	N	N	N	N	BN	N	NL	EL	NL
	103%	99%	96%	92%	108%	89%	89%	82%	91%	62%	58%	69%
6	426.2	340.4	387.1	337.3	400.2	380.6	298.9	316.7	280.5	274.2	208.4	225.1
	AN	BN	N	BN	N	N	BN	N	BN	BN	EL	EL
	119%	93%	102%	86%	106%	102%	81%	88%	81%	82%	60%	64%
7	438.3	457.4	422.6	412.2	437.1	440.0	401.4	347.9	362.7	299.3	308.2	264.9
	N	N	N	BN	N	N	N	BN	N	NL	BN	NL
	106%	108%	96%	92%	98%	101%	94%	82%	87%	75%	77%	65%
8	475.7	469.5	539.6	447.7	512.0	476.9	460.8	450.4	393.9	381.5	333.3	364.7
	N	N	N	BN	N	N	N	N	BN	BN	NL	BN
	101%	98%	109%	89%	103%	95%	94%	93%	81%	81%	71%	79%
9	531.2	506.9	551.7	564.7	547.5	551.8	497.7	509.8	496.4	412.7	415.5	389.8
	N	N	N	N	N	N	BN	N	N	NL	NL	NL
	102%	95%	100%	100%	98%	99%	90%	93%	91%	77%	77%	74%

As a consequence of exceptionally low rainfall across our Severn Trent region during the summer of 2022, the continued below average rainfall during the start of autumn and the ongoing low soil moisture deficits, storage in a number of our other strategic reservoirs are well below the expected levels for this time of year which is shown below in Figure 24.

Figure 24 (Raw water availability status as of 26th September 2022)



5. Operational measures to try and avoid the need for this permit

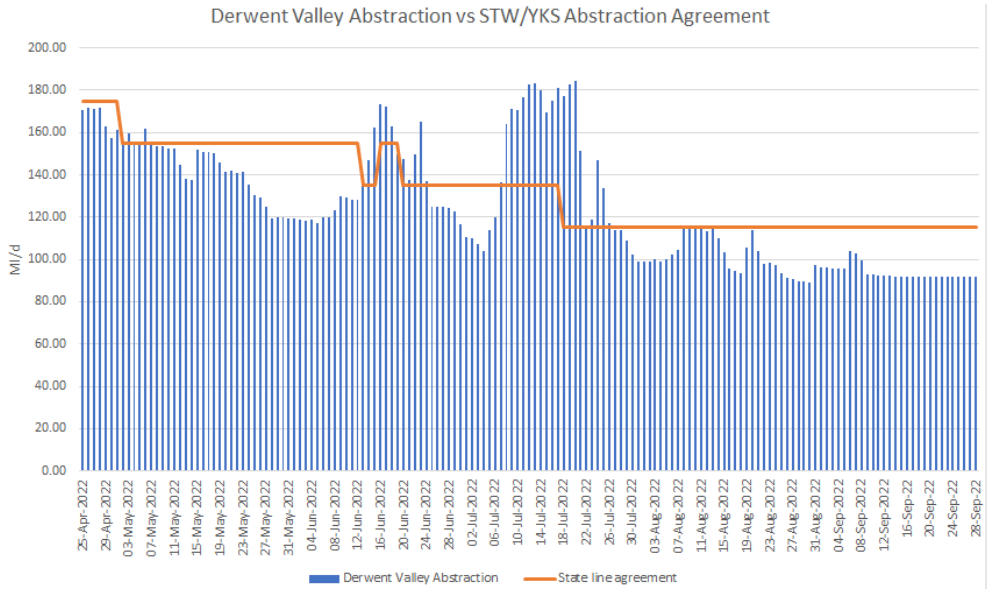
Throughout 2022 we have taken proactive measures to manage our supply network in a way that would avoid the need for us having to make this drought permit application. We describe in this chapter the different actions we have taken throughout the year, and the alternative measures we have considered before making this Drought Permit application.

Many of these actions and the associated triggers are described in our Drought Plan and were reviewed when we consulted on our updated Drought Plan prior to publication in September. In summary, Table 14 (Drought Plan actions taken throughout 2022) illustrates the escalating operational actions that are described in our Drought Plan and shows that we have deployed all of the actions that will have a direct benefit on protecting Derwent Valley reservoirs storage. Each of the actions marked as green has been completed and each of these actions can directly help to reduce demand on the Derwent valley reservoirs.

Following the favourable rainfall in late winter, the Derwent Valley reservoirs were full in March ready for the coming spring and summer period. As we saw the continued dry weather, we proactively reduced our abstraction to preserve storage taking over 780ML less water than our drought agreement with Yorkshire water allows between March and the start of July when the extreme hot weather hit. This meant that we could increase our take over this period to ensure we could continue to supply our customers, while remaining in surplus against these drought states.

As can be seen from Figure 25 (Derwent Valley Abstraction Vs STW YKS Agreement) below, we since the end of the extreme hot weather, managed to again reduce our abstraction below the agreed allowance and have since the end of July taken 1000Ml less than our agreement.

Figure 25 (Derwent Valley Abstraction Vs STW YKS Agreement)



Since the end of July, we have continued to minimise the demand on the Derwent Valley Reservoirs. As a result, we are abstracting far less than the amount that we are licensed to take from the reservoirs, and we have reconfigured our wider network in a way that will allow us to use alternative sources of supply while we minimise our use of the Derwent Valley sources over the winter.

More explanation is given in the rest of this chapter.

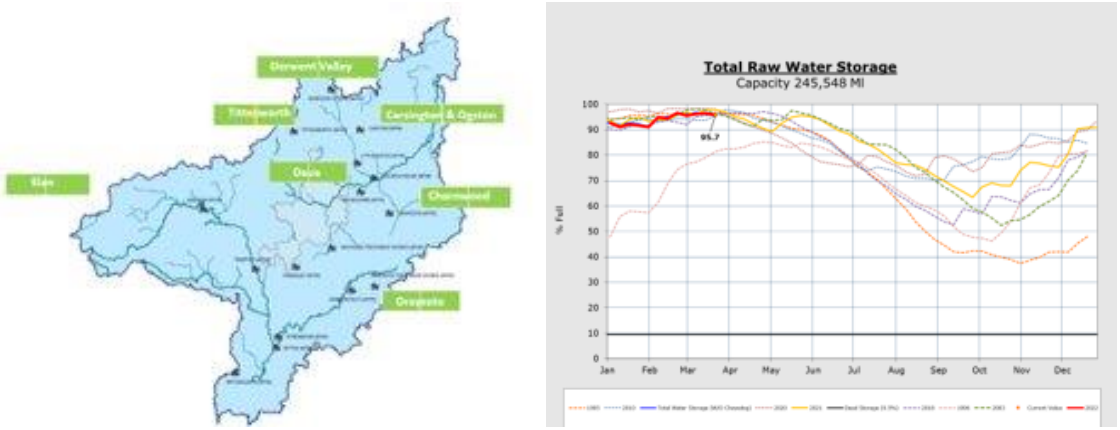
Table 14 (Drought Plan actions taken throughout 2022)

Trigger Level / Action	Supply Activities	Started	Reservoir Influence / Comments	Status
Trigger Hit 24th April Level 1a / Action 2	Raise Awareness Convene Tactical DAT	April 2022	Increased Control of reservoirs	Complete
Action 2 b	Test Drought Actions Understand timeline for a drought permit	May 2022	NA	Complete
Action 2 c	Consider Staged Reduction in abstraction from Reservoirs	Early May to early July 2022	Saved 700Ml in anticipation of hot weather, 5575Ml less abstracted than prior year	Complete
Trigger Hit 13th June Level 1b / Action 3	Liaise with EA and Yorkshire Water	April 2022 Onwards	Through our Liaison Yorkshire reduced their take and banked 100Ml of water by June.	Ongoing
Level 1b / Action 4	Review Maintenance Schedule	May 2022 Onwards	Re-phased maintenance work to allow reduced abstraction from the reservoirs so recorded in action 2c and Action 7	Ongoing
Level 1b / Action 5	Maximise abstractions depending on storage and flows	April 2022 onwards	We have increased our abstraction on our river sources on the lower river Derwent which support reductions in abstraction from the Derwent Valley Reservoirs. For example, Combined abstraction on these two sources has increased by around 20 Ml/d in 2022 compared to 2021	Ongoing
Level 1b / Action 6	Consider importing via Elms Farm – depends on demand and availability	April 2022 onwards	We have not imported via Elms Farm as we have been balancing Water Resource issues on the East and West of our Strategic Grid. We have however reduced our average flow via elms farm by around 3 Ml/d as compared to 2021 which would be considered a "normal year".	Ongoing
Level 1b / Action 7	Reduce Abstraction to min sustainable from D V Reservoirs	21st July 2022	We again reduced abstraction from the reservoirs to our works at the end of July towards its sustainable Minimum flow and have since the middle of August kept the work at sustainable minimum apart from for a very few days. This has saved over 1000Ml based on our agreement with Yorkshire Water or over 5000Ml between Apr-Sept compared to our abstraction in 2021	Ongoing
Level 1b / Action 8	Consider Ogston Reservoir Abstraction reduction	NA	This option does not support Derwent Valley Reservoirs and is in the plan to support Ogston Reservoir	
Level 1b / Action 9	Use Bowmer Rough	August 2022	We have been reversing our flow to use Ogston Reservoir abstraction, at around 10 Ml/d since mid-August, once we had brought demand down in the area supplied by Ogston.	Ongoing
Level 1b / Action 10	Stop Abstraction from Ogston reservoir	NA	This option does not support Derwent Valley Reservoirs and is in the plan to support Ogston Reservoir.	
Level 1b / Action 11	Prioritise Carsington refill	NA	This does not support Derwent Valley (in year 1 of a drought). We will be prioritising refill over the winter period.	
Level 1b / Action 12	Reduce Langley Mill	May Onwards	We have optimised use of the Langley Mill transfer	Ongoing
Level 1b / Action 13	Strelley Support for Misk Hill	April onwards	We have increased flow between these control groups whenever available across this period	Ongoing
Level 1b / Action 14	Strelley from Notts Ground Water	April onwards	We have optimised our GW sources in the Notts area to help minimise imports from the Strategic Grid	Ongoing
Level 1b / Action 15	Reduce Kings Corner	April onwards	We have reduced this transfer from Strategic Grid to Nottingham, taking on average 2 Ml/d less in 2022 than in 2021	Ongoing
Level 1b / Action 16	Consider releases from Carsington	July Onwards	We have been releasing up to 130 Ml/d across the summer to support abstraction on the River Derwent thus reducing abstraction from the Derwent Valley Reservoirs.	Ongoing
Level 1b / Action 17	Consider Imports from Elsewhere and rezoning	June Onwards	We have balanced all imports and exports and continue to look at potential rezones where the network allows. An example is the reverse flow from Bowmer Rough.	Ongoing

5.1. We made sure we had sufficient reservoir storage in time for summer 2022

Figure 26 (Raw water availability status as of 21 March 2022) illustrates that going into April 2022 storage levels at all our reservoirs were on target for the time of year. In response to this our Drought Action Team took proactive measures that would allow us to maximise the amount of water we can pump into the reservoirs while winter river levels are high.

Figure 26 (Raw water availability status as of 21 March 2022)



Overall, as a result of our proactive actions our strategic water sources were at target levels in April 2022, meaning that we entered the summer in a strong water resource position. Table 15 (Raw Water Storage Summary April 2022) shows the overall raw water storage position for our strategic sources in March 2022 and demonstrates that overall reservoir storage was above our target position of 95% going into the summer period.

Table 15 (Raw Water Storage Summary April 2022)

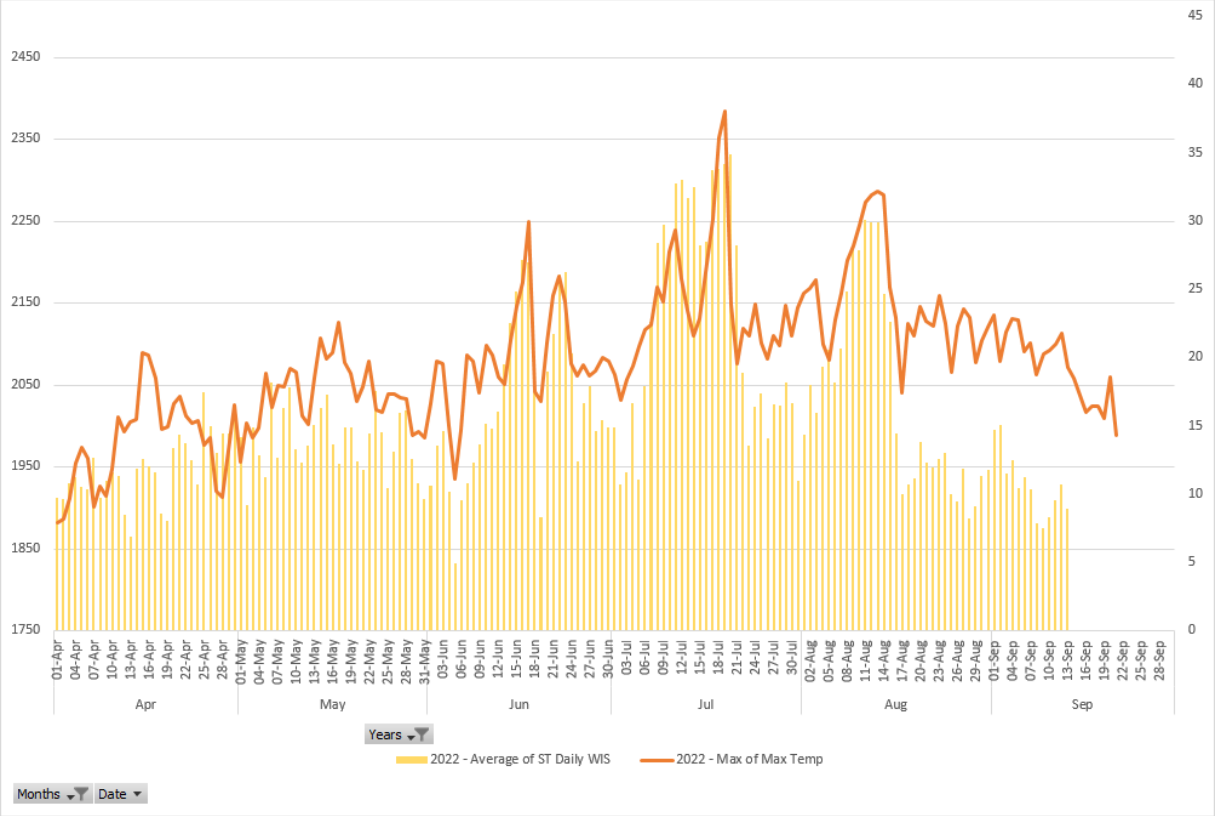
WATER RESOURCES RESERVOIR STORAGE SUMMARY 21 March 2022									
RESERVOIR	Pumped or Natural Fill	CAPACITY	LAST WEEK'S STORAGE		CURRENT STORAGE		Diff	RAG Status / Zone	Projected RAG / Zone in Aug - Dry 30th %ile
		(Ml)	%	(Ml)	%	(Ml)	%		
OGSTON	Pumped & Natural	6050	81.4	4925	79.9	4834	-1.5	B	B
TITTESWORTH	Natural	6440	99.4	6401	97.3	6266	-2.1	B	B
ELAN VALLEY	Natural	99500	99.1	98585	98.3	97809	-0.8	B	B
DRAYCOTE	Pumped	23000	88.4	20330	89.3	20539	0.9	B	B
DERWENT VALLEY		46345	98.8	45791	95.3	44173	-3.5		
Howden	Natural	8998	97.0	8728	88.0	7918	-9.0		
Derwent	Natural	9478	97.0	9194	92.0	8720	-5.0		
Ladybower	Natural	27869	100.0	27869	98.8	27535	-1.2	B	B
CARSINGTON	Pumped & Natural	36331	97.5	35423	97.6	35459	0.1	B	A
DOVE		19845	93.1	18477	93.5	18563	0.4		
Foremark	Pumped	13190	92.3	12174	92.5	12201	0.2	Above Licence Curve B	Above Licence Curve B
Staunton	Pumped	6655	94.7	6302	95.6	6362	0.9		
CHARNWOOD		4756	99.3	4722	100.0	4756	0.7		
Swithland	Natural	2228	98.7	2199	100.0	2228	1.3	In Licence zone B	In Licence zone B
Cropston	Natural	2528	99.8	2523	100.0	2528	0.2		
BARTLEY/FRANKLEY	Pumped	3281	80.4	2638	85.5	2805	5.1	NA	NA
WHITACRE	Pumped & Natural	2160	87.0	1879	84.8	1832	-2.2	NA	NA
CLYWEDOG	Natural	49936	95.9	47889	96.4	48138	0.5		
TOTALS		**247708**	**96.6**	**239169**	**95.7**	**237035**	**-0.9**		
TOTAL Incl. Clywedog		**297644**	**96.4**	**287058**	**95.8**	**285173**			

5.2. We acted early to protect Derwent Valley Reservoirs storage

As outlined above in Section 4, as the spring and summer of 2022 has progressed, we experienced exceptionally dry and hot weather conditions which led to very high demand for water in early summer and exceptionally low inflow into our raw water reservoirs.

The total company demand of over 2300 Ml/d in July was the highest recorded, this exceeded the peak at the height of COVID. This exceptionally high demand for water was also observed within our Strategic Grid zone, which is directly linked to the volumes of water being supplied from the Derwent Valley Reservoirs.

Figure 27 (Total demand for water year to date 2022)



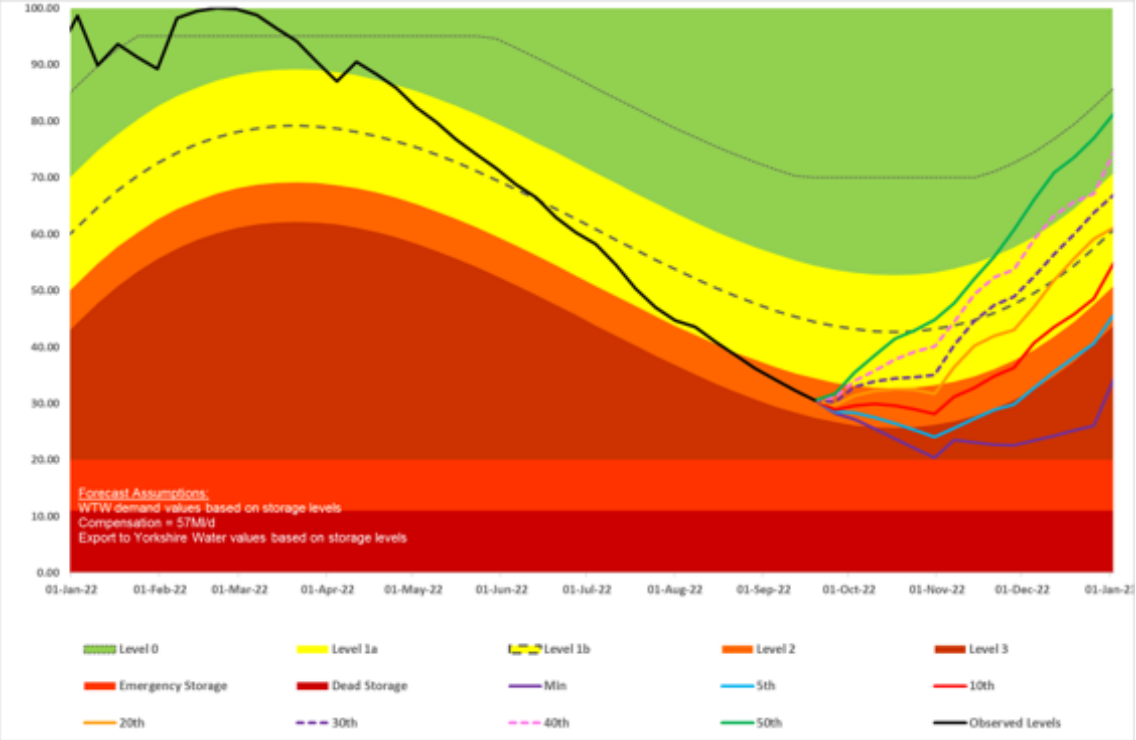
A combined effect of extremely high demand for water in early summer, hot temperatures and exceptionally low rainfall led to an increased draw down in the storage at the Derwent Valley reservoirs by the end of the summer. Table 16 (Raw water storage summary 19 September 2022) demonstrates that our overall raw water storage had reduced from 96% full to just 43%.

Table 16 (Raw water storage summary 19 September 2022)

WATER RESOURCES RESERVOIR STORAGE SUMMARY 19 September 2022							
	Pumped or Natural Fill	CAPACITY	LAST WEEK'S STORAGE		CURRENT STORAGE		Diff
		(Ml)	%	(Ml)	%	(Ml)	%
OGSTON	Pumped & Natural	6050	67.4	4078	67.1	4060	-0.3
TITTESWORTH	Natural	6440	35.8	2306	34.4	2215	-1.4
ELAN VALLEY	Natural	99500	37.3	37094	34.1	33959	-3.2
DRAYCOTE	Pumped	23000	72.2	16606	71.9	16537	-0.3
DERWENT VALLEY		46345	**32.3**	**14990**	**30.5**	**14139**	-1.8
Howden	Natural	8998	12.6	1134	13.3	1197	0.7
Derwent	Natural	9478	27.7	2625	25.7	2436	-2.0
Ladybower	Natural	27869	40.3	11231	37.7	10507	-2.6
CARSINGTON	Pumped & Natural	36331	52.8	19183	48.3	17548	-4.5
DOVE		19845	**59.4**	**11779**	**57.0**	**11310**	-2.4
Foremark	Pumped	13190	61.7	8138	58.7	7743	-3.0
Staunton	Pumped	6655	54.7	3640	53.6	3567	-1.1
CHARNWOOD		4756	**41.0**	**1949**	**38.5**	**1833**	-2.4
Swithland	Natural	2228	49.6	1105	46.3	1032	-3.3
Cropston	Natural	2528	33.4	844	31.7	801	-1.7
BARTLEY/FRANKLEY	Pumped	3281	94.2	3091	94.4	3097	0.2
WHITACRE	Pumped & Natural	2160	61.1	1320	58.7	1267	-2.4
CLYWEDOG	Natural	49936	48.0	23969	44.4	22172	-3.6
TOTALS		**247708**	**45.4**	**112394**	**42.8**	**105965**	**-2.60**
TOTAL Incl. Clywedog		**297644**	**45.8**	**136364**	**43.1**	**128137**	**-2.76**

Figure 28 (Derwent Valley Storage 19 September 2022) illustrates the rapid draw down that we experienced at Derwent Valley and shows how storage had fallen to under 30.5% by mid-September.

Figure 28 (Derwent Valley Storage 19 September 2022)

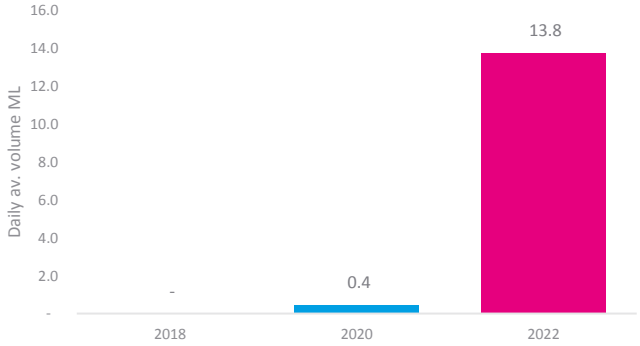


Other Actions undertaken

Derwent Valley storage would have been more significantly impacted had we not taken a number of proactive actions during the summer months to change our normal water production activities to minimise the demand on Derwent Valley. Throughout June, July and August hot weather event we took a number of operational actions across our Strategic Grid to allow our water treatment and distribution system to meet the exceptionally high levels of customer demand. Highlights included:

- Initiating our internal drought action team in May with a primary focus of preparing for the forecasted warm summer
- Testing of summer readiness protocols and operating scenarios well in advance of the summer
- Pre-emptively initiating our hot weather incident response protocol on 18th June in response to the forecast weather conditions and expected increase in demand for water despite triggers not being met. This included actions such as increased operational and maintenance provisions, cessation of all tariff management at water production sites.
- Mobilising our full tankering fleet and procuring additional tankers to support several our distribution service reservoirs which were struggling to meet the demand for water, taking water from other sources to reduce abstraction from Derwent.
- When we experienced extreme weather periods, we used tankering and over-pumping to move 14 Ml/d of water from areas of surplus to deficit. This was significantly more than during the last extreme hot weather experienced in 2020 as shown in Figure 29 (Av. ML discharged via over pumping during hot weather).This increase is reflective of the additional investment we have made to grow our in-house capabilities.

Figure 29 (Av. ML discharged via over pumping during hot weather)



- Re-phased intrusive maintenance activities and re-prioritised planned restrictions or outages wherever possible in order to maintain a continuous supply of treated water.
- Maximising bulk supply imports from neighbouring companies.
- Accelerating several ongoing capital projects where they could facilitate an increase in our water treatment and distribution capability.
- Rezoning and re-valving large parts of our network to minimise the impact on customers.
- Releasing additional water from Carsington Reservoir into the River Derwent from 28th June in order to support our downstream abstractions at two major water treatment works which feed into the strategic grid, this has meant we have been able to keep these abstractions running at close to maximum flows of 90 Ml/d and over 100 Ml/d, had we not taken this approach these works would have been severely restricted or switched off, which in turn would have put significant demand on Derwent Valley Reservoirs.
- Maximising the use of our regional Strategic Grid assets to meet customer demand and manage the risk to water resource availability. For example, we changed and managed the flows of water between Birmingham and the wider Grid as necessary to balance the abstraction and storage risks for Frankley & Bartley reservoirs with other water treatment works, including Derwent Valley. We utilised our valve network to continuously manage and balance the flow between the North and South Grid.

Managing our water treatment works

Our Upper Derwent Water Treatment Works processes water from the Derwent Valley raw water reservoirs (Howden, Derwent & Ladybower), and can produce a maximum of 185 Ml of treated water per day. The Derwent Valley Aqueduct (DVA) then carries the treated water through to our treated water reservoir forming part of our strategic grid.

Since April 2022, we reduced our treatment works output where possible below the levels in the agreement with Yorkshire Water as can be seen if Figure 25 (Derwent Valley Abstraction Vs STW YKS Agreement) (Section 5). This was in anticipation of potential hot weather over the summer period, prevailing weather conditions at this time were dry. We incrementally reduced the works further at the end of June and start of July below the agreed abstraction thresholds. Notably, despite a temporary increase in abstraction due to the extreme hot weather in mid-July, we reduced water treatment works output again to continue to preserve Derwent Valley raw water storage from the 21st of July, we reduced treatment works output below the 115 Ml/d state line to 100 Ml/d for the remainder of July, following some site modifications and process testing the works was further reduced to 95 Ml/d by mid-August. The works has remained on an average of 95 Ml/d.

Figure 30 (Derwent valley reservoir projections and indication of when decision was taken to limit output below 115 Ml/d) illustrates that at the point we made the decision to further reduce treatment works output below the - with any increases requiring director approval - the Derwent Valley Reservoirs were at 50% and in the 'Level

1b' storage zone at this point. We implemented this process to ensure treatment work outputs remained at the minimum sustainable level, due to the weather forecast for continued warm dry weather into September and our probabilistic reservoir storage projections.

Figure 30 (Derwent valley reservoir projections and indication of when decision was taken to limit output below 115 Ml/d)

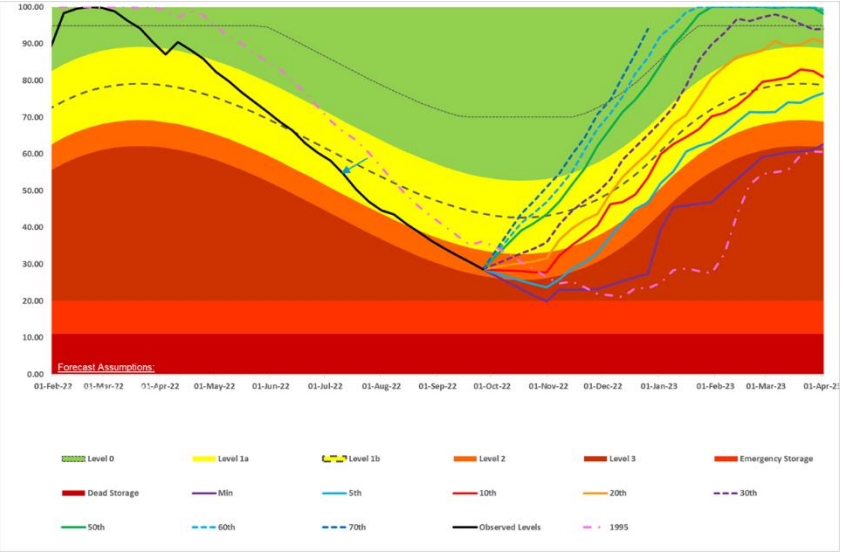
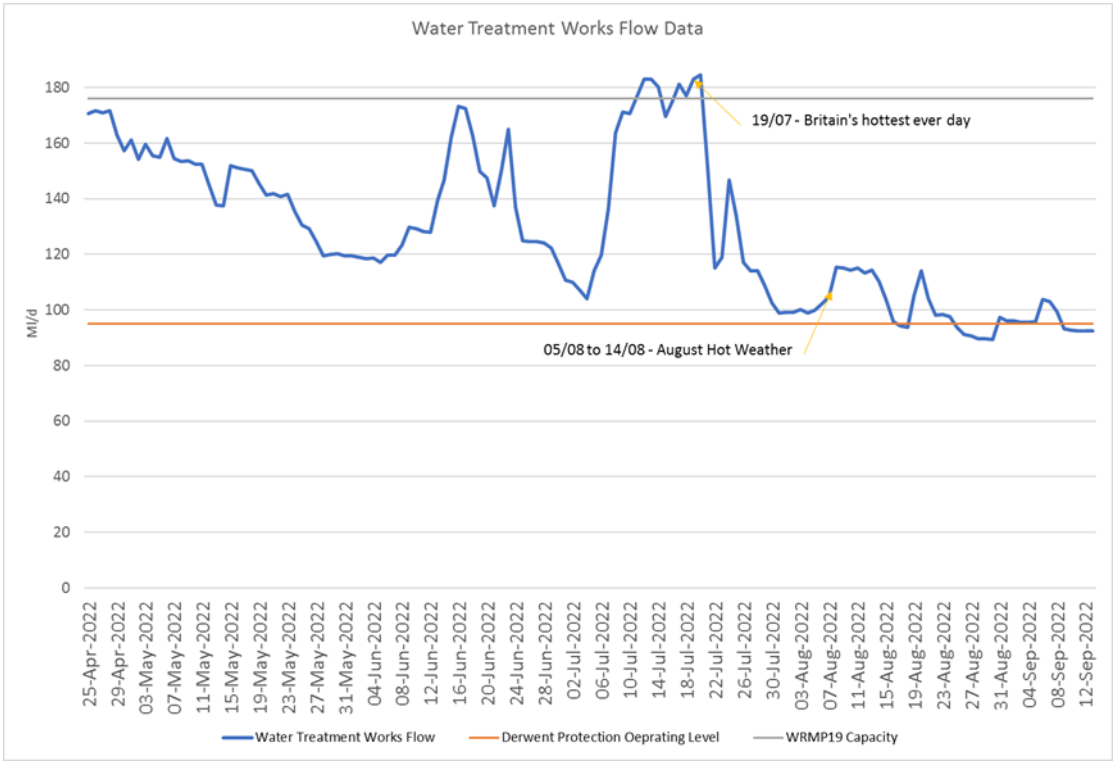


Figure 31 (WTW output changes)shows that at the time when this proactive action was taken, overall demand for water was still exceptionally high and the hot weather continued.

Figure 31 (WTW output changes)



Over the course of the year, we have created 58.6 days of extra capacity by reducing output at our Upper Derwent Water Treatment Works when our reservoirs were still in Level 1, saving 5,575 Ml compared to last year. The favourable topography of the area for supplying water via gravity means this works is typically one of our lowest cost sites. Making the decision of reducing the works has cost us an additional £0.6m in energy and power costs as we balance abstraction from other water treatment works in our strategic grid.
has meant we

5.3. Operational Changes we will make to avoid future drought related problems

Our operating target for the autumn and winter is to minimise the amount of water we put into supply from Derwent Valley Reservoirs, and to get as close to a target of 90 Ml/d output whenever possible. For comparison, our normal operating target for this time of year would see output closer to 180 Ml/d.

To help us achieve our target of minimising output we have made further changes to the configuration of our wider Strategic Grid to balance resources across the water resource zone. Many included in our drought plan and shown in table 9a.
This has included:

- Rezoning parts of our network into parts of our Strategic Grid wherever possible such as reversing Bowmer Rough pumps.
- Increasing the output from our Birmingham and Coventry supply systems and sending that water into the wider Strategic Grid, again allowing us to reduce the amount we send from the northern parts of our Grid and therefore reducing Elms Farm.
- Re-phasing asset maintenance and asset investment across our Strategic Grid so that we maximise the amount of output from our abstraction sources and reduce the demand on our reservoir fed sources (detailed in section 7 of this document).

Our ability to sustain our objective of minimising the output from Derwent Valley constrained by other risks and issues across our Grid. For example:

- The extremely low Charnwood Reservoirs levels mean that we will proactively shut down the associated water treatment works for the coming winter in order that the reservoirs can refill in time for next year.

As well as making operational changes to our water treatment and distribution system to protect Derwent Valley Reservoirs, we have also taken action to try and maximise the potential reservoir refill over the coming winter.

Within our draft Water Resource Management Plan (dWRMP) that has been submitted to the EA and Secretary of State on the 3rd of October we have set a series of supply improvements to secure additional deployable output and transition over the coming AMPs to a greater level of drought resilience.

5.4. Other options considered and reasons for rejection

The drought management actions we have taken follow the list of escalating options that are described in our Drought Plan. We have prioritised those activities that have benefits attributed to storage preservation within Derwent. There are four items listed in our North Grid plan that would have acted contrary to this and as such they have not been deployed.

Over and above our drought plan we have taken action to improve treatment capacity at neighbouring works, for example accelerated membrane replacements at the immediate source downstream. We have rezoned parts of our system and deployed tankers to discrete areas, for example, we tankered into an area of Derbyshire to

support high demand as opposed to pull water from the strategic grid. These actions have enabled demand on our Upper Derwent WTW to be reduced.

With exception to our year two Drought measures that we are actively reviewing and seeking to accelerate deployment, there are no alternatives that can be deployed this year in place of a Drought Permit.

We have a dedicated workstream established to evaluate alternative sources that could be deployed to aid refill or act as compensation (including named year two drought options). This review is live, ultimately any option would require support of both the Drinking Water Inspectorate and Environment Agency and may require additional infrastructure to deploy. We will continue to work closely with our stakeholders as feasibility assessments develop.

6. We have continued to reduce leakage across our network

Leakage, much like river water quality, is a totemic issue for our sector. Ofwat was right at its last price review to point to a levelling out of the pace of leakage improvements achieved by our sector (with the majority of the 40% reduction achieved between 1996 and 2020 occurring in the early part of this period). This flattening in progress was in part because, historically, water availability made it uneconomic to drive further step changes. However, we fully recognise that in the prevailing circumstances this no longer the appropriate approach. We therefore embraced Ofwat's challenge of achieving a 15% (69.2 Ml/d) reduction by 2025, we have also committed to achieving a 50% reduction by 2045 – five years ahead of the National Infrastructure Commission's target.

We have met our leakage reduction regulatory targets for 10 out of the last 11 years (the exception being 2017/18 reflecting challenges caused by the 'Beast from the East') and, are currently on track for this year. Since Financial Year 2020/21 we have delivered a 3.4% (15.9 Ml/d) reduction on leakage from our benchmark position in 2019/20, in line with our regulatory target of 15% by 2025.

At the start of the financial Year, 2022/23, we will be delivering a very significant 30 Ml/d reduction in annual leakage, which would deliver a further 2.3% reduction on our 3-year average performance and is the equivalent of saving 12 Olympic sized swimming pool per day.

This year we have experienced very challenging operating conditions as the prolonged dry weather has meant soil conditions have caused more mains to burst. Despite this, we remain on track to deliver reductions this year in line with our plans. The key factors that have supported our strong performance on leakage are as follows:

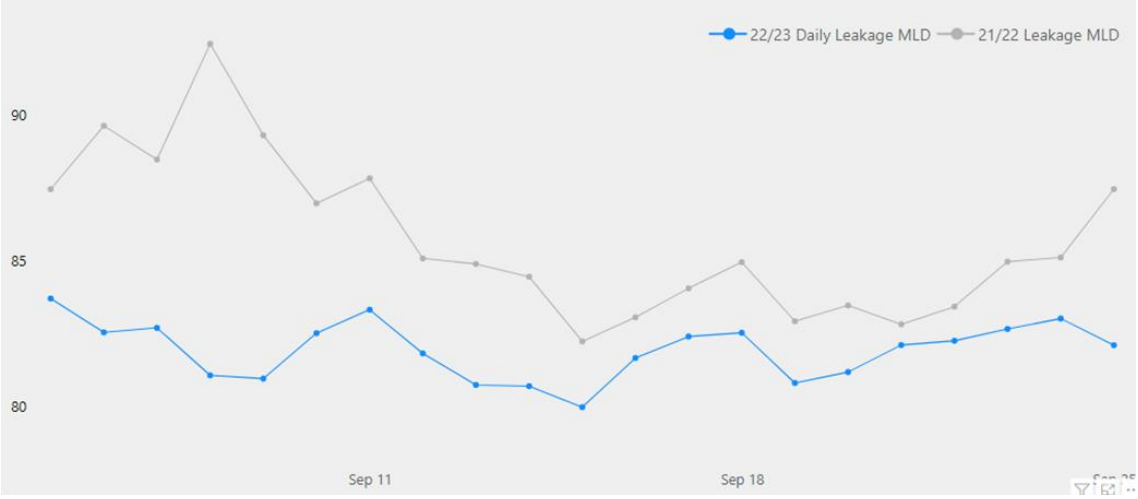
- We have invested in our people by creating a leakage apprenticeship scheme, with 75 apprentices joining us over a 3-year period, costing £1.5m.
- We have increased resources with 30 extra Water Network Technicians, taking our total to 161 FTE looking for leaks and an extra 20 repair teams fixing them.
- Proactively targeting to locate 25,000 leaks this year, compared to 20,000 last. We are currently on track to locate c.28,000, 40% more than last year, including 10,000 private side leaks. This is in addition to the leaks reported by our customers - normally c.50% of our total leaks. Total expenditure on leakage find this year is expected to be in excess of £20m approximately £2m more than 2021 and £4m more than 2019.
- In the last five years we have increased repairs on leaky pipes by 25% (in 2017/2018 we fixed 29,662 leaks and in 21/22 we fixed 37,133.)
- We are using drones and satellite images with various cameras that detect leaking pipes through something as subtle as a temperature change. Developing our internal capability by surveying our reservoirs and trunk main surveys and rural areas. We currently have two drone pilots and are looking to expand this team very soon
- We have been using AI technology to analyse our 30,000 acoustic loggers to identify leaks more quickly on our network. Over a six-month period, this AI generated c.2.5k Points of Interest, with a confirmed 769 leaks raised so far. We continue to work with this innovation and will be making some improvements to our organisation from September to take advantage of these benefits
- Continued support of our most vulnerable customers by assisting them to reduce leakage on supply side pipe work.
- We have accelerated our AMP7 Pressure Management schemes. Installing and optimising 120 new Pressure Reducing Valves this year, this was originally planned to be delivered over 3 years. Installation of Pressure Reducing Valves allows us to manage night-time pressure through our District Metered Areas (DMAs), by reducing the pressure we reduce the flow rate in the DMA and reduce leakage. This

activity has so far delivered an estimated 3.7 Ml/d leakage reduction and on track to deliver 6.7 Ml/d by year end. 0.7 Ml/d ahead of target.

- We will proactively service and inspect 833 pressure reduction valves across our network by end 2022-23, and have completed 653 so far, ahead of plan by c.100 Also optimising existing pressure reducing valves where possible across our network.
- We are taking steps to improve our understanding of customer water consumption utilising our AMP7 Proactive and Green Recovery smart metering roll outs. We are utilising this data to understand customer behaviours and consumption patterns in real time. In 2021/22 we proactively installed 110,000 meters with another 227,000 planned to be installed by 2025. As part of our Green Recovery programme, we are installing 157,000 AMI (Advanced Meter Infrastructure) in the Nuneaton area.

Specifically for the Derwent, we have put in additional focus to the above resulting in the average estimated DMA leakage position across Leicestershire & Derbyshire for the first 3 weeks of September (as shown in the below figure) being 3.48 Ml/d lower than the same period last year. 82.09 Ml/d compared to 85.57 Ml/d.

Figure 32 (Daily Leakage Ml/d Leicestershire & Derbyshire Sept-21 vs Sept-22)



Leicestershire

- Increase in back-office leakage targeting resource and Senior leakage technician;
- We have uplifted our leak-find resource by 36% (+7) since early Spring 2022;
- Delivering well ahead of target find numbers.

Derbyshire

- We have uplifted our Leak Find resource (+5) since early Spring 2022;
- Delivering well ahead of target find number.

Additionally, we are taking steps to improve our understanding of the additional customer water consumption we observed during the hot weather period. Using our small area monitors, commercial consumption monitors and half yearly consumer meter readings we will gain greater confidence in our ability to differentiate between true increases in water consumption and leakage.

At this stage it is not possible to give a precise forecast for our leakage position due to the interaction between high night-time usage in summer and how leakage is calculated. The summer of 2022 and hot weather has resulted in an exceptional increase in demand on the network. For example, on a single day in July we produced 300 million more litres of water than we would normally expect. This rapid increase in network demand made it difficult to distinguish between changes in customer consumption and changes in leakage performance.

This is because reported leakage uses average estimates of household night use. The night-time period being when demand is at its minimum and therefore operational leakage most accurate. Hot weather can increase night-time water use because of people waiting for the temperature to reduce before going to bed, being unable to sleep due to the hot night temperatures and taking showers or baths later in the evening or night. Where we see above average demand in periods of hot weather, excess demand is reported as leakage.

7. We have managed our planned outage approach and reduce unplanned outages to ensure our resources are used effectively

7.1. Current Performance

We have kept outage of supplies within the water resource zone to a minimum to allow flexibility in how we maintain our supply demand balance. Against our WRMP19 assumptions we are significantly under our forecast for outages planned and unplanned for this financial year (Strategic Grid 26.26 Ml/d outage planned and unplanned between vs 124.06 Ml/d WRMP Assumption). This has been driven in part through an increased focus on early indicators of unplanned outages and identification of new approaches to the way in which we carry out work.

The below table represents our outage data (Ml/d) since the beginning of the period since the ESoR began for the strategic grid resource zones. Our total outage has 3991.00 mega litres over 152 days which equates to 26.26 Ml/d.

Table 17 (Total Outage 1st April to 31st August 2022)

Outage	Groundwater	Surface water	Grand Total
Planned Outage	118.60	564.73	683.33
Unplanned Outage	2488.35	819.33	3307.67
Grand Total	2606.95	1384.06	3991.00
Average ML per day of outage	**17.15**	**9.11**	**26.26**

As described in section 5.2, we took actions to reduce water treatment works output and preserve Derwent Valley raw water storage, this is largely due to reducing outages and ensuring our resources are used effectively. Our 22/23 forecast for Supply Demand Balance Index - level of service is yet to be finalised however we have maintained a steady state from our 21/22 position. This was a level of service of 100 (Reporting year DI scenario) with the Strategic Grid having 5.89% percentage surplus for the zone.

The below table lists the sources affected by outage both planned and unplanned since the beginning of the period since the ESoR began for the strategic grid resource zones.

Table 18 (Outages by site 1st April to 31st August 2022)

Site	# Of Outages	Ml/d Lost Planned	Ml/d Lost Unplanned	Total Ml/d Outage	Average ML per day of outage
Strategic Grid South-East 1 (DBS)	1		0.18	**0.18**	*0.00*
Strategic Grid South-West 1 (BPS)	12		26.22	**26.22**	*0.17*
Strategic Grid South-West 2 (BPS)	14		236.20	**236.20**	*1.55*
Strategic Grid South-West 3 (WTW)	16		24.03	**24.03**	*0.16*
Strategic Grid South-West 4 (SS)	27		3.11	**3.11**	*0.02*
Strategic Grid South-West 5 (BPS)	10		5.27	**5.27**	*0.03*
Strategic Grid South-West 6 (WTW)	13		176.88	**176.88**	*1.16*
Strategic Grid South-West 7 (GWS)	73		43.88	**43.88**	*0.29*
Strategic Grid South-West 8 (BPS)	21		37.15	**37.15**	*0.24*
Strategic Grid South-West 9 (BPS)	3		0.01	**0.01**	*0.00*
Strategic Grid South-West 10 (BPS)	11		2.70	**2.70**	*0.02*
Strategic Grid South-West 11 (WTW)	2		3.50	**3.50**	*0.02*
Strategic Grid South-West 12 (WTW)	18	7.10	8.71	**15.81**	*0.10*

Site	# Of Outages	Ml/d Lost Planned	Ml/d Lost Unplanned	Total Ml/d Outage	Average ML per day of outage
Strategic Grid South-West 13 (WTW)	42		37.22	**37.22**	*0.24*
Strategic Grid South-East 2 (WTW)	4		25.28	**25.28**	*0.17*
Strategic Grid North-West 1 (DSR)	1		0.00	**0.00**	*0.00*
Strategic Grid South-West 14 (DSR)	1		0.07	**0.07**	*0.00*
Strategic Grid South-West 15 (WTW)	48		10.60	**10.60**	*0.07*
Strategic Grid South-East 3 (WTW)	7	24.64	128.34	**152.98**	*1.01*
Strategic Grid North-West 2 (BPS)	46		7.56	**7.56**	*0.05*
Strategic Grid South-West 16 (WTW)	3		13.58	**13.58**	*0.09*
Strategic Grid South-West 17 (BPS)	3		0.69	**0.69**	*0.00*
Strategic Grid Central 1 (DBS)	5		8.87	**8.87**	*0.06*
Strategic Grid Central 2 (BPS)	6		5.23	**5.23**	*0.03*
Strategic Grid South-West 18 (BPS)	5		3.61	**3.61**	*0.02*
Strategic Grid South-West 19 (BPS)	2		1.43	**1.43**	*0.01*
Strategic Grid South-West 20 (WTW)	5		1.78	**1.78**	*0.01*
Strategic Grid North-West 3 (DSR)	5		5.08	**5.08**	*0.03*
Strategic Grid North-East 1 (WTW)	12		345.53	**345.53**	*2.27*
Strategic Grid North-East 2 (WTW)	7		82.19	**82.19**	*0.54*
Strategic Grid South-West 21 (WTW)	32		46.00	**46.00**	*0.30*
Strategic Grid South-East 4 (WTW)	2		56.67	**56.67**	*0.37*
Strategic Grid South-West 22 (BPS)	7		15.95	**15.95**	*0.10*
Strategic Grid South-West 23 (GWS)	26		8.16	**8.16**	*0.05*
Strategic Grid South-West 24 (WTW)	3		13.24	**13.24**	*0.09*
Strategic Grid South-West 25 (BPS)	2		3.36	**3.36**	*0.02*
Strategic Grid South-West 26 (WTW)	3		30.38	**30.38**	*0.20*
Strategic Grid South-West 27 (BPS)	20		11.68	**11.68**	*0.08*
Strategic Grid South-West 28 (BPS)	8		4.13	**4.13**	*0.03*
Strategic Grid South-West 29 (DSR)	10	65.29	1055.38	**1120.67**	*7.37*
Strategic Grid North-East 3 (WTW)	6		32.00	**32.00**	*0.21*
Strategic Grid South-West 30 (BPS)	4		0.67	**0.67**	*0.00*
Strategic Grid South-West 31 (WTW)	12	237.87	170.55	**408.41**	*2.69*
Strategic Grid South-West 32 (BPS)	11		303.50	**303.50**	*2.00*
Strategic Grid South-West 33 (BPS)	7		12.73	**12.73**	*0.08*
Strategic Grid North-West 4 (WTW)	1		2.25	**2.25**	*0.01*
Strategic Grid South-West 34 (BPS)	4		0.96	**0.96**	*0.01*
Strategic Grid South-West 35 (BPS)	18		10.03	**10.03**	*0.07*
Strategic Grid South-West 36 (WTW)	7	46.22	3.24	**49.45**	*0.33*
Strategic Grid South-West 37 (BPS)	14		265.47	**265.47**	*1.75*
Strategic Grid Central 3 (WTW)	1	302.22		**302.22**	*1.99*
Strategic Grid South-West 38 (BPS)	21		16.47	**16.47**	*0.11*
Grand Total	**642**	**683.33**	**3307.67**	**3991.00**	*26.26*

In relation to our Strategic Grid North area, there was one significant unplanned outage which ran from the 16th until the 29th of June, at this time a works (shown on the table above as Strategic Grid North-East 1 (WTW)) was restricted 20 Ml/d for 12 days due to a failure of a Non-Return valve. This works utilised water from Meerbrook Sough. During this period, our Upper Derwent Water Treatment works averaged 143 Ml/d to reduce the risk of customer outages whilst balancing abstraction on the Derwent and not increasing the works to its full output 176 Ml/d.

7.2. Applying learnings from past events

Applying our learnings from the 2018 Hot Weather and "Beast from the East", we have invested in several areas to improve our resilience which has enabled us to reduce demands on Derwent Valley. From 2018 to 2021 we have invested over £5m across on several activities that looked to increase deployable outputs from groundwater sources in vulnerable areas, remove network restrictions an enable greater flexibility, and reduce our risk of unexpected asset failure. Examples of these activities are:

- Installing Variable Speed Drives across Nottinghamshire to enable better control of 3water transfer in the water resource zone, requiring less reliance on the Strategic Grid.
- Installation of telemetry and additional sample points to provide better control of production and allow sustained peak deployable output from our water treatment works that take off our Cropston and Swithland reservoirs.
- Returning assets to service on a water treatment works on the lower Derwent to provide improved resilience against deterioration in clarified water quality.

Indirectly, one of the areas our strategic grid can support is Nottinghamshire, following the learnings of the 2021 hot weather we have also invested to reduce outage in this area and minimise strategic grid exports to this area. Over the past year we have:

- Completed capital maintenance, refurbishing 7 boreholes and a further 2 treatment plants across multiple sites to sustain deployable output and increase resilience.
- Installed generators on standby across multiple sites to reduce outages due to power.
- Launched a new standby rota for better resilience in event of an outage.
- Completed a proactive maintenance regime ahead of disinfection equipment.
- Optimised the network further for stability.

7.3. Responding to drought conditions

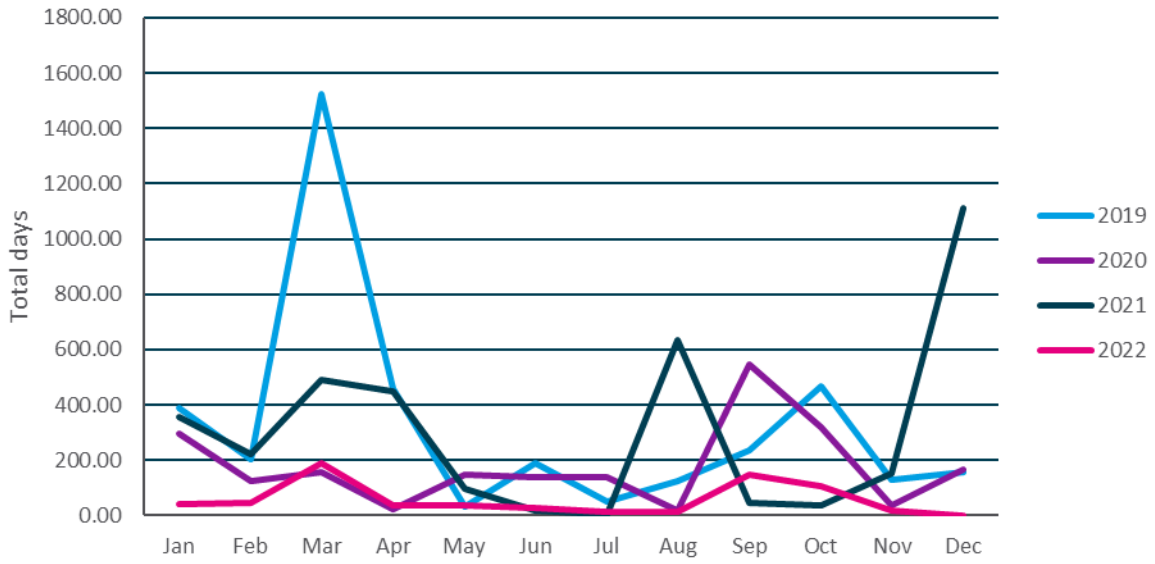
In response to Drought conditions, we have implemented several activities through the summer of 2022 to help reduce abstraction from the northern part of our strategic grid water resource zone. Examples of these activities are:

- Improvements to asset condition and availability at a Water Treatment Works that abstracts from the lower Derwent and investing in additional monitoring to increase through-put by 10 Ml/d. These new operating levels required the release of additional water from Carsington into the Derwent to enable the increased level of abstraction but has protected resources would ordinarily come from Derwent Valley reservoirs.
- We invested an additional £1m at another water treatment works that abstracts from the Derwent in Derbyshire to improve resilience ahead of the summer to sustain higher output from the works whilst maintaining water that is good to drink for our customers.
- We have improved process control mechanisms at Water Treatment Works which enabled us to improve output, resilience and flexibility between Derbyshire, Nottinghamshire and supporting the strategic grid from our reservoirs at Ogston.

- We have been working with the EA and Coal Authorities to reduce discharges containing bromide into the Derwent. As a result, there hasn't been a water quality related challenge this summer, which could have resulted in outage of our works.
- We also evaluated our capital programme for opportunities. As an example, a borehole in the peak district was taken out of service in late 2021 for planned capital maintenance and routine tank inspections. Follow on work was identified as a result of the planned activities with the programme of work expected to be completed after the summer months. In response to the hot and dry weather, a 'fast track' plan was implemented to complete the required remedial work and recommission the site over a 4-day period.

As per our drought plan, we have ensured we maximise our resources available wherever possible, to achieve this we decided in April to reduce the number of planned interventions (outages) at non-infrastructure sites that impact the strategic grid. As a result of this, the number days we have had assets out between April and September in 2022 has been 75% less than the average between 2019 and 2021, this can be seen in Figure 33 (Total Intervention Days Scheduled per Month for sites impacting Strategic Grid North-East, South-East and South-West).

Figure 33 (Total Intervention Days Scheduled per Month for sites impacting Strategic Grid North-East, South-East and South-West)



8. Customer engagement

8.1. Our communications have raised awareness about the situation

We launched our largest ever customer engagement programme this summer investing £1.4m on campaigns across TV, radio, social media, outdoor posters, text messages, PR and digital advertising to inspire efficient water use, and to offer customers simple water saving tips they could follow.

In the last two years we have increasingly relied on behavioural sciences:

- Professor Ivo Vlaev and the Behavioural Sciences Group at Warwick University helped design our summer SMS alert system and wider summer engagement.
- We tested customer responses to different stimuli through our online community.
- Undertook trials to understand what drivers have the most impact.
- Professor Lucy Easthope advised our Board and Executive this summer on how to engage with customers in a post-COVID world so that we have the greatest long-term impact.

This work has shaped how we have engaged with customers, for example:

- Focus on financial motivations which have had the largest impact in changing water behaviour.
- Avoid telling customers what they can and can't do and instead provide more practical support (e.g., don't tell customers to stop using paddling pools, instead encourage them to refill less).
- Ensuring our messages support long term behavioural change so we can mitigate climate impacts (e.g., ensuring each piece of engagement is additive).

Our summer campaigns were seen or heard over 115m times, and we are planning to sustain elements of the campaign throughout the winter period and into the spring. The contents of our campaign were designed around the different socio-economic factors and context at the time. The desired outcome was to raise awareness and encourage efficient water use and leakage reporting.

Our summer campaigns were seen or heard over 115m times	
1.6 m all-customer emails	9.5m SMS
Local media campaigns	Local radio broadcasts to 13.8m people
Leveraged social influencers	Tailored call centre wait music
Reminders to all our employees	Emailed our suppliers
Reached 88k customers in specific regions via social media boosts	Commonwealth Games – ½m interacted with our water saving messages

Targeted Audio

We used the same creative as summer 2021 as we found that these ads were the most effective with the demographics via targeted audio. This activity was live from 6th June to 21st July and targeted all adults in Nottingham, Wolverhampton, Staffordshire and Telford. During the campaign period the ads received 1,171,827 impressions, with the highest engagement occurring between the 13th – 19th June. All creatives had a very even split of interaction/engagement. The ads focused on giving customers water saving tips to change their behaviours.

Radio

This year we also wanted to add in an incident ad to be more instructive and bring us in line with the wider industry. This went live on the 28th of July and ran for 4 weeks (until 24th August) reaching 50% of adults across our region. The radio ad achieved 14,688,186 impacts and was played across a range of Free, Hits and Heart radio stations across the region. This ad focused on the challenge of keeping up with supply and providing customers with tips for saving water.

Social Media

As part of our communication plan, we have utilised targeted social adverts to areas where demand has been the highest in our region. These ran from 6th June – 17th July.

Hedgehog

Frog

The Hedgehog & Frog ad were visible to the under 35 population across Nottinghamshire, Staffordshire, Telford and Wolverhampton. These ads lead to their own landing page which can be found here: stwater.co.uk/careforit.

Sprinkler

Bucket

The Sprinkler and Bucket were visible to the over 35 population across the above targeted areas. The Sprinkler & Bucket ad leads to their own landing page so we can monitor uptake: stwater.co.uk/lookafterit.

After publishing these social media adverts, we found that:

- All 4 ads received 2,914,035 impressions and a 0.37% click through rate. With ads mostly being viewed on smartphones.
- All ads received similar engagement, with Sprinkler being the front runner with 293,110 impressions alone.

We've posted 26 organic social posts across all regions, utilising Facebook, Instagram and Twitter. With interaction on Twitter and Facebook being the highest.

Utilised boosted social in North Staffrodshire, Forest & Stroud. This ran from 11th – 25th July and received a total of 17,481 engagements. Derbyshire boosted social ran from 5th August – 26th August and received 19,927 engagements.

Working with influencers

We utilised 6 influencers across June and July and had a total of 7 posts. They have a combined following of 146,856. Diary of the Denton Dolls was the best performing ad, receiving 1,316 likes and 49 comments. Most comments were very positive, people were really engaged and offered their own water saving tips.

SMS

In total 7,380,319 SMS were sent @ a cost of 3.8p = £280,452.12. This was broken down into the following:

- **15th July** - sent 1,925,970 : *Hi, Severn Trent here. We're set for a hot weekend, and we need your help to make sure there's enough lovely water to keep your community hydrated. Do your bit by putting away the hoses and jet washers and turn off the tap when brushing your teeth. That way we'll keep the water flowing for all. Thanks.*
- **16th July -** sent 1,934,338: *Hi it's Severn Trent. The hot weather is here, and we want everyone to stay safe and hydrated. We are seeing a large increase in water use across the region. Please put the sprinklers and hosepipes away for a few days so we can keep the water flowing for all. Thanks, Severn Trent.*
- **29th July –** sent 1,590,631: *Hi, Severn Trent here. We just wanted to give you a massive shout out for helping us during the heat wave and this dry weather. All our teams are grateful for the effort as it is making a big difference. Thanks for your help this summer!*
- **11th August –** sent 1,929,380: *Hi, Severn Trent here, since we last spoke, we have not had any decent rain and experienced the driest July in over a century! With low rainfall and the sunshine here to stay, please stay hydrated and continue to use water wisely. Thank you.*

We also followed this up into September, as an example we sent this on the 14th of September to all our customers:

Commonwealth Games

For 2022 we announced partnership with the Commonwealth Games to be their official Nature and Carbon Neutral Partner, our Brand was prominent with our water wise messaging conveyed at all venues, majority of which were situated within the Strategic Grid Water Resource Zone. The event attracted over a million people directly with millions more watching on TV. We saw this as a fantastic opportunity to promote our precious resource and connect with customers directly on ways to not only be efficient with water they use but also other ways to protect our regions rivers and the broader environment.

For the duration of the games, we provided 41 water bars across 14 locations supported by 1000 staff volunteers.

8.2. We have worked with customers to try and reduce their demand for water

Leakage

Since 2021 we have been using leak alarm data from our meters, proactively targeting customers that had a continuous flow at the property. We offered to check the water fittings at the property, installed water saving devices where appropriate and carried out simple plumbing repairs where it was simple to do so – this is free of charge to the customer.

We quantified the leak before and after the repair and used this to confirm actual water savings. This programme has been very successful, having delivered 1.21 Ml/d savings and 4,542 Water Efficiency audits for 2021/22.

Our programmes have been highly successful and has delivered 1.85 Ml/d of demand savings to date (including pre-2021). We are however, seeing fewer leak alarms as we work through the backlog but continue to develop additional workstreams to help customers reduce their demand.

GWF (Get Water Fit) Leak repair challenge

The introduction of our bespoke 'Free leak repair' challenge on our Get Water Fit platform which highlights the benefit of a free leak repair has seen an average demand saving of 90 litres per property since April, with savings of 0.04 Ml/d. Customers can report leaks on their toilet, basin or shower and we repair them where possible or refer them to our Water Safe plumbers.

Vyn Leaky Loo programme

We have recently introduced a digital platform where customers can upload videos of their leaking toilet with an explanation of what the issue is. Our technicians then review the video's and repair the ones that are eligible under our free fix offer and offer advice to those which are not. Initially the programme will be targeting new build properties as data suggest these are more likely to have leaking toilets. We emailed c.30k customers in August talking about leaky loos and encouraging customers to get them fixed through this programme.

High Consumption HWEC's

We are currently trialling home water efficiency checks with customers who have come through our retail channel due to a high bill. In the current reporting year, we have completed 253 HWECs (Home Water Efficiency Checks) with these customers and so far, have seen a demand saving of 0.19 Ml/d.

Highest Consumers

To understand why our top 4,000 customers are using excess water we are looking to understand reasons for continuous high usage i.e., high occupancy, internal plumbing losses, behaviours, and opportunities to help them reduce their water consumption and We will be offering them a free Home Water Efficiency audit and leak repairs on internal plumbing.

Community Engagement

We also work with teams across Severn Trent in customer facing roles to deliver water efficiency advice and to promote our other water efficiency offerings such as products and home water efficiency checks. We have expanded the number of teams we work with and developed our existing relationships to ensure that water efficiency remains a key message across the business.

Gardening industry

We have partnered with the Wildlife trust and PlantLife on social campaigns discussing the impact on the environment and saving water as well as promoting our own Gardeners Growing Kit.

Water industry
We have run two social campaigns supporting Water Wise and Water UK – we mirrored their messaging and also referenced their research in some of our comms.

NHH retailers
We have shared our comms with the NHH team to ensure we are aligned in our messaging. There are regular meetings with the NHH WE team to continue communication.

Media briefings
We've held various media briefings over the summer to talk about the hot weather and low rainfall.

- **Tuesday 9th July –** interviews with BBC Radio Gloucester, BBC Radio Hereford & Worcester, BBC Shropshire, Bauer Media Group and BBC West Midlands.
- **Wednesday 10th July** - interview with BBC Radio Leicester.
- **Friday 15th July** Media Day at Carsington Water – interviews with BBC Midlands Today, ITV Central News, Global Radio (inc. Heart, Capital, LBC and Smooth radio), Greatest Hits Radio, Harborough FM, BBC CWR, BBC East Midlands Today, BBC Radio Nottingham, and BBC Radio Stoke.
- **Monday 8th August** – interview with Heart FM.

Free and subsidised products
We continue to offer free water saving products on request to our customers which we promote via our digital platform called Get Water Fit. The platform provides customers with all the tools they need to save water, energy, and money, while also supporting local charities and schools. By answering a few simple questions about their water usage habits and appliances, customers can compare their water use to others and find out which free water-saving products are suitable for their home.

By completing the Get Water Fit calculator, which takes around five minutes, customers can order appropriated free water saving devices. Plus, any completed water saving challenges will be turned into rewards in the form of coins which customers can then donate to a charity or school of their choice. We contribute a £1000 which is allocated and distributed across (up to nine charities/groups) in % proportion to the coins earned over a period of 6 months. Our partners Save Water Save Money (SWSM) facilitate email communications to remind customers of outstanding challenges not yet complete and/or outstanding coins not yet donated, this is to motivate users to support their charity/group. We have seen the number of customers registering (completing the online calculator) on the Get Water Fit platform double between the months of April-August 2022, compared to the same reporting period of 2021. We have had 44,041 registrations this reporting year with 0.46 Ml/d savings, compared with 22,987 registrations (April-Aug 2021) totalling 0.24 Ml/d savings.

Our three-month campaign at the beginning of June 2021 was launched through our 'Be a water saving hero' to help customers use water more wisely. Throughout the campaign, we offered our water saving customers the opportunity to win a day out. Customers needed to upload a photo, video, or drawing/design of their top tip to Facebook or Instagram and explain the idea or top tip in the description. They were entered into a free prize draw to win a £200 gift card for use in a variety of restaurants, theme parks and hotels. They were also entered into a draw for Commonwealth Games tickets to help with engagement and reinforce water saving behaviour messages.

Our communication and marketing team continue to push the promotion of both free and subsidised products and have delivered 7 successful email campaigns that has reached more than 1.5 million customers this year. We have seen a healthy uplift of free product orders this year that has already delivered 0.6 Ml/d of demand

savings through 26,883 orders compared to 0.39 Ml/d demand savings through 17,888 product orders for the same April-August reporting period last year.

Our free showerheads, swell gels and shower timers are some of the popular products that customers order. We've also 2 new products to our range; the Bubble stream tap aerator which has an inbuilt flow regulator, which helps customers to save on their water usage. It has a flow regulator of 8 litre per minute, compared to a standard 12 litre per minute flow rate. The second product is the toothy timer which encourages children to brush for two minutes and to turn off the tap between rinses.

We will continue to offer both pipe lagging and tap guards to help prevent pipe bursts on customer properties in the event of freezing weather over the winter period.

We offer subsidised water butts that have capacities of 100, 200 and 227 litres. Prices start from £30.21 for a 100-litre water butt which retails at £36.99, and we offer up to £10.00 off for the 200 and 227 litre water butts. The price includes a rain diverter kit and delivery. The Harcostar 227l Water Butt has been a success with customers which has plenty of capacity to keep gardens watered through extended dry spells.

We saw a record number of water butt sales for the month of August due to our ongoing engagement with radio stations throughout the region.

Our 8 litre regulated Methven showerheads are offered at just £8.50 against the recommended retail price of £30.00.

Summary of product savings*

Dates	Activity	Savings
2021 / 2022	Leak alarms	1.21 Ml/d
April - August 2022	Get Water Fit leak challenge	0.04 Ml/d
April - August 2022	High Consumption HWEC's	0.19 Ml/d
April - August 2022	Get Water Fit registrations	0.46 Ml/d
April - August 2022	Free and subsidised products	0.6 Ml/d
Results not received yet		
Aug-22	Vyn Leaky loos	

*This includes savings attributed to customer emails and social media.

8.3. We have not implemented a temporary use ban

The legislation (Water Industry Act 1991, as amended in the Water Use (Temporary Use Bans) Order 2010) allows that temporary use bans (TUBs) can be used if a serious deficiency of water available for distribution exists or is threatened. Our Drought Plan explains that if extended drought conditions mean that reservoir storage or other drought indicators are in drought trigger level 2 during the spring and summer, we may need to temporarily restrict certain uses of water. Temporary use bans (TUBs) apply to domestic customers preventing use of hose pipes for recreational and cleaning purposes.

Within our Drought Plan we refer to such measures being considered in spring and summer nominally April through October when outdoor water use is more prevalent, and restrictions will materially reduce demand on our water system. It is unlikely these restrictions are applied in autumn and winter as external water use is much less and therefore restrictions of this nature do not materially alter demand.

TUBs are an important tool within our drought toolkit however, by their nature they are temporary and therefore the benefits associated with application must be considered alongside other options. Before applying restrictions, there are a number of variables considered (for example, temperature, demand, growth season, population dynamics). Our analysis of these was used to inform our decision to deploy an alternative approach to engage with our customers and tackle predominate water use within our region over the autumn and winter period.

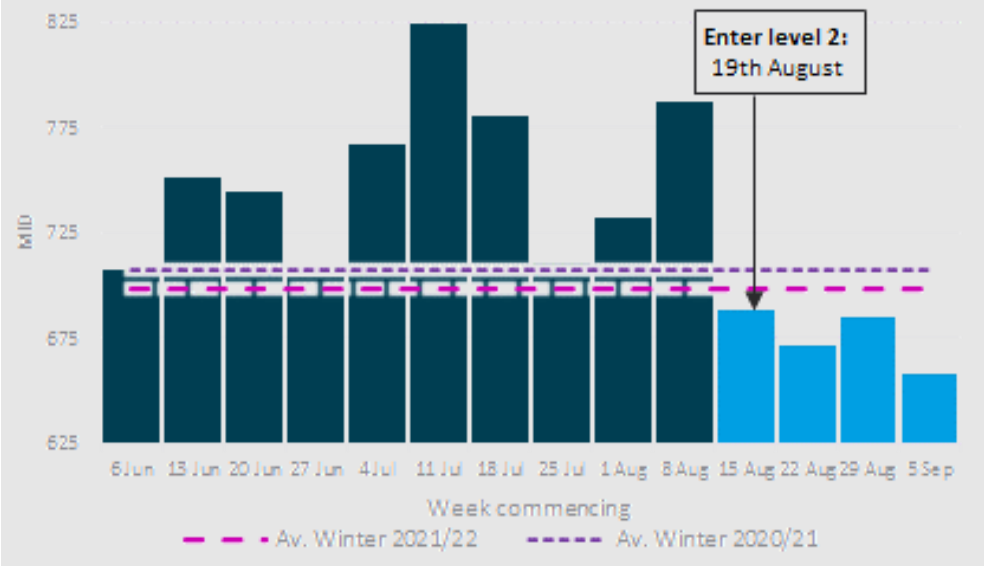
Throughout spring and summer 2022 we have engaged with our customers to promote water efficiency and offer alternative ways to enjoy this resource over the summer in the form of practical hints and tips. We have also actively managed our network to reduce abstraction from the Derwent Valley reservoirs (as detailed in section 5), taking 5,575 million litres less water than last year. This has enabled us to prolong storage and create capacity to allow response to unprecedented demand and temperatures experienced in July and early August.

We crossed into level two on the 19th of August, at the time there were several factors that were considered to shape the best course of action going forwards:

Our current demand profiles

Through our engagement activities alongside other variables, demand in our north grid was aligned with that of winter. A 6% reduction in demand had already been observed against prior summer months. Demand reduced further post school return when average demand reduced to 658 Ml/d for this area of supply. This was lower than winter levels of 698 Ml/d last year and 707 Ml/d the year before as shown in Figure 34 (Average Weekly Demand Summer 2022 vs Average Winter Demand 2020/21 & 2021/22) – North Grid.

Figure 34 (Average Weekly Demand Summer 2022 vs Average Winter Demand 2020/21 & 2021/22) – North Grid



Diurnal Patterns – North Strategic Grid

Our sub daily (diurnal) flow pattern provided further intelligence of likely water usage. Within our drought plan we explain how sub daily demand analysis is useful in determining patterns of water use. Typically, during summer, our demand profile adjusts with evening peak period lasting much longer than that in winter. The highest daily usage also moves from the morning to around 9pm. Our experience tells us this is largely influenced by increased outdoor usage. The monthly diurnal profiles for the northern section of our strategic grid are set out below in Figure 36 (Strategic Grid Diurnal Pattern Analysis).

Our analysis of the diurnal profile at the time we entered level 2 demonstrated a shift in water usage and customer behaviour, with the diurnal pattern resembling that of winter and indicative of predominant indoor water usage. Peak demand was now in the morning reflecting usage for showers, cleaning, and breakfast with slightly elevated in day rise, typical of school holidays. As children returned to school at the end of August (Derbyshire and Leicestershire) in day usage reduced, the profile on the 13th of September mirrored that experienced in February and November as shown in Figure 35 (Strategic Grid Diurnal Pattern Comparison November 2021, February, July, August and September 2022).

Figure 35 (Strategic Grid Diurnal Pattern Comparison November 2021, February, July, August and September 2022)

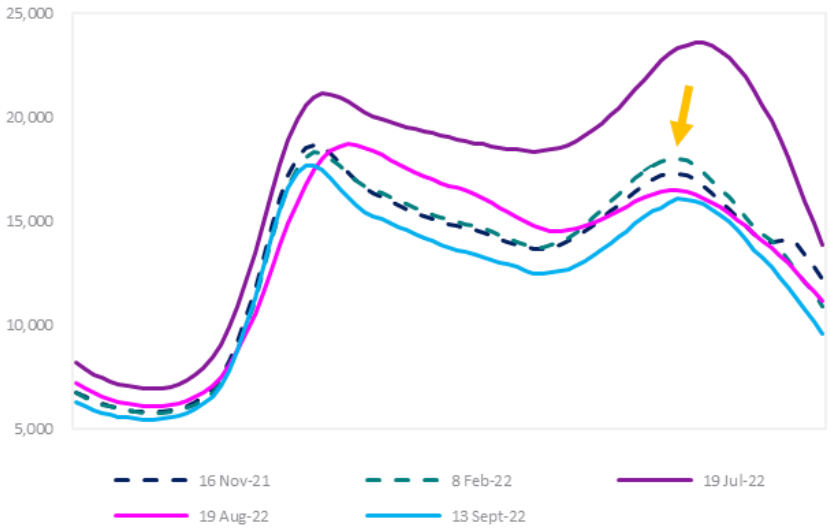
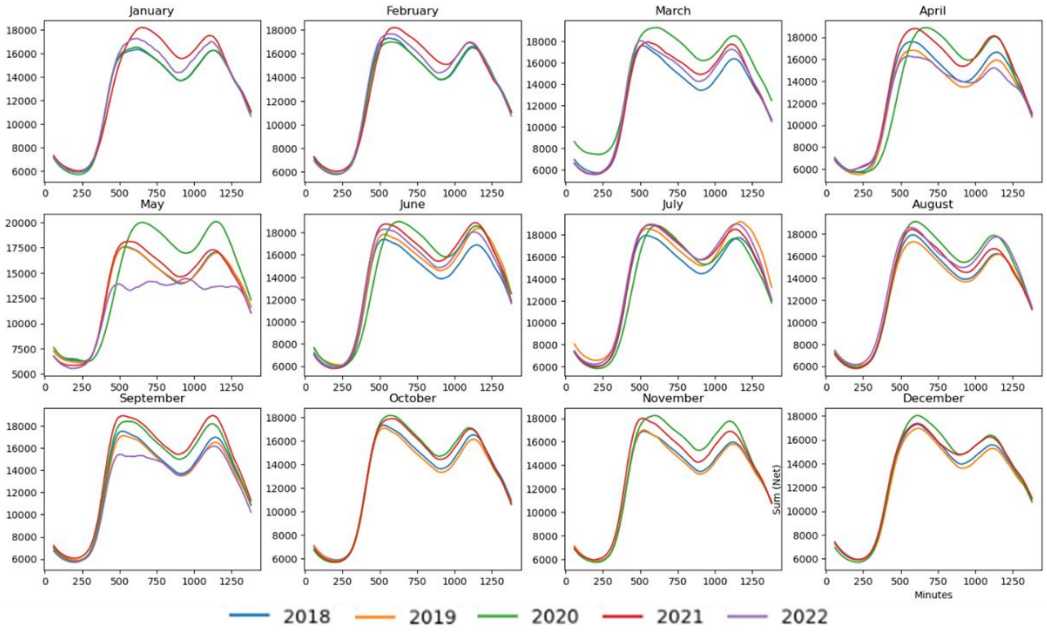


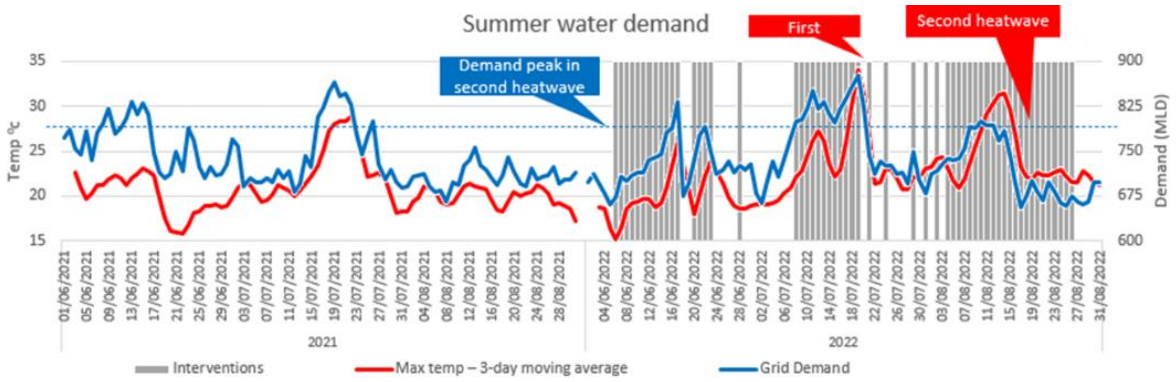
Figure 36 (Strategic Grid Diurnal Pattern Analysis)



Throughout summer we had actively engaged our customers, the detailed account of activities can be found in Section 8.1. Figure 37 (Comparison of customer interactions and correlation with temperature and demand 2021 and 2022) compares the customer interactions in 2021 and 2022. Together **with the help of our customers, we**

were able to effectively reduce demand for water on the hottest and driest days. Figure 26 within section 5 clearly shows how the traditional relationship of temperature and demand had been influenced and Figure 2 in our introduction compares demand profiles for both Severn Trent and Hafren Dyfrdwy. This figure illustrates how customer behaviour changed as a result of engagement, reducing demand. An equivalent demand reduction was not observed within Hafren Dyfrdwy which experienced similar weather conditions but did not enact a comprehensive customer campaign.

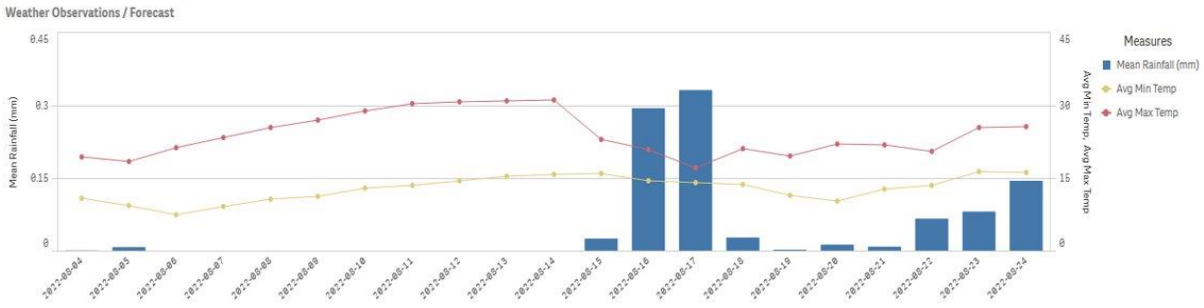
Figure 37 (Comparison of customer interactions and correlation with temperature and demand 2021 and 2022)



Temperatures and the prevailing weather forecast

As we approached level 2, the prevailing weather forecast indicated a decrease in temperatures across both day and night, with increased cloud cover and intermittent showers. We had just entered a period of unsettled weather with intense rainfall events resulting in flash flooding in some areas. Whilst these may not have been sufficient to sustain recharge of large water bodies, they were able to influence soil moisture levels and negate need for watering of gardens influencing demand further. Figure 34 shows the prevailing temperature and rainfall as storage entered level 2.

Figure 38 (Weather Observations and forecast)



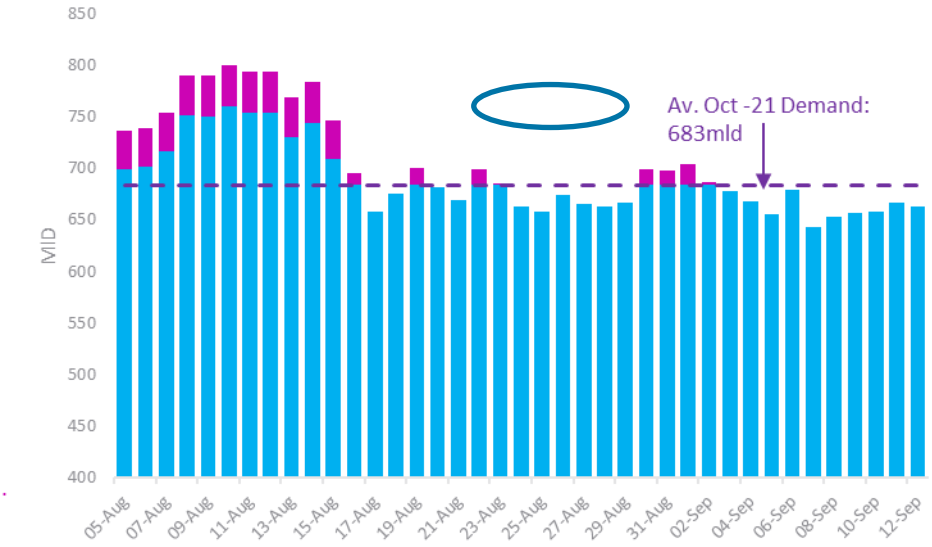
Intelligence from the broader sector

Through our connections with other water companies, we were able to ascertain demand patterns and establish benefits associated with temporary use bans already in place. From this we were able to derive what the likely impact of restrictions would have been if enacted within the strategic grid. To draw this comparison, we needed to make a number of assumptions:

- Start date – we are assuming a start date of 5 August as per Southern Water's TUB (although we did not cross into level 2 until 19 August and so implementation of a TUB would have most likely been in early September)
- End date – we are assuming the TUB would have no impact by October

- Impact – we are assuming a TUB delivers a 5% saving consistent with our drought plan and these savings only occur on days when consumption is above the October average (the point in time when a TUB is considered effective demand control mechanism)
- The figure below sets out our analysis of likely TUB benefits over the period August and September. As described above, the likely implementation date having reached level 2 on the 19th of August would have been early September, there are only 3 days where demand was at a level where we believe a benefit would be realised.

Figure 39 (TUB benefit at 5% of daily demand capped at average Oct-21 demand)



Potential benefit from TUB delivering up to 5% reduction (pink), capped at av. October demand denoted by purple line

We determined that implementation of a temporary use ban at this time would not deliver a marked or sustained reduction in demand (best case 2%). All our analysis suggested outdoor usage was now at a minimum and likely to fall further, this required us to think differently and develop the sectors' first winter demand management campaign alongside more targeted activities that would deliver an immediate benefit to the Derwent Valley reservoir complex.

More acute action was required within the immediate Derwent catchment, both we and Yorkshire Water enacted further system modifications to reduce abstraction by a further 20 Ml/d. This has been carefully actioned and is subject to ongoing monitoring and control as we have transitioned to operation outside of optimum asset design, it is essential that both companies uphold requirements of water quality legislation and remain within the physical hydraulic requirements of the connected system.

We recognised that whilst temporary usage restrictions would not deliver the desired demand reductions, it was essential to work with our customers to reduce in-home usage, a tool not prescribed in detail within any drought plan. This would not only aid our autumn and winter recovery but also help deliver monetary savings within our local communities as the height of the national affordability crisis comes to bare

We sought advice from behavioural scientists and media agencies to embark on a multimedia company wide initiative that sits alongside face-to-face interactions and in home visits across Derbyshire and Leicestershire. The detail of our approach and progress to date is set out in section 8.4. Through this initiative we are targeting over 200M customer touch points.

The detail of this alternative approach is not currently prescribed within our Drought Plan. Having experienced several unprecedented events over the summer period, it was important to take account of the dynamics of the situation at hand and pivot our approach to give the best possible recharge opportunities whilst supporting our customers and communities in making sustainable changes, creating new and enduring habits and save some money at the same time. The current economic environment and high energy costs provided us with the means to more strongly incentivise our customers to reduce consumption (e.g. reducing shower duration can save £700) - we can only do this by acting as partners with our customers as opposed to policing their behaviour, this approach would not have been possible had more formal restrictions been enforced.

Through our autumn and winter campaign we are targeting 1000Ml reduction in demand over and above the 6% demand reduction we have collectively delivered with our customers.

8.4. We are trialling new methods of engaging our customers

The water industry currently has no accepted drought related intervention plan for demand over the autumn and winter period. Having determined that a TUB would not address the demand pressures on our system at this time, we have developed the first mass campaign designed to tackle in home usage. We recognise this approach is not currently prescribed within our drought plan albeit we strongly believe this is the right course of action for our customers and the environment. We have been deliberate in setting up a multifaceted approach incorporating different media outlets alongside face to face and in home activities. We are committed to sharing our approach and learning with our stakeholders and with wider sector as this could form a blueprint for future drought recovery and climate change adaptation.

We have used independent behavioural scientists and media agencies to develop our approach. Our 8m customers will each have c25 interactions with our activity over the coming 3 to 4 month period. The table below sets out the channels we have live and expected reach.

Table 19 (Overview of our communication channels and reach)

Channel	Reach	Go-live
Radio	97.1m reach	Live
Press/ Media	79m reach	Live
40 community pop-up events	10k reach	Live
Work with retailers & NAVs to engage their customers	>30 retailers & NAVs	Live
Text messaging	1.9m customers	Live
Emails	1.6m customers	Live
Third-party engagement	CAB, CCWater, Octopus Energy, Cllrs & MPs	Live
Social influencers	290k reach	20 Sep
71 school education visits	18k children	20 Sep
Social media boost	40k reach	20 Sep
TV and VoD ad	19.9m reach	5 Oct

We are using wide-ranging media as part of the arsenal. A new TV ad – borrowing from the hugely successful Starbucks Glen ad that played a catchy 80s tune while following Glen through his day, supported by Starbucks (found https://www.youtube.com/watch?v=8oXNmNUeoE4).

Our ad also aims to use humour to help our message to cut through to our audience and drive behaviour change. It aims to bring joy to saving and will follow an individual/ family around their house in the morning showing all the ways to save water and money.

We have taken a layered approach to our marketing campaign to make sure it has maximum impact. We know from previous activity and behavioural change insight that a mix of channels works best. Press, TV and radio work to build awareness with customers around the subject of saving water and how precious it is. Building this awareness means that when we follow up with more direct messaging, customers already have a baseline understanding so are more likely to make a change. We'll also use SMS, email and social media to provide more information and give a clear instruction to customers to do something different. We can also use these channels to promote products or our Get Water Fit app to which we can attribute demand savings. In addition, using more

than one channel means customers are likely to hear the message more than once which is again important to drive behavioural change.

We are also investing in additional resources to convey our message as well, recruiting 100 Community Water Saving Champions right now to support existing internal resource. We're partnering with local job centres and universities to match these opportunities to job seekers. Our Champions will take part in pop-up events across Derbyshire and Leicestershire at high-contact spots such as supermarkets, shopping centres, local attractions, in addition to visiting people's homes to carry out water efficiencies audits. We are aiming for 1000 visits per month. These are targeted in our highest demand areas of Leicestershire and Derbyshire which are the areas impacted by this permit. During these visits we will trial different information and products to gain as sense of customer preferences and impact.

As of the 26th of September, we had delivered 545 visits in Leicestershire and Derbyshire, 96% of doors knocked converted into a well received in home check. We have also hosted 9 pop up events and hosted a series of sessions at the National Space Centre in Leicestershire. Feedback so far has been positive: customers have been pleasantly surprised at the free services on offer and grateful for the opportunity to identify ways to reduce their bills. We've had praise for our financial support schemes and a commitment that they'll do their bit in looking after their water as Severn Trent has looked after them and not introduced water bans.

Customers are responding well to our pop-up

How we'll measure the impact of customer visits

We have used industry wide data, for example from UKWIR, learning from other companies and data from our own demand management activities to forecast the demand savings from our activities. For example, we assume we will realise a 16 litre per property saving through having education conversations with customers physically in their home when we undertake Home Water Efficiency Check visits – this assumed benefit is quantified using the outputs of an UKWIR report which undertook research to quantify savings based on different types of interaction. Where, however, a customer does not have a physical face to face interaction with us and receive demand management education through our online get water fit platform we only assume 10.5l saving per property (again qualified using the UKWIR report) as we recognise this interaction is not so direct and therefore would not result in as much benefit. Where we physically install products, we use the quantification of the saving from that product to build into our demand saving assumptions. Where a customer orders a product online and

is required to install it themselves, we have assumptions built into our model around the proportion of those customers who will install the product once received – these assumptions are based on Save Water Save Money's findings from research done across the water industry. Where a customer requests a free product that requires behaviour change or additional action, such as dye tablets to identify a leaky loo we do not assume any specific benefit in our demand saving.

When we repair an internal leak, we quantify the leak whilst undertaking the repair by undertaking a flow test before and after the repair. This is a physical demand reduction change so is a sustained demand saving. We have used Waterwise data, wider industry data and data from our activity in Severn Trent to estimate the proportion of properties that are likely to have a leaking toilet. We know that properties built since the year 2000 are more prone to having a leaking toilet due to the type of product that was installed. We are targeting our door knocking activity in areas with properties built since the year 2000 to give us an increased chance of engaging customers with a leaking toilet and helping them repair them. Leaking toilets is one of the highest untapped opportunities in the home to help reduce demand. Our customer engagement activity has also focussed on customers who we know are higher users using actual consumption data.

Where we do not get a response from a customer and leave them a water efficiency leaflet, we do not assume this will deliver any specific benefit as it is too difficult to know whether a customer has or has not read it and taken any relevant action, but it still forms part of our proposition to ensure we can engage customers on the challenge. Therefore, we only classify a positive engagement where we have either engaged a customer face to face through a home water efficiency check or where the customer has gone through our get water fit process, we do not classify the posting a leaflet through a customer's door as a positive engagement.

In our forecast calculations we have used actual data from previous campaigns to quantify things such as email open, response rates and uptake rates. These have been compared to wider industry data to ensure these are representative and realistic.

We will be using metering data, distribution input and DMA data to help validate the impact of our demand reduction engagement.

We had originally committed an additional £1 million on top of existing resources to deliver this activity, our current expenditure is tracking in excess of this.

Understanding our Customers Views

We are running quantitative customer research in September to understand customer views on TUBs and the current demand trial. The research, run with a representative sample of customers across our region, will unpick attitudes towards the current drought situation, restrictions for customers and the link between water and energy usage in the home.

We will determine the level of support, or otherwise, for the approach we are taking. We will also be tracking the success of the demand trial in terms of customer recognition, feedback on customer communications and messages, campaign reach and claimed impact on household water consumption behaviours.

9. We are working closely with Yorkshire Water to manage the reservoirs

As well as supplying Severn Trent's Strategic Grid zone, the Derwent Valley Reservoirs also supply water into Yorkshire Water's network. The supply to Yorkshire Water is operated under an agreement between our two companies, and the amount supplied throughout the year is governed by a series of reservoir storage rule curves. Depending on the amount of water in the reservoirs, Yorkshire Water can take between 35 million litres per day and 68 million litres per day.

Part of this Drought Permit application as outlined in Section 2 is to add an additional abstraction point to the licence to allow continued supply to Yorkshire via a temporary pump system to the normal raw water export tunnel. This extra abstraction point is required because the current abstraction point to Yorkshire is from Derwent Reservoir, Derwent and Howden reservoirs are currently lower than Ladybower reservoir. This is because they are at the top of the reservoir chain. There is a risk that we may not be able to continue to supply Yorkshire with the export from the current abstraction point should the dryer than average weather continues. The total abstraction to Yorkshire would be unchanged, it would just be which of the reservoirs the abstraction is taken from.

Yorkshire Water's supply network has been similarly affected by the effects of this year's hot summer, the high demand for water and exceptionally low rainfall. As a result, we have been working closely with Yorkshire Water to try and manage the amount of water both companies abstract from the Derwent Valley Reservoirs, while also having to balance the wider water availability risks across both companies' water supply networks.

Through the autumn, while we have been trying to minimise the amount we take from Derwent Valley, Yorkshire Water have not been able to reduce the amount that they take from the reservoirs as much. This has been because Yorkshire Water have other reservoirs in their network that have even lower storage than at Derwent Valley.

As part of Yorkshire Waters Drought management, the production at Rivelin has been reduced to 25 Ml/d, population equivalent of 112,500 since 5th September, the additional water has been supplied via the Yorkshire Grid which is now fully maximised.

Rivelin normally supplies 58 Ml/d average (2021), population equivalent of 261,000 to Southern Sheffield and parts of the city centre.

The consequences of not maintaining Rivelin flows would be a loss of 15-20 Ml/d into supply a population equivalent of 67,500 – 90,000 customers. As the Yorkshire Grid has been maximised for a significant period the additional water would be required from the other three southern WTW's all of which also have very low stocks to such an extent where this will begin to affect the hydraulics.

In addition, to manage drought, Yorkshire have reduced their tolerance for compensation releases, (moving from 10% to 5% overcompensation where possible). Yorkshire are applying for drought permits to reduce compensation flows from reservoirs, and to increase river abstractions.

10. Managing the environmental impacts of the Drought Permit

To support this Drought Permit application, we have commissioned an environmental impact report that assesses the potential impacts on the downstream river and aquatic ecology, and that describes the measures we will take to mitigate for those risks. Overall, the study finds that there are no significant impacts predicted to affect ecological receptors or other water user receptors.

The conclusions from the environmental report are as follows.

- Because the operation of the reservoirs tends to maintain water at Howden, the uppermost reservoir in the Derwent Valley cascade, rather than in Ladybower, the effects on spills (and consequently to spates and to flow variability) in the River Derwent downstream are predicted to be negligible. Howden storage is most noticeably improved because water is purposely kept in the higher reservoirs so that spills are retained within the reservoir system and not lost to the river.
- Low flows are, however, predicted to be reduced from baseline - a moderate negative change in river discharge - in the River Derwent from Westend to Wye waterbody (although flows would remain above those that would naturally occur during a severe drought). The resulting reduction in capacity to dilute pollutant inputs is predicted to result in small negative changes to ammonia and phosphate concentrations, but other changes to water quality parameters are considered likely to be negligible or of small benefit (due to reduced loads from the reservoir compensation).
- Likewise, reductions in velocity and depth are predicted to cause small negative changes to the size of wetted habitat (wetted width and perimeter) and to the character of flow.
- Downstream of the confluence with the River Wye, tributary inflows – principally from the River Wye itself, appear sufficient to render flow changes in the River Derwent Wye to Amber, River Derwent Amber to Bottle Brook and River Derwent Bottle Brook to Trent waterbodies negligible. Consequent predicted effects on water quality and physical habitat are likewise predicted to be negligible.
- The Derwent Valleys DP is predicted to have very little effect on Protected Rights throughout the catchment. A seasonal distinction has been identified with the winter and spring period determined as least sensitive to potential effects - resulting in a negligible potential impact significance at all locations.
- Predicted effects associated with the Derwent Valleys DP on amenity and leisure receptors and on designated sites have been predicted to be negligible at all locations.

There are no significant impacts of a Derwent Valley Reservoirs DP predicted, even prior to mitigation. However, implementation of mitigation measures will allow monitoring and validation of predicted effects, particularly those assessments with elements of inherent uncertainty. However, we are proposing the following responsible mitigation options to cater for the possibility that habitat loss is greater than anticipated:

- Return to statutory compensation flow, or temporary elevation of discharge in the event of a pollution incident, evidence of ecological distress, or evidence of serious detrimental environmental consequences on downstream watercourses.
- Implementing reductions to the compensation flow in phases. The phasing of flow changes would be determined by infrastructure constraints and reservoir levels but might aim, for example, for reductions of approximately of 5 Ml/d per phase over six hours.
- Discharge of a freshet release from the reservoir to assist fish movement or in the event of a pollution incident downstream of Ladybower, if the EA deemed such action appropriate.
- Use best endeavours where possible to manage storage within the Derwent Valley Reservoirs to ensure that compensation flows from Ladybower do not rely upon water drawn from the bottom levels of the reservoir.
- Discharge of a freshet release from the reservoir should particular events be considered to be potentially impacting internationally important sites.

- Although it is highly unlikely that fish will become trapped, reactive fish rescue and relocation, deployment of localised aeration etc. could be deployed if fish become trapped and in distress during the proposed DP.
- Should impacts on fish be identified as a potential issue for localised areas, fish refugia could also be installed.
- Funding of appropriate reasonable measures (e.g., habitat restoration) in the event of ecological damage occurring in reaches affected by reduced compensation flows.

We will carry out river monitoring throughout the duration of any Drought Permit being in effect and will respond with the relevant mitigation measures wherever necessary.

In our application we are also including a proposal to move our abstraction point for water that is supplied from the Derwent Valley to Yorkshire to a location on Ladybower Reservoir. It will not result in any increase in the abstraction volumes, but it will allow us to continue to supply to Yorkshire. The new abstraction point is in the part of Ladybower Reservoir that is closest to the boundary of the Eastern Peak District Moors SSSI, but the action will not have an impact on the SSSI (see map below). The location is not within the SSSI boundary. The location was chosen as it is the closest to the tunnel that supplies Yorkshire Water without having to cross any roads. This is the same location as we used 2018 when it was granted as a temporary licence change.

Figure 35 Map of location of temporary pumps and SSSI

11. Consequences of the Drought Permit application being rejected

The purpose of the permit is to reduce the amount of water released from Ladybower Reservoir into the River Derwent from 54 million litres per day to 34 million litres per day, and to hold that saved water back in the reservoirs over the winter. As part of this permit, we have committed to continue to minimise abstraction as far reasonably practicable as opposed to following the higher levels of abstraction associated with reservoir states within our drought plan. We are applying for the permit to potentially remain in place until 31 March 2023.

The effect of the reducing compensation flow will be to preserve at up to 3,360 million litres of water storage in the reservoirs over that period. This is the equivalent of approximately 7.3% of the total storage capacity of the reservoirs. This is the equivalent of almost 30 extra days of supply from the reservoirs. Our continued efforts to minimise abstraction will preserve up to 9153 million litres equivalent if approximately 19.8% of storage. The below figures illustrate the benefit to reservoir storage under both the 50th percentile winter (normal) inflows and the 5th Percentile (very low) inflows.

Should the permit be rejected, this will increase the risk of going into next summer with reservoirs below normal levels as our winter recharge potential will be reduced through controllable activity will be reduced by 26%. Should winter and spring continue to be dry there is increased likelihood of more significant restrictions on our customers and furthermore increased likelihood of impact to environment through a summer drought permit.

Figure 40 (Derwent Valley Reservoir Storage without the Drought Permit and abstraction following permitted state curve rules)

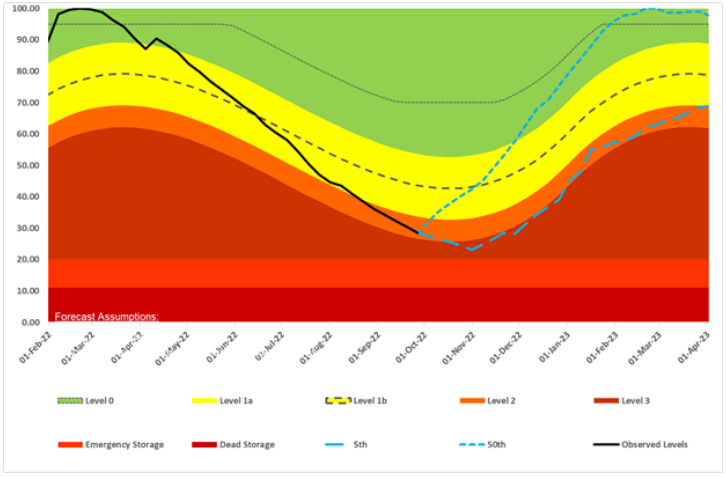
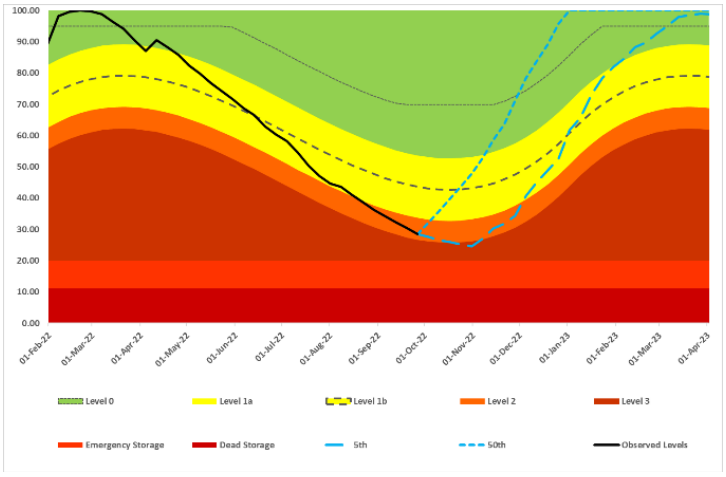


Figure 41 (Derwent Valley Reservoir Storage permit in place to reduce compensation abstraction)



12. Consulting our key stakeholders

We have already consulted earlier this year with all stakeholders (and wider) as part of our drought plan review (2022-2027) and will now engage with them again on the Derwent Valley reservoirs winter drought permit option.

12.1. Consultation Process

As required by the March 2021 Drought permits and drought orders EA guidance, we are obliged to notify any navigation authorities and local drainage boards of our intent to apply for a permit. For the water courses affected by this drought permit application, we have not identified any navigation authorities or drainage boards.

12.2. Communication Plan

In parallel with submitting our application to the EA, we will:

- Contact statutory stakeholders (statutory letter, notice and leaflet).
- Write letters to all other stakeholders (non-statutory letter and leaflet).
- Discuss any concerns with stakeholders (with calls or face-to-face meetings if required).
- We will place formal notifications in the London Gazette and two local papers.
- The full application will be made available in locations in the affected area (as set out in the notice) for interested parties to view.
- Place a record of our application on our website.

12.3. Engagement and communication strategy

We will contract all stakeholders to notify them of the intention to make the permit application, how we will protect against the potential impacts and how they can find out more about the permit we are applying for.

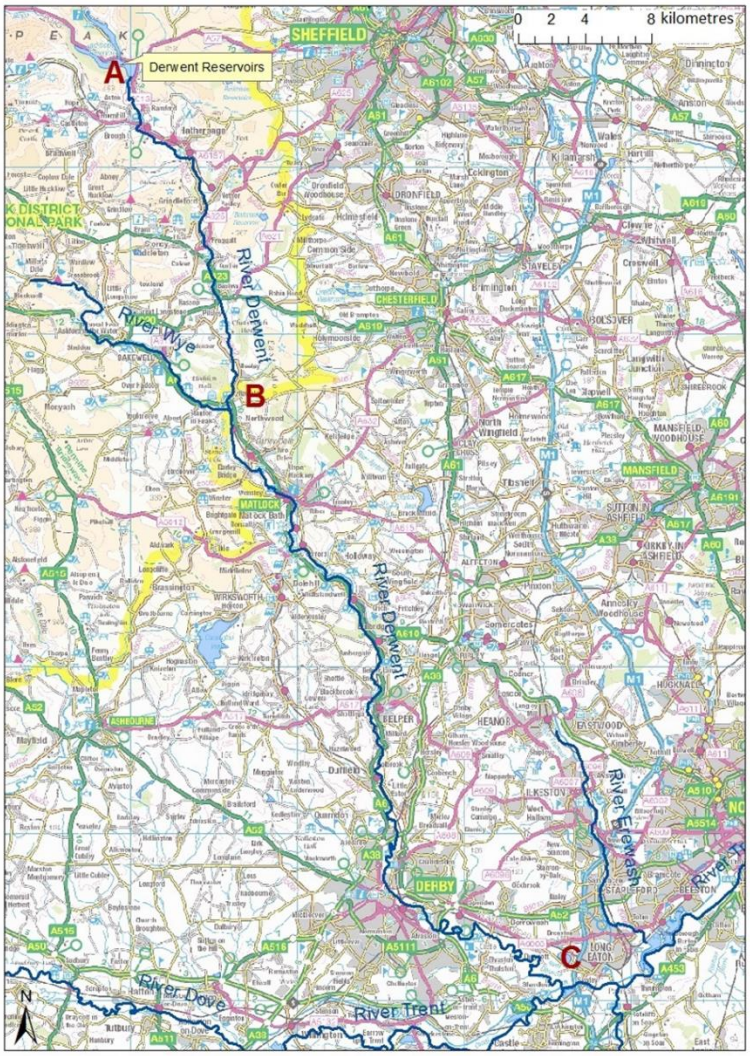
We have compiled a list of stakeholders utilising records of known downstream river users and feedback from local Environmental Agency teams. Our stakeholders can be categorised into three areas: statutory, notifiable and community.

Our strategy for each stakeholder category is the following:

- **Statutory stakeholders**: We will contact statutory consultees in parallel with the application being advertised and notify them of why we are requesting the permit. We will offer to share a draft of the Justification of Need and Environmental Assessment Report for review.
- **Notifiable stakeholders**: We have worked with the Environment Agency (EA) to identify the downstream river users and abstractors who have the potential to be affected by the permit. We will write to them prior to the application being advertised, explaining the need for the permit, how we will protect against the potential impacts and options to contact us to find out more. We have split stakeholders and river users into two groups. Those in the upper reaches of the River Derwent down to the confluence with the River Wye (A to B on the maps in and those in the stretch of the river from the River Wye to River Trent (B to C), where there should be no noticeable impact. We will also write to broader stakeholders including MPs and Councils.
- **Community stakeholders:** We will write to all identified community stakeholders in parallel with the application being advertised to notify them of the timing and need for the permit, how we will protect against the potential impacts and options to contact us to find out more about the permit we are applying for.

We will continue to keep stakeholders updated over the winter period as appropriate.

Figure 42 (River Derwent Map with Wye and Trent Confluences)



12.4. Media and Customer

As set out in the guidance, we have put our notice into the London Gazette which will be published on the 3rd of October 2022.

We have also identified two local papers with publication on the same date. These are the

- The Sheffield Telegraph.
- The Derbyshire Telegraph.

We also considered the Derbyshire Times; however, this is a weekly publication and is not suitable for the notice. The Derbyshire Telegraph is daily with a very similar reach.

12.5. Location of Deposited Documents

Our application will be made available in the affected area for parties to view, free of charge, during normal working hours for a period of seven days from the publication of the notice:

- Hathersage Post Office, Main Road, Hope Valley, S32 1BB, Tel: 0345 722 3344 (https://www.postoffice.co.uk/branch-finder/6363407/hathersage)
- Matlock Library, Steep Turnpike, Matlock, Derbyshire, DE4 3DP, Tel: 01629 533837
- Belper Library, Bridge Street, Belper, Derbyshire, DE56 1BA, Tel: 01629 533192
- Severn Trent Water, Raynesway, Derby, DE21 7JA,
- Environment Agency, Trentside Offices, Scarrington Road, West Bridgford, Nottingham, NG2 5BR, Tel: 03708 506 506
- Severn Trent Water, 2 St John's Street, Coventry, CV1 2LZ, Tel: 02477 715000
- Severn Trent Water's Website at https://www.stwater.co.uk/

Objections may be made in writing to the Environment Agency at Water Resources Permitting Support Centre, Environment Agency, Quadrant 2, 99 Parkway Avenue, Parkway Business Park, Sheffield, S9 4WF or psc-waterresources@environment-agency.gov.uk.

Objectors may also send a copy of their objection to the address below or by email to:
FutureConsultation@severntrent.co.uk

Appendices

Our Communication Data

Social Influencers

Influencer	Followers	Likes	Comments	% Of engagement	Link to post
Sustainabrum	868	15	4	2.1%	https://www.instagram.com/p/Ceoqwssrahn/?igshid=YmMyMTA2M2Y=
House of Stew	20.1K	667	11	3.4%	https://www.instagram.com/p/Ce5rgXBM_r7/?igshid=YmMyMTA2M2Y=
Diary of the Denton Dolls	36K	1,316	49	3.8%	https://www.instagram.com/p/CfKDFr5MV9Z/?igshid=YmMyMTA2M2Y=
Curlymummy	16K	492 265	19 1	3.2% 1.6%	https://www.instagram.com/reel/Cf4fAmVsC_P/?igshid=YmMyMTA2M2Y= https://www.instagram.com/p/Cgj-APzMU0J/?igshid=YmMyMTA2M2Y=
Daywithdad	33.6K	1,415	302	5.1%	https://www.instagram.com/p/Cf_avOkIp0Q/?igshid=YmMyMTA2M2Y=
Stacey_and_three	41.3K	847	61	2.2%	https://www.instagram.com/p/CgKQDussRnW/?igshid=YmMyMTA2M2Y=

Digital audio - Weekly Breakdown

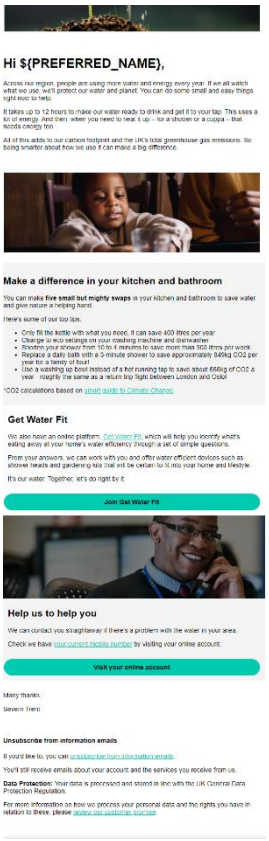
Date	Impressions	CPM	100% Complete	LTR	Gross Spend
6th June - 12th June	208,733	£14.52	201,505	96.54%	£3,029.84
13th June - 19th June	219,566	£14.42	211,401	96.28%	£3,165.31
20th June - 26th June	198,455	£15.95	190,546	96.01%	£3,165.12
27th June - 3rd July	182,193	£17.37	177,029	97.17%	£3,164.91
4th July - 10th July	176,456	£17.99	166,918	94.59%	£3,174.40
11th July - 17th July	170,968	£17.55	167,873	98.19%	£2,999.89
18th July - 21st July	15,456	£19.68	15,050	97.37%	£304.10
Total	1,171,827	£16.22	1,130,322	96.46%	£19,003.57

Social - Weekly Breakdown - Full Supply Area - All Adults:

Date	Impressions	Views	VTR	Cost Per View	100% Completed	Clicks	CTR	Est Ad Recall Lift Rate	Gross Spend
6th June - 12th June	385,796	363,333	39.53%	£0.01	151,870	1,546	0.40%	12.36%	£2,857.04
13th June - 19th June	393,656	367,269	38.80%	£0.01	152,452	1,559	0.40%	12.14%	£2,935.31
20th June - 26th June	388,102	360,722	35.48%	£0.01	133,342	1,562	0.40%	11.04%	£2,798.74
27th June - 3rd July	416,681	384,903	36.54%	£0.01	152,493	1,674	0.40%	11.29%	£2,872.69
4th July - 10th July	442,025	410,147	38.67%	£0.01	170,954	1,531	0.35%	11.27%	£2,858.85
11th July - 13th July	191,593	178,928	29.51%	£0.01	56,104	585	0.31%	11.22%	£979.22
18th July - 21st July	360,904	339,678	30.11%	£0.01	107,727	1,292	0.36%	11.77%	£1,834.55
Total	2,578,757	2,404,980	36.12%	£0.01	924,942	9,749	0.38%	11.60%	£17,136.40

EMAILS – top 5%

Environmental



Hi ${PREFERRED_NAME},

Across our region, people are using more water and energy every year. If we all watch what we use, we'll protect our water and planet. You can do some small and easy things right now to help.

It takes up to 12 hours to make our water ready to drink and get it to your tap. This uses a lot of energy. And then, when you need to heat it up – for a shower or a cuppa – that adds energy too.

All of this adds to our carbon footprint and the UK's total greenhouse gas emissions. So being smarter about how we use it can make a big difference.

Make a difference in your kitchen and bathroom

You can make **five small but mighty swaps** in your kitchen and bathroom to save water and give nature a helping hand.

Here's some of our top tips:

- Only fill the kettle with what you need. It can save 400 litres per year
- Change to eco settings on your washing machine and dishwasher
- Shorten your shower from 10 to 5 minutes to save more than 350 litres per week
- Replace a daily bath with a 5-minute shower to save approximately 840kg CO2 per year for a family of four!
- Use a washing up bowl instead of a hot running tap to save about 656kg of CO2 a year - roughly the same as a return trip flight between London and Oslo!

*CO2 calculations based on smart guide to Climate Change

Get Water Fit

We also have an online platform, Get Water Fit, which will help you identify what's eating away at your home's water efficiency through a set of simple questions.

From your answers, we can work with you and offer water efficient devices such as shower heads and gardening kits that will be certain to fit into your home and lifestyle.

It's our water. Together, let's do right by it.

Join Get Water Fit

Help us to help you

We can contact you straightaway if there's a problem with the water in your area.

Check we have your current mobile number by visiting your online account.

Visit your online account

Many thanks,

Severn Trent

Unsubscribe from information emails

If you'd like to, you can unsubscribe from information emails.

You'll still receive emails about your account and the services you receive from us.

Data Protection: Your data is processed and stored in line with the UK General Data Protection Regulation.

For more information on how we process your personal data and the rights you have in relation to these, please review our customer promise.

Monetary

Hi ${PREFERRED_NAME},

The cost of living is rising. But there are some small and easy things you can do today to save money. And at the same time, you can help us to look after our wonderful water.

We all need to use water every day, however you could be wasting a lot without even knowing it.

Cut down your shower time

Did you know that if every person in a family of four halved their daily shower time from 10 minutes to 5 minutes they could save almost £700 a year. *

*Potential savings calculations are national averages based on typical combined average water and energy use for a family using an electric shower

How you could save water

Oh, and here is another tip for you, put your water in a jug in the fridge to keep it cold and stay hydrated this summer!

There are lots of other things you can do, and we can help.

Our online platform, Get Water Fit, identifies what's eating away at your home's water efficiency through a set of simple questions.

Saving water can help you save money on your bills.

From your answers, we can work with you and offer water efficient devices that fit into your home and lifestyle.

Join Get Water Fit

Help us to help you

We can contact you straightaway if there's a problem with the water in your area.

Check we have your current mobile number by visiting your online account.

Visit your online account

Many thanks,

Severn Trent

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Monetary (social norm)

Hi ${PREFERRED_NAME},

We all need to use water every day, however you could be wasting a lot without even knowing it – and that increases both our water* and energy bills too for things like heating our water.

The cost of living is rising, but there are some small and easy things you can do today to lower your bills and at the same time, you can help us to look after our wonderful water too!

*If you're on a meter

Cut your shower time down

Did you know that if every person in a family of four halved their daily shower time from 10 minutes to 5 minutes they could save almost £700 a year. *

*Potential savings calculations are national averages based on typical combined average water and energy use for a family using an electric shower

How you could save water

Saving water can help you save money on your bills, and there are lots of simple things you can to do to help reduce your usage such as:

- Filling up a water jug to keep in the fridge instead of running the tap until it goes cold
- Take slightly shorter showers - shaving a couple of minutes off makes all the difference!

Get Water Fit

Our online platform, Get Water Fit, identifies what's eating away at your home's water efficiency through a set of simple questions.

From your answers, we can work with you and offer water efficient devices that fit into your home and lifestyle.

It's our water. Together, let's do right by it.

Join Get Water Fit

Help us to help you

We can contact you straightaway if there's a problem with the water in your area.

Check we have your current mobile number by visiting your online account.

Visit your online account

Many thanks,

Severn Trent

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If you'd like to, you can unsubscribe from information emails.

You'll still receive emails about your account and the services you receive from us.

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For more information on how we process your personal data and the rights you have in relation to these, please review our customer promise.

Demand Management

Leicestershire & Derbyshire

Hi ${PREFERRED_NAME},

After the hot, dry summer, we've seen a little rain recently. You might be thinking everything is back to normal, water-wise. But we still need your help in saving water – especially if you live in Leicestershire or Derbyshire.

Save water, save energy, and save money

The good news is that saving water can help reduce your energy bills. Most homes use a lot of gas or electricity just to heat water. So cutting water use means you can save money, too.

Here are just a couple of examples:

- Halving your shower from 10 minutes to 5 minutes can save up to £700 per year for a family of four*.
- Cutting out two dishwasher runs per week (by using full loads) could save you up to £75 per year on water and energy*.

How you can save water

There's so much more you can do

Shorter showers and discerning dishwashing are just part of it. Visit our website to see more details on saving water, energy and money.

We're not back to normal yet

We need more rain to get our reservoirs back to healthy levels. We're not issuing any Temporary Usage Bans, also known as hosepipe bans, but we do still need you to be careful about how you use water in the weeks ahead.

Please help us

Leicestershire and Derbyshire use a lot of water. Our forecasts tell us we're going to see more dry weather over the coming weeks, so we need you and your household to keep saving water so there's enough to go around for everyone.

Thank you

We've got through one of the driest periods for decades – because you and your neighbours have used water wisely over summer. Let's all carry on the good work, so everyone can enjoy our wonderful water.

Many thanks,

Severn Trent

*Potential savings calculations are national averages based on typical combined average water and energy use for a family - https://www.ccwater.org.uk/blog/2022/03/22/ccw-

All region

Hi ${PREFERRED_NAME},

After the hot, dry summer, we've seen a little rain recently. You might be thinking everything is back to normal, water-wise. But we still need your help in saving water.

Save water, save energy, and save money

The good news is that saving water can help reduce your energy bills. Most homes use a lot of gas or electricity just to heat water. So cutting water use means you can save money, too.

Here are just a couple of examples:

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- Cutting out two dishwasher runs per week (by using full loads) could save you up to £75 per year on water and energy*.

How you can save water

Get Water Fit

There are plenty of hints and tips, plus free and discounted water saving products, at Get Water Fit.

Visit Get Water Fit

There's so much more you can do

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Thank you

We've got through one of the driest periods for decades – because you and your neighbours have used water wisely over summer. Let's all carry on the good work, so everyone can enjoy our wonderful water.

Many thanks,

Top 5% highest consumers

Hi ${PREFERRED_NAME},

You might not know this, but your household is using more water than your close neighbours.

We'd like to help you reduce your water usage – especially as our reservoirs are still low after a long, dry summer.

Let's work together

- **Look for leaks** - might there be a leak somewhere at home? If you're on a meter, check if the reading goes up while there's no-one home.
- **Toilet terror** – a leaky loo can quietly waste hundreds of litres – and you might never know about it. Don't panic – we can help you spot it and fix it with no fuss.
- **In the garden** – still using a garden sprinkler? They get through 1,000 litres of drinking water every hour. Try using a watering can instead.

Check out the many quick and easy ways you can save water.

Save water, save energy, and save money

The good news is that saving water can cut your energy bills, too. Most homes use a lot of gas or electricity just to heat water.

Here are just a couple of examples:

- Halving your shower from 10 minutes to 5 minutes can save up to £700 per year for a family of four*.
- Cutting out two dishwasher runs per week (by using full loads) could save you up to £75 per year on water and energy*.

How you can save water

Please help us

We've seen a bit of rain recently, but we'll need more to get our reservoirs back to healthy levels. We're not issuing any Temporary Usage Bans, also known as hosepipe bans, but we do still need everyone to be careful about how they use water in the weeks ahead.

Please work with us to make sure there's enough of our water to go around for everyone.

Get Water Fit

There are plenty of hints and tips, plus free and discounted water saving products, at Get Water Fit.

Many thanks,

Severn Trent

Boosted Social Radio Deliverables

Campaign deliverables for the Summer Incident radio activity. We overdelivered across all stations, most significantly across Hits Radio Brand (Staffordshire).

Station	Booked Impacts (All Adults)	Delivered Impacts	Variance	OTH*
Free Radio (Birmingham)	1,114,257	1,217,920	109.30%	8.3
Free Radio (Black Country and Shropshire)	702,248	810,528	115.42%	7.9
Free Radio (Coventry & Warwickshire)	780,911	782,003	100.14%	8.7
Free Radio (Herefordshire & Worcestershire)	669,622	672,867	100.48%	8.7
Hits Radio Brand (East Midlands)	3,258,233	3,288,908	100.94%	8.9
Hits Radio Brand (Staffordshire)	1,642,376	2,166,910	131.94%	11.21
Heart West Country (Gloucestershire)	908,000	924,370	101.83%	7.5
Heart West Midlands	4,771,000	4,824,680	101.14%	6.9

*OTH stands for 'opportunities to hear', therefore a customer listening to Staffordshire Hits radio station is likely to hear our ad 11.21 times over the period the ad was running.

Campaign	Channel	Demographics	Delivery Date	Recipients	Engagements/open rate
Top 5% Environmental - 1	Email	Circa 76k customers with high consumption – each email had circa 25k recipients	20th May	55,924	46.46%
Top 5% Monetary - 2			26th May	55,899	48.74%
Top 5% Monetary Social Norm - 3			26th May	54,839	49.16%
ST – All customer		All other customers who hadn't received emails 1-3, discussing WE messaging. (1.7m (ST) & 40k (HD))	24th May – 31st May	1,593,278	49.61%
HD – All customer			10th June	42,786	46%
ST – All customer hot weather x 2		All customers during hot weather period asking them to use water wisely	11th July &	1,626,367	49.75%
			11th August	1,623,074	53.53%
North Staffs – Hot weather			11th July	110,620	47.04%
3 emails - Save water, energy & money		3 emails split into: Leicestershire & Derbyshire, Top 5% of our highest users and the rest of our ST region	16th – 22nd September	827,869	N/A
Animated Ads (Facebook only)	Social	Animals - Under 35s in Nottinghamshire, Staffordshire, Telford & Wolverhampton	6th June	N/A	2,914,035 engagements, 10,776 clicks & 0.37% CTR
Targeted Audio	Spotify	Water Efficient Behaviour – 35s+ in above targeted areas	6th June	N/A	1,171,827 impressions
Organic social (Twitter, Facebook & IG)	Social		March - Ongoing	Whole region	26 posts, 1,594 engagements
Social influencers (Facebook & IG)	Social	6 influencers in ST region. Have a combined following of 146,856.	June & July		5,464 engagements
Radio incident ads	Radio	Available for region when needed.		Whole region	Impacts – 14,688,186
Radio ads x 2		Save water, energy & money	14th Sept 20th Sept	Leicestershire & Derbyshire All region	Predicted impacts – 97,122,760
SMS	SMS	5 x all customer SMS's	15th, 16th, 29th July 11th August & 14th Sept	8,980,319	N/A
SMS – Save water & energy		All ST region	16th September	1,900,000	N/A

Drought Permit – modify existing abstraction

Section 79A Water Resources Act 1991 as amended by the Environment Act 1995

The Environment Agency grants this drought permit to:

Severn Trent Water Limited ("the Water Company")
Severn Trent Centre
2 St. John's Street
Coventry
CV1 2LZ

Company registration number: 02366686

This drought permit modifies Licence Number 03/28/38/0018 dated 27 March 2020 "the Licence") as set out in the Schedule to this drought permit for such periods as specified in condition 4.2 in the Schedule.

This drought permit commences from the effective date shown below and shall remain in force until the date of expiry shown below.

All other provisions of the Licence and Acts relating to the Derwent Valley Reservoirs remain in full force and effect.

Signed .....
<insert name>
Area Director

Environment Agency
Trentside Offices
Scarrington Road
West Bridgford
Nottingham
NG2 5BR

Date of issue……..XX October 2022

Date effective ……XX October 2022

Date of expiry……31 March 2023

Note: References to "the map" are to the map which is attached to this drought permit

SCHEDULE OF CONDITIONS

1. COMPENSATION FLOW REQUIREMENTS

1.1 In the Licence under the heading "Compensation requirements from Ladybower Reservoir to the River Derwent from 1 April 2009 to 22 December 2031" conditions 9.2 and 9.3 shall be substituted in full by the following words:

"The volume of water to be discharged from Ladybower Reservoir into the River Derwent shall not be less than 34 megalitres per day".

1.2 In the Licence under headings "Compensation requirements to Jaggers Clough and discharge requirements of the River Noe and Ashop from 1 April 2009 to 22 December 2024, unless an earlier date is agreed with the Environment Agency" and "Combined compensation discharges measured at Yorkshire Bridge and immediately downstream of the Jaggers Clough confluence with the River Noe" conditions 9.4, 9.9 and 9.10 shall be substituted in full by the following words:

"The combined flow of the compensation discharges measured at Yorkshire Bridge Gauging Station at [redacted] and immediately downstream of the Jaggers Clough confluence with the River Noe at approximately [redacted] shall not fall below 51 megalitres per day."

Note: a day means the period of 24 consecutive hours from 6am through to 6am.

2. POINTS OF ABSTRACTION

2.1 In the Licence under section 2 'Points of Abstraction' under the heading "River Derwent" an additional point of abstraction will be included that will read:

"Up to and including 31st March 2023:

At National Grid Reference [redacted] (Ladybower Reservoir) marked 'G' on the map.

3. MEANS OF ABSTRACTION

3.1 In the Licence under section 3 Means of Abstraction, under the header "River Derwent" an additional means of abstraction will be included that will read:

"Up to and including 31 March 2023 from Abstraction point G:

Ladybower Reservoir with mobile pumps."

4. FURTHER CONDITIONS

4.1 For the purpose of this permit "Above Level 0" is the drought trigger zone as defined in the Water Company's Drought Plan 2022.

4.2 The conditions of this permit shall cease to have effect when the percentage storage within the Derwent Valley Reservoirs is Above Level 0.

4.3 During the life of this permit:

(i) the Water Company shall abstract no more than 3600 megalitres in any rolling period of 30 days; and

(ii) the Water Company shall demonstrate, by providing to the Agency in the form of a calendar month report, details of how demand at Upper Derwent Water Treatment Works is being managed including but not limited to reports showing daily abstraction at Upper Derwent Water Treatment Works, strategic grid water production output targets, leakage control, re-zoning of supplies.

4.4 Condition 4.3 (i) shall be temporarily suspended on the occurrence of any of the following:

(i) The Water Company's strategic water supply grid:

(a) holding strategic storage of treated water of less than 287 megalitres or storage of treated water in its [redacted] reservoir of less than 82.8 megalitres;

(b) suffering an unplanned outage or failure of one or more assets as a consequence of which the Water Company reasonably predicts that its strategic storage of treated water will fall below 287 megalitres or its storage of treated water in its [redacted] reservoir will fall below 82.8 megalitres.

(ii) In respect to the Water Company's strategic supply grid, or Yorkshire Water Services' supply grid, the loss of treatment capacity at any water treatment works as a result of an unplanned outage or as a result of maintenance work essential to the ongoing output of the asset during the lifetime of this permit;

(iii) The air temperature, as recorded at any weather station in the area of the Water Company's strategic water supply grid or Yorkshire Water Services' supply grid, remaining below 0 (zero) degrees Celsius for any period of 72 consecutive hours or more.

(iv) The forecasting, or occurrence, of winds of 50 miles per hour or more in the area of the Water Company's strategic water supply grid or Yorkshire Water Services' supply grid. For this condition 4.4 (iv) such winds will be deemed forecast when forecasted as 75% likely or more by Weather Questor or the Meteorological Office and such winds will be deemed to have occurred when recorded at any weather station situated within the area of the Water Company's strategic water supply grid or Yorkshire Water Services' supply grid.

4.5

Save for any temporary suspension of condition 4.3(i) pursuant to conditions 4.4(i)(a) or (b), the temporary suspension of condition 4.3 (i), pursuant to condition 4.4 shall last only for so long as, and to the extent that, any of the circumstances listed in condition 4.4 have, or continue to have after their passing, an adverse impact on the Water Company's or Yorkshire Water Services' ability to supply customers with drinking water. The Water Company will use all reasonable endeavours to mitigate and as necessary resolve as quickly as possible any such adverse impacts.

4.6 In the event of the temporary suspension of condition 4.3(i) pursuant to condition 4.4, if the Water Company intends to, or is, abstracting on the basis of that temporary suspension it shall notify the Environment Agency in writing of:

(i) the circumstances that have arisen and which have led to the temporary suspension of condition 4.3(i); and

(ii) the steps the Water Company has, is or is planning to take in response.

For the purposes of this condition 4.6, notice shall be provided to [EA email address] and shall be provided within one working day of a decision by the Water Company to abstract on the basis of the temporary suspension.

4.7 When condition 4.3(i) is reinstated following a temporary suspension pursuant to condition 4.4, any subsequent calculation of the rolling 30 day limit of 3600 megalitres shall be done on a pro-rata basis, to discount any time within that rolling period during which condition 4.3(i) had been suspended.

4.8 The Water Company shall carry out the actions specified in condition 6.2 if the Agency notifies them in writing that environmental problems are occurring or there is a significant risk to the environment including but not limited to fish kills, a pollution incident, or algae blooms.

4.9 The Water Company shall carry out the actions specified in condition 6.3 if the Agency notifies them in writing that there is obstruction to fish passage on the River Derwent.

5. ENVIRONMENTAL MONITORING

5.1 The water company shall undertake environmental Monitoring as set out in Appendix 1 attached to this permit.

5.2 The Water Company shall carry out the actions specified in 6.2 and 6.3 if the environmental monitoring identifies signs of ecological distress including but not limited to fish in distress, a pollution incident, water quality deterioration and algal blooms.

6. MITIGATION

6.1 Immediately upon finding any signs of ecological distress the Water Company shall notify the Agency in writing and by telephone on [redacted] and shall provide details of the signs of distress and the location.

6.2 If ecological distress or a significant risk to the environment is identified in accordance with condition 4.5 or 5.2, then the Water Company shall return to the compensation flows specified in abstraction licence 03/28/38/0018, or lesser quantities if agreed in writing by the Agency.

The water company shall commence or cease the stated change in compensation flows as soon as possible and within 24 hours of receipt of written notification from the Agency.

6.3 **Freshet flows**

The water company shall increase the release of compensation water if the Agency notifies them in writing that additional flow is needed on the River Derwent. These releases of compensation water are referred to here as 'freshet flows'. The freshet flow shall return the compensation flows from Ladybower Reservoir to the normal flows as specified in abstraction licence number 03/28/38/0018, or a lesser flow if agreed between the company and the Agency. The frequency and duration of the freshet flows shall be agreed between the company and the Agency, depending on the needs of the River Derwent at the time.

ADDITIONAL INFORMATION

Note: the following information is provided for information only. It does not form part of the permit.

REASONS FOR SUSPENSIONS AND/OR MODIFICATIONS

Condition 5 of this drought permit has been included to allow monitoring of signs of environmental impacts that may be caused by or affected by the water company reducing compensation flows.

Conditions 4.4 and 6 of this drought permit have been included to mitigate against any environmental impacts that may be caused by or affected by the water company reducing compensation flows.

IMPORTANT NOTES