

Yorkshire Water Drought Order Application

River Ouse Supporting Information

September 2022



YorkshireWater

Contents

1.0	Introduction	4
1.1.	The Yorkshire Water Supply area	4
2.0	Drought order description	7
2.1.	Location	7
2.2.	Water resource management arrangements relating to the application	7
2.3.	Abstraction from the River Ouse under Drought Order proposal	9
3.0	Drought order justification	11
3.1.	Why we need a drought order	11
3.2.	Benefits of this drought order	11
3.3.	Deficiency of supplies due to an exceptional shortage of rain	12
3.4.	Reservoir Stocks	16
3.5.	River Flows	21
3.6.	The effects of the current water shortage	22
3.7.	Population affected by the drought order	23
3.8.	Summer 2022 demand	23
3.9.	Leakage control	25
3.10.	Demand on the affected water source	27
3.11.	Drought order alternatives considered	28
3.12.	Consequences if the drought order is not granted	29
4.0	Actions taken to reduce demand and conserve supplies	30
4.1.	Demand management during normal operating conditions	30
4.2.	Metering	31
4.3.	Leakage reduction activity	32
4.4.	Trigger: Reservoirs crossed our normal control line	32
4.5.	Trigger: Reservoirs crossed Environment Agency early warning trigger line	33
4.6.	Trigger: Reservoir stocks predicted to be 10 weeks from crossing the drought control line	34
4.7.	Trigger: Reservoir stocks predicted to be 8 weeks from crossing the drought control line	35
4.8.	The use of sources in 2022	36
5.0	Environmental impacts of drought order	41
6.0	Water Supply Strategy for the Continuation of Drought	42
6.1.	Operational changes we will make to avoid future drought-related problems	44
7.0	Notices and advertisements relation to application	45
7.1.	Public inspection arrangements	45

7.2.	Environment Agency	45
7.3.	Natural England	46
7.4.	Navigation Authority	46
7.5.	Internal Drainage Board	46
7.6.	Retailers	46
8.0	Appendices	47
8.1.	Appendix 1: Summary of water saving communications	47
8.2.	Appendix 2: Notice relating to the River Ouse drought order application	53

1.0 Introduction

This drought order application is a drought option in Yorkshire Water's Drought Plan 2022. We are applying for the order following the dry spring and early summer of 2022 as it would help reduce the risk of a shortage of supply if we do not receive sufficient rainfall to allow reservoirs to recover. By temporarily increasing river abstractions at low flows, we reduce the volume we put into supply from reservoirs. This helps conserve reservoir supplies until we receive sufficient rainfall for levels to return to normal.

This document provides supporting information for Yorkshire Water's drought order application for varying abstraction permissions on the River Ouse at Moor Monkton. The application requests an increase in the daily abstraction limit at Moor Monkton when the River Ouse is flowing at a rate of less than 1,000 MI/d.

The changes, if the application is granted, will be in place for up to six months. We have submitted a drought order application form (using EA form WR80, for drought permits) to Defra and this document provides supporting information. A draft order, with details of the temporary licence changes, has been prepared and a copy provided in support of this application. The application form and the draft drought order are provided in the documents named '7. WR80 Ouse at MM.pdf' and '9. Draft drought order - Ouse at MM.docx' respectively.

The potential environmental impacts of implementing the drought order have been considered and an environmental assessment report is provided in support of the application.

1.1. The Yorkshire Water Supply area

Yorkshire Water supplies water to over five million customers. Under normal weather conditions, approximately 45% of this water is from impounding reservoirs, 30% from rivers and 25% from boreholes (groundwater). This varies from year to year depending on weather conditions. In dry years rivers are used more, with about 40% of supply coming from reservoirs, 40% from rivers and 20% from groundwater. By increasing river abstraction, we make use of supplies that would otherwise be lost and retain reservoir and groundwater supplies for longer. In normal weather conditions reservoir and groundwater stocks are replenished through rainfall and we do not need to rely on rivers as much.

For planning purposes, the Yorkshire supply region is divided into two water resource zones, shown in Figure 1.1. The majority of our region is within our Grid Surface Water Zone (Grid SWZ), with 1% of customers in our East Surface Water Zone (East SWZ). The Grid SWZ has an integrated supply network dominated by the operation of lowland rivers and Pennine reservoirs. The East SWZ, is a much smaller zone covering Whitby and the surrounding area. It is supplied by a river abstraction and moorland springs in the Whitby area. We are not applying for any drought permits/orders in our East SWZ.



Figure 1.1: Water resource zones

Our Grid SWZ includes five interconnected operating areas, which we refer to as North, North West, South, South West and East areas. This drought order application applies to a river abstraction located in the North Area. Water abstracted from the River Ouse at Moor Monkton is usually treated at Huby water treatment works (WTW) near York, Eccup No 2 WTW and Headingley WTW in Leeds but can also be treated at Elvington WTW. Following treatment, the water is put into our 'grid system' which is used to provide additional water to the operating areas in our Grid SWZ as required

Our Drought Plan 2022 includes 49 drought options that are designed to conserve reservoir supplies or provide additional river or groundwater supplies when droughts occur in our Grid SWZ. The majority (43) of our drought options are related to reservoir compensation releases and we have a high number of these as there are over 100 reservoirs in our region. We have six drought options in our Drought Plan relating to existing river abstractions that can be used to provide additional resources to our Grid SWZ without the need for any new infrastructure. This drought order application relates to one of these six options, and if granted would allow additional abstraction from the River Ouse at flows below 1,000 Ml/d.

We operate our Grid SWZ to balance resources through our five operating areas rather than drawing down individual reservoir groups in each area. Our river sources can be used in preference to reservoir supplies when stocks are low in order to conserve resources for later in the year if we do not receive sufficient rainfall for stocks to recover. Our Drought Plan is designed to implement drought actions, when needed, across our Grid SWZ to provide benefits regionally rather than at a local level. During droughts our use of river sources can be limited by licence conditions which restrict abstractions at low flows. Drought permits/orders, if granted, can temporarily alter these restrictions in order to provide additional water for supply to customers if our normal resources are low due to exceptional shortage of rainfall.

We are applying for drought permits/orders that will enable us to implement several of the drought options in our Drought Plan (a list of these options is provided in Section 6.0). The permit/order applications have been selected through modelling and analysis of our drought plan options. We are

prioritising our permit/order applications to those that will offer the maximum benefits to protecting public water supply in the current situation.



Figure 1.2: Grid SWZ integrated network

Figure 1.2 is an outline of our grid network, which connects most of the water resources in our Grid SWZ. The River Ouse abstraction at Moor Monkton is an essential part of this system. The grid network enables highly effective conjunctive use of different water resources facilitated by raw and treated water pipelines. Water abstracted from the river intakes is used to support the five operating areas either directly or indirectly, so they are not solely dependent on local resources.

During dry weather we aim to maximise use of river sources to conserve reservoir stocks for longer. However, this year we have experienced exceptionally high demand and low rainfall. At times we have had to maximise use of rivers and reservoirs simultaneously and during periods of low river flow we have had to rely on reservoir supplies. We balance the drawdown of reservoirs across the zone through use of our grid system. This makes our region more resilient to supply risks but following exceptional weather conditions during 2022, stocks in the reservoirs across our region are lower than average for this time of year. Our use of the licences in this application is described in Section 4.8.

As a result of the low rainfall our reservoirs are below average for the time of year and there is a risk to security of supply if we do not take action to conserve reservoir stocks as much as possible. We are applying for drought permits/orders to conserve supplies in reservoirs in case the dry weather continues. The River Ouse order, if granted, will increase our permitted annual abstracted volume from the river at low flows. This additional water will be used in our grid system to reduce the water we put into supply from reservoirs.

2.0 Drought order description

Yorkshire Water can abstract water from the River Ouse at Moor Monkton under the terms of abstraction licence agreements held with the Environment Agency. This drought order application is relevant to the abstraction from the River Ouse at Moor Monkton when flows are below 1,000 Ml/d. We have two abstraction licences for this site, a base licence held directly with the Environment Agency (licence 2/27/24/158), and a time limited licence held with the Environment Agency by the Canal and Rivers Trust for Yorkshire Water (licence NE/027/0024/065). In an agreement between YW and CRT, CRT have transferred the benefit of the abstraction licence to YW in full. Copies of the licence agreements and a letter of consent from CRT to apply for a drought order are provided as part of this application.

2.1. Location

Moor Monkton is in the Harrogate district of North Yorkshire. The licence agreements held with the Environment Agency allow abstraction from the River Ouse at Moor Monkton, approximately 1.5 km downstream of the confluence with the River Nidd. The Moor Monkton intakes (grid reference SE 52 57) are southwest of the village of Benningbrough and approximately 9km to the northwest of the City of York.

A location map of the abstraction point is provided in Figure 1.2. Water abstracted from Moor Monkton is mostly treated at Eccup No 2 WTW and Headingley WTW with a small amount treated at Huby WTW. Water can also be transferred to Elvington WTW if required.

2.2. Water resource management arrangements relating to the application

We are authorised to abstract water from the River Ouse at Moor Monkton under the terms of licence serial number NE/027/0024/065, an agreement we hold with the Canal and Rivers Trust, and under the terms of licence 02/027/0024/158, an agreement we hold with the Environment Agency. Under the terms of the licences the volume we are permitted to take is dependent on the flow in the River Ouse as measured at Skelton gauging station (grid reference SE 56 55). The abstraction is limited to: 300 Ml/d when flow at Skelton gauging station is more than 1000 Ml/d; 150 Ml/d when flow at Skelton gauging station is between 650 and 1000 Ml/d; 72 Ml/d when flow at Skelton gauging station is between 400 and 650 Ml/d; and 10 Ml/d when flow at Skelton gauging station is less than 400 Ml/d.

In addition to the above, the aggregate quantity of water authorised for abstraction from Moor Monkton under licence number NE/027/0024/065 and licence number 02/027/0024/158 is limited to 12.5 megalitres per hour; 300 megalitres per day (Ml/d); and 73,000 megalitres per year (Ml/year). Abstraction must be taken at an instantaneous rate not exceeding 3,473 litres per second.

Yorkshire Water is currently operating within the terms and conditions of both licence agreements to abstract from the River Ouse at Moor Monkton.

We operate a second intake on the River Ouse at Acomb Landing. The terms of use for this abstraction are specified in a separate licence agreement held with the Environment Agency (licence serial number 02/27/024/078) and will not be affected by this drought order.

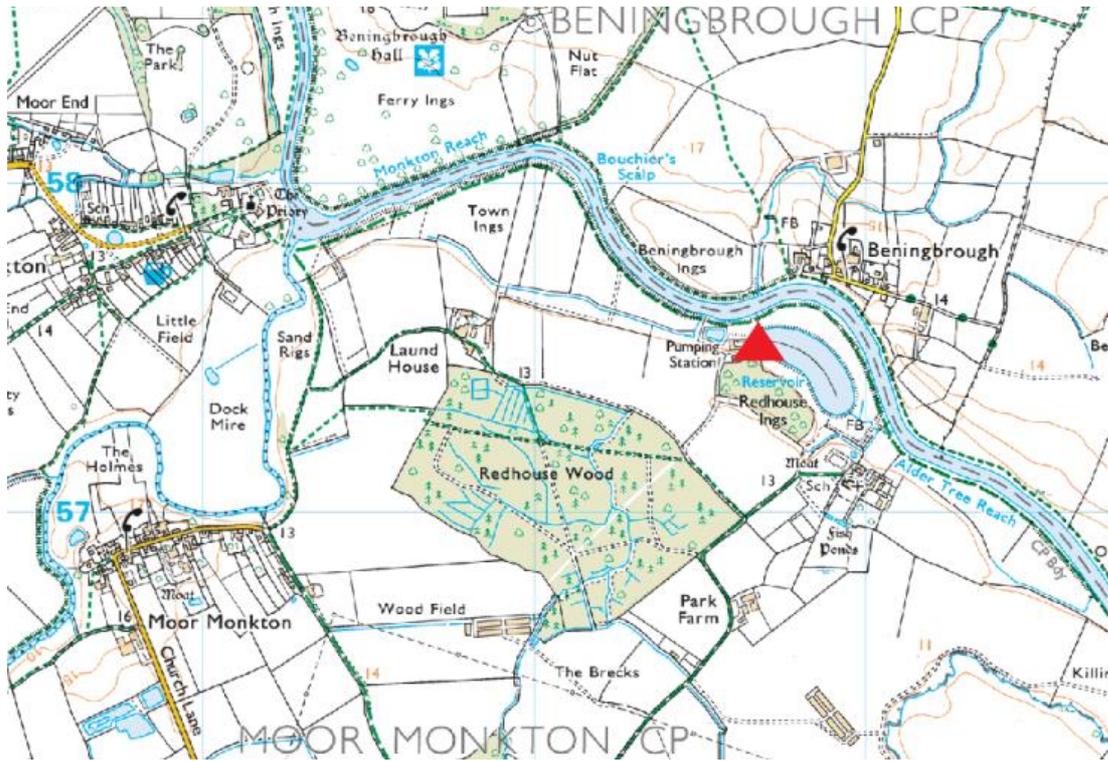


Figure 2.1: Location of River Ouse intakes

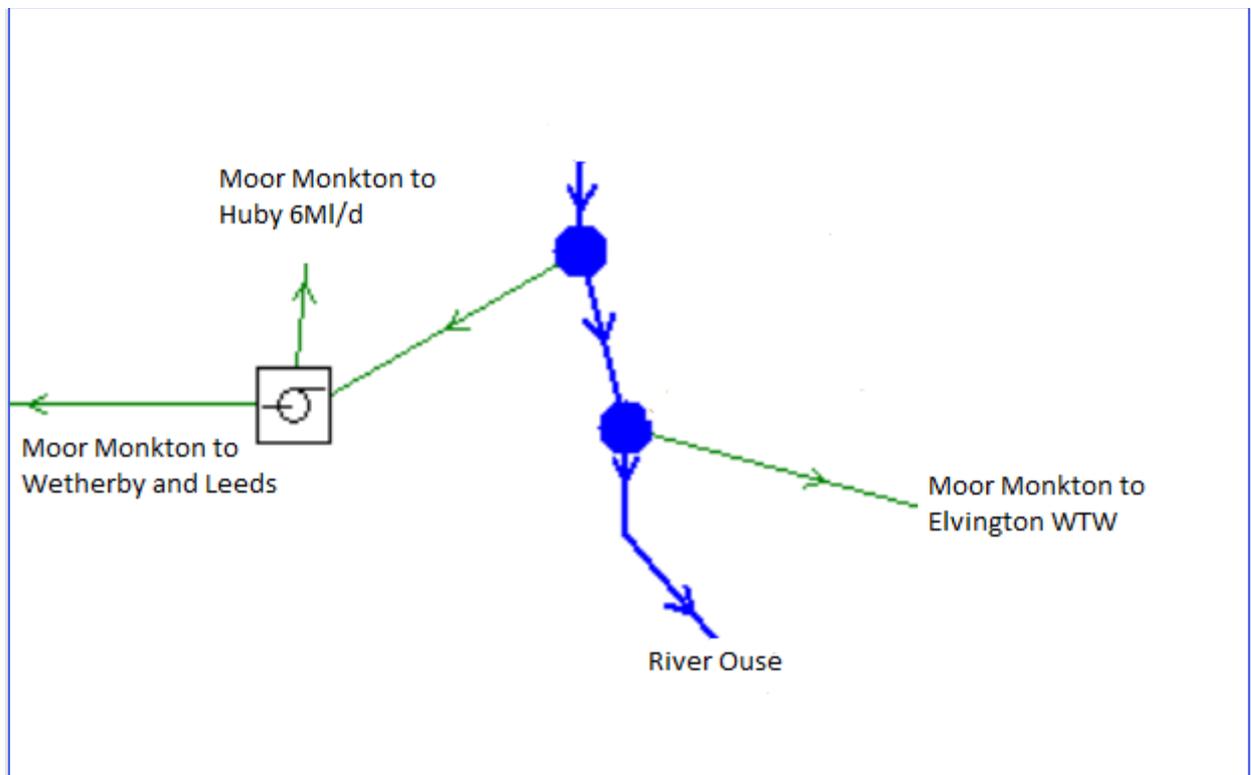


Figure 2.2 Schematic showing the River Ouse abstractions and grid connections

The water abstracted at Moor Monkton intake is treated at Huby WTW, Eccup No 2 WTW, Headingley WTW and Elvington WTW. Elvington WTW can also treat water abstracted at Elvington from the River Derwent. Elvington WTW supports supplies in York and supplies the grid. The grid can directly support supplies in Leeds, Sheffield, Wakefield, Kirklees and Calderdale, and, by supporting these areas and allowing sources in these areas to be transferred, can thereby support stocks in Harrogate, Bradford and other areas of Yorkshire.

In general, the use of reservoirs is maximised when stocks are above the Normal Control Line (NCL). Control lines are discussed in Section 3.3. When reservoir stocks are below the NCL the abstraction is reduced to the reservoir yield where possible, and the use of rivers is increased. A schematic showing the grid system connection to the River Ouse abstractions is provided in Figure 2.2.

2.3. Abstraction from the River Ouse under Drought Order proposal

The drought order application for the River Ouse is to increase the daily abstraction limit at Moor Monkton in all but the highest flow band by 60 MI/d.

The current daily maximum abstraction licence permissions at Moor Monkton on the River Ouse for each flow band and proposed changes for the duration of the drought order are shown in Table 2.1, (changes highlighted yellow).

Allowed Abstraction at Moor Monkton			
Flow at Skelton Gauging Station	Current Licence	Proposed drought order	Change
Greater than 1000 MI/d	300	300	No change
650–1000 MI/d	150	210	Increase allowed by 60MI/d
400–650 MI/d	72	132	Increase allowed by 60MI/d
Less than 400 MI/d	10	70	Increase allowed by 60MI/d

Table 2.1: Current Licence and Drought Order proposals

The drought order application is to temporarily amend the licences to allow an additional 60 MI/d to be abstracted at Moor Monkton in the flow bands below 1,000 MI/d. If granted the order will be in place for six months.

If we receive sufficient refill for our regional reservoirs stocks to recover to a level we refer to as ‘the normal control line’ and no individual reservoir group is below a level we refer to as our ‘early warning trigger line,’ we will revert to the conditions defined in the licence agreement. Plots of the reservoir stocks and further explanations about the triggers to be used for compensation flow reductions can be found in Section 3.4.

The abstraction rates (daily maxima and combined annual maxima) specified in the licences are unchanged. This means that the total annual maximum from the River Ouse is unchanged, but that more will be able to be taken when the river is low.

During 2022 our reservoirs stocks are low following below average rainfall since the start of March 2022, coupled also with periods of high summer demand. This drought order will provide more river water for supply to customers and helps conserve reservoir stocks in case the dry weather continues.

3.0 Drought order justification

This drought order application is necessary due to an exceptional shortage of rain threatening a serious deficiency of supplies of water in the area supplied by Yorkshire Water. Evidence to demonstrate the exceptional shortage of rain in the Ouse catchment and the Yorkshire region is provided below, and further details are available in the separate document on 'Exceptional shortage of rain 2022', provided in support of this application.

We are applying for a drought order on the River Ouse to conserve reservoir stocks if the dry weather continues. The order will allow us to increase our use of river supplies during low flows. This will reduce the volume of water we are required to put into supply from reservoirs so that we conserve the supply for use later in the year.

3.1. Why we need a drought order

Our Grid SWZ has an interconnected network (grid system) that enables highly effective conjunctive use of the available water resources using raw and treated water pipelines. During dry weather we aim to maximise use of river sources to conserve reservoir stocks for longer. However, during 2022 we have experienced exceptionally low rainfall as well as periods of very high demand; this has led to greater draw down of reservoirs, and the below average rainfall has meant reservoirs have not refilled.

Rainfall over the winter period of 2021/22 was very variable, it was dry until January with reservoir stocks at 87% full at the start of the year. A very wet February meant that stocks recovered to 95% full by the end of February 2022. However, rainfall was significantly below long term average (LTA) in March and April, with stocks falling to 87% at the end of April.

Reservoir stocks crossed our 'Normal Control Line' in mid-March 2022. This triggered additional activity to manage water resources and in particular to abstract, treat and distribute more water from rivers in order to reduce our draw on reservoir stocks. This activity continued during the summer and will continue into autumn and winter until the water resources position recovers. We have used our grid system to move water up to 70 miles from river sources to areas in the south and west of the region which are usually supplied by local reservoirs. Throughout this period, we have been managing reservoir levels to ensure, as far as possible, that stocks are drawn down evenly across all areas.

In June and July, we experienced high customer demand due to ongoing dry weather coupled with a period of high (and very high) temperatures. The very high temperatures were unprecedented, with the highest temperatures ever being recorded across the UK, and the first Met Office Red weather warning for heat being issued. At times we had to maximise use of rivers and reservoirs simultaneously in order to meet customer demand, and during periods of low river flow we had to rely on reservoir supplies more than would normally be the case.

This led to our reservoir stocks depleting at a much faster rate and if the dry weather continues there is a risk we will not be able to maintain supplies in some areas, or receive sufficient refill for levels to return to normal in the autumn.

3.2. Benefits of this drought order

The proposed increase in allowed abstraction in the 3 lower flows at Moor Monkton would allow us to maximise the abstraction at low flows, reducing the rate of fall of reservoir stocks by abstracting more from rivers. Protecting reservoir stocks in this way allows us to prolong the amount of time reservoirs are available for both public water supply and compensation releases to the environment.

We have considered all options and this drought order application has been identified as being the best option for the current situation. Very high demands and extremely dry weather have led to an increase in abstractions from all sources to meet peak demands and from river sources to support reservoir stocks. If we were able to continue the use of the river abstractions at a higher rate when river flows are low, this would aid recovery of reservoir stocks and put us in a better position with respect to reservoir stocks.

This drought order provides an additional 60MI/d at flows below 1,000MI/d which can be treated at Eccup No 2 WTW, Headingley WTW and/or Elvington WTW to provide more water to our grid. It will also maintain supply to Huby WTW. The additional resource to the grid allows us to conserve reservoir stocks in case the dry weather continues. Increasing the abstraction allows stocks in the reservoirs in the North and North West areas to be protected and can also protect stocks in the South if the extra abstraction is treated at Elvington and used to support the southern part of our grid. Further details of how abstraction from Moor Monkton on the River Ouse supports the grid are provided in Section 3.5.

We would be able to reduce reservoir abstractions by increasing the abstraction from the River Ouse.

Reservoir group	Assuming River flows in lower 3 bands for 50% of the time	Assuming River flows in lower 3 bands for 33% of the time
Regional stocks	3%	2%
North stocks	16%	11%
North West Stocks	11%	8%

Table 3.1: Potential drought order benefits on 1 April 2023

The benefits that could be achieved if this order is granted are summarised in Table 3.1 and include improved flexibility and an increase in regional reservoir stocks of up to 3% on 1 April 2023 if river flows are in the lowest flow bands for 50% of the time from October–March (an extreme worst case scenario), or 2% of regional stocks if river flows are in the lower bands for 1/3 of the time (a reasonable worst case scenario). The benefits shown are the total additional abstraction as a proportion of total stocks in the regional, North West, or North groups (i.e. not 11% in North AND 8% in North West in the reasonable worst case scenario with a 10% likelihood based on historic rainfall patterns). This is an estimate of the potential benefits based on the above assumption; clearly the real benefits will depend on actual rainfall and river flow conditions that are experienced for the period when the order is in place.

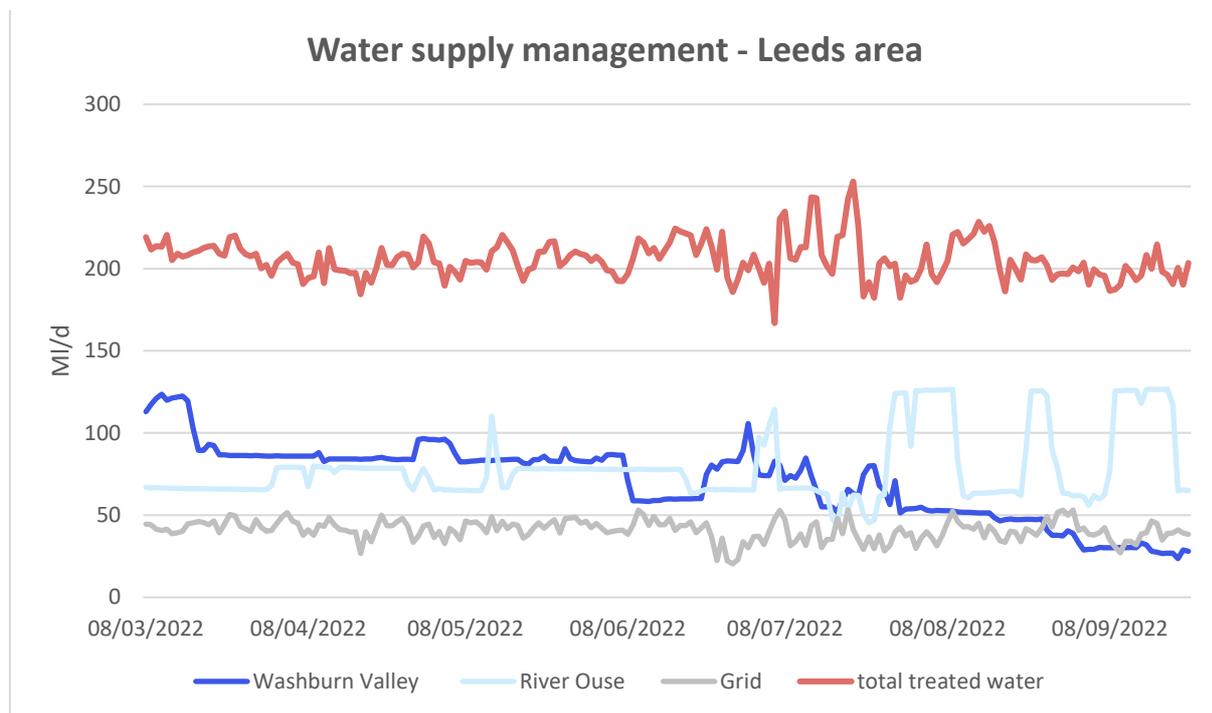
The benefits calculated above assume the additional 60MI/d is taken at all times when river flows are in the lower flow bands. In reality, we may take less, depending on conditions at the time, but we have applied for a drought order that will cover all eventualities. When all assets are operational, we can abstract 125MI/d to Eccup via the Wetherby pumps, 6MI/d to Huby, and up to 80MI/d to Elvington WTWs. The abstraction to Elvington would only be used at such a high level if there was a failure in the Elvington abstraction on the River Derwent, and we are applying for this additional 60MI/d in the 650–1000MI/d flow band to allow this additional abstraction in the event of such a failure. Although our licence allows us to abstract up to 300MI/d, we do not currently have the infrastructure to do this. We are looking at our use of the River Ouse at Moor Monkton and Acomb Landing with the Environment Agency as part of our WINEP investigations. We are looking at options to increase abstractions to increase supplies, including increased storage and network infrastructure. At present, in normal circumstances, there is little benefit in increasing abstractions at high flows, as this is typically when reservoirs are full and we maximise their use.

3.3. Supply system management

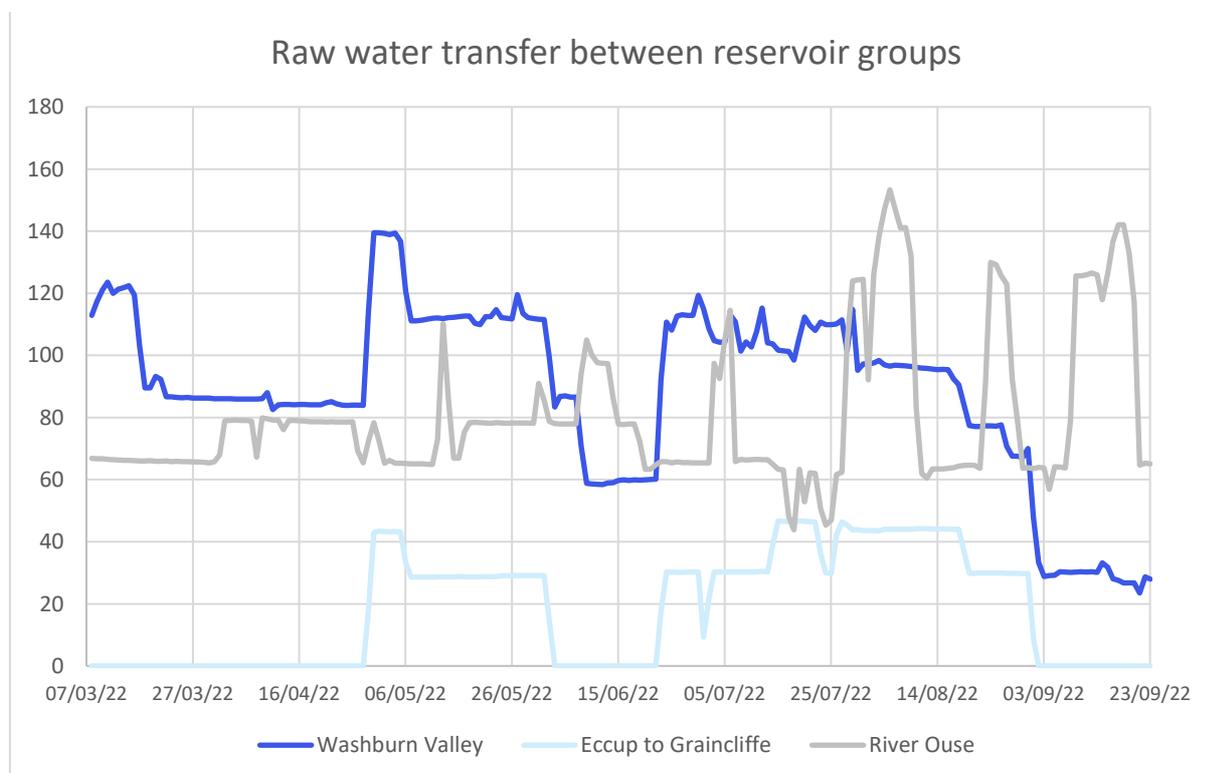
Three water treatment works supply drinking water to the Leeds area. Eccup No 1 WTW treats raw water from the Washburn Valley reservoirs; Eccup No 2 WTW treats water from the River Ouse abstracted at Moor Monkton and Headingley WTW is supplied from Eccup reservoir. Eccup reservoir has very little natural catchment and receives water from both the Washburn Valley reservoirs and River Ouse. In addition, treated water from the River Derwent works (Grid) is used to meet customer demand in the Leeds area.

The graph below demonstrates our operational strategy of maximising reservoir sources when stock levels are above the normal control line (NCL) with the emphasis moving to river sources as reservoir levels drop further.

Note that there may be a difference between the sum of the three sources of water and the total treated water on a day-by-day basis. This is due to variation in raw water levels in Eccup reservoir.



Water from the Washburn Valley reservoir group can also be used to support reservoirs in the North West and South West supply groups using Eccup to Graincliffe pumping station. By increasing abstraction from the River Ouse for treatment in Leeds, capacity is created for the transfer of raw water for treatment at our Bradford and Halifax treatment works.



All requests for maintenance of assets that require a reduction in flow cannot proceed without approval from our WRAP (water resource allocation planning) team. The WRAP team assess the regional impact of any planned outages on both raw and treated water systems using our KAM (Key asset management) process. Priority is given to safety critical work and that which will increase, or maintain, treatment or transmission capacity. If a request is considered to be too great a risk to the Regional Supply System, then it will be rejected and an alternative methodology developed.

3.4. Deficiency of supplies due to an exceptional shortage of rain

Our drought triggers include data from a number of sources – rainfall, river flows, ground water levels and reservoir levels. Our report 'Exceptional shortage of rainfall 2022' provides a regional overview of conditions across the Yorkshire Water area and details the analyses we have carried out on rainfall and climate data in Yorkshire. This document is presented in support of our application and includes the following analyses:

- Standardised Precipitation Index (SPI) calculations
- Rainfall ranking
- Rainfall probability bands
- Rainfall percentage of long term average
- Soil Moisture Deficit

We have analysed rainfall for the Yorkshire river catchments, and a number of reservoir group catchments.

Table 3.2 summarises some of the analyses that have been carried out on rainfall data for the catchments most relevant to this drought order application. The River Ouse at the Skelton Gauge which dictates the flow thresholds for the Moor Monkton abstraction is made up of the Nidd, Ure and Swale catchments, with the Ouse catchment below this point. The results show the 1 month, 3 month, and 6 month standardised precipitation index (SPI) for the Yorkshire regional rainfall, the River Ouse catchment and sub catchments, reservoir groups in the north west, north, south and south west, which supply areas that can all be supported by the River Ouse abstraction, and for the River Derwent catchment (a grid source that can be supported by the Ouse abstraction).

The analyses show that the 6 month SPI is extremely dry for the Yorkshire regional catchment rainfall and for the River Ure and Derwent catchments, as well as for the Ponden and Lower Laithe, Washburn Valley, Little Don Valley and Walshaw Dean reservoir catchments, and severely dry for the other catchments. The 1 and 3 month SPI are also shown, with the River Derwent, Ponden and Lower Laithe, and Walshaw Dean catchments severely dry for the 3 months period June–August, and most others showing a severely dry 3 months to August.

	1 month SPI	3 month SPI	6 month SPI	%LTA March-August rainfall	Ranking March-August
Yorkshire regional	-1.64	-1.85	-2.36	61%	3
Ouse	-2.00	-1.98	-1.98	62%	5
Ure	-1.51	-1.43	-2.00	64%	5
SwaleNE	-1.66	-1.53	-1.95	65%	6
River Nidd	-1.93	-1.61	-1.93	64%	5
Related catchments					
Nidd group	-1.35	-1.28	-1.81	65%	5
Ponden/Lower Laithe	-1.54	-2.03	-2.76	54%	2

	1 month SPI	3 month SPI	6 month SPI	%LTA March-August rainfall		Ranking March-August	
Washburn group	-1.87	-1.83	-2.31	58%		3	
LDV group	-0.96	-1.74	-2.84	51%		1	
Walshaw group	-1.57	-2.11	-2.98	52%		1	
River Derwent	-1.87	-2.04	-2.29	59%		3	
Key							
SPI	Extremely dry	Severely dry	Moderately dry	Near normal	Moderately wet	Severely wet	Extremely wet
Ranking-Cunnane plotting classification	Exceptionally low	Notably low	Below normal	Normal	Above normal	Notably high	Exceptionally high

Table 3.2: Rainfall catchments and summary of analyses August 2022

For the River Ouse catchment, the SPI is Severely dry for the April-August period, based on the monthly rainfall data, but the river flow plots on the Centre for Ecology and Hydrology (CEH) Water resources portal (shown in our Exceptional Shortage of Rainfall report) show periods when the river flows are notably low and exceptionally low during the month of July. Intense rainfall events at the end of the month mask the predominantly dry conditions when only monthly data are considered. Flows on the River Ouse gauged at Skelton have been lower at times this year than at any time since 1995 (see Figure 3.9).

March-August rainfall as % of LTA for these catchments is between 51% and 65% of the LTA. For the Yorkshire Region, the March-August LTA is 61% (the same period in 1995 had 51%, partly due to a very dry August with only 12% of LTA).

The rank of the March-August rainfall is also shown, and is shaded according to the Cunnane plotting position (see Exceptional Shortage of Rainfall report). All catchments have exceptionally low rainfall, ranked 1-6 in the 132 year period of record.

Plots of monthly rainfall as percentage of the 1961-1990 LTA are shown in the Exceptional Shortage of Rainfall report. These show that since October for most catchments only October and February have been above average. December was close to average, and February was extremely wet, providing some much needed reservoir refill.

Reservoir catchments in the south of the region show the lowest rainfalls, with some catchments, having the driest March-July on record since 1891.

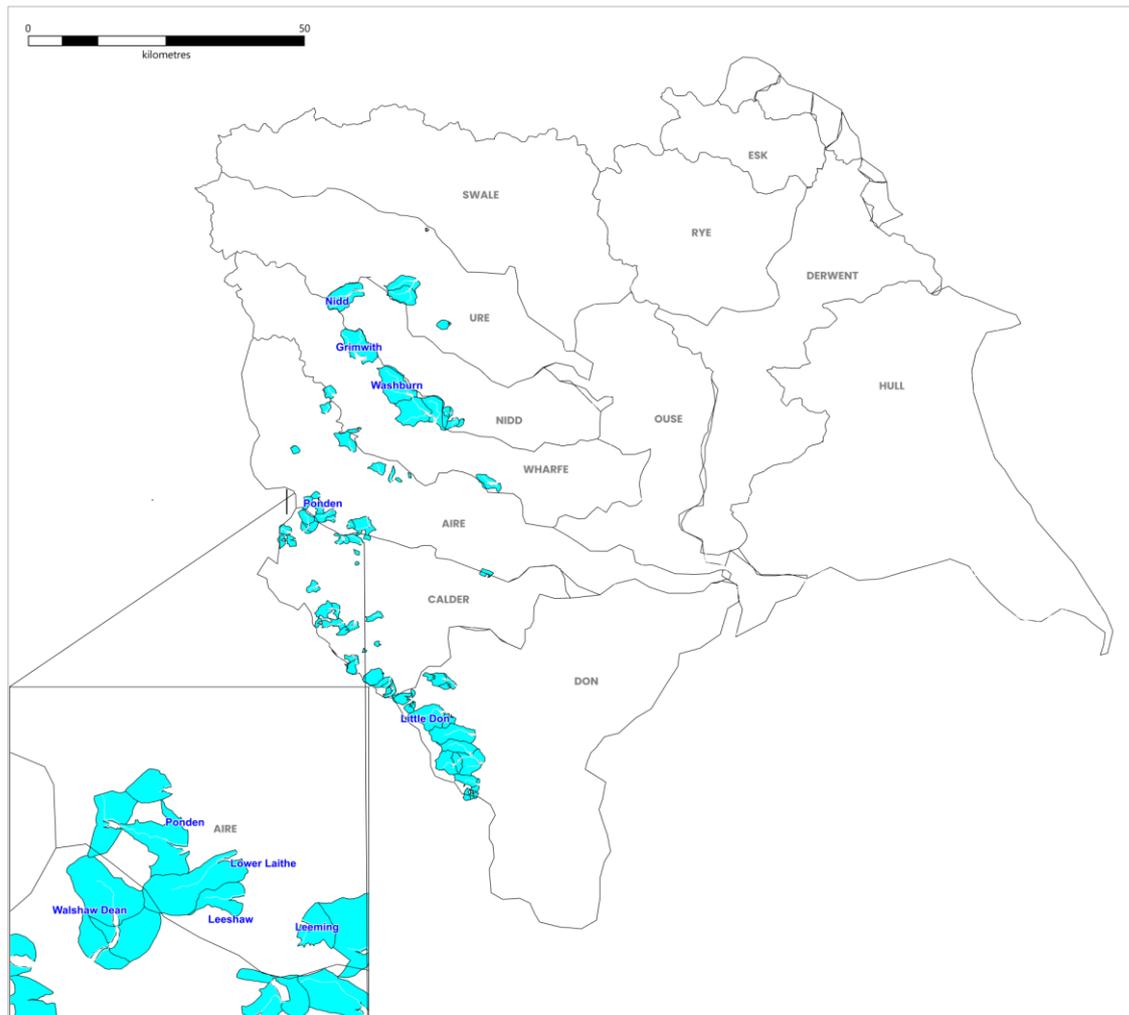


Figure 3.1: River and reservoir catchments

Figure 3.1 shows the location of the river and reservoir catchments for which rainfall data has been analysed.

River flows and reservoir stocks and their use as an indicator for a deficiency of supplies are discussed in the next sections of this document.

3.5. Reservoir Stocks

Our reservoir control lines represent the value of reservoir storage that is required to guarantee a continuous rate of supply (equivalent to yield) such that the reservoir storage never falls below a critical storage line given the minimum historical inflows.

We calculate two sets of control lines:

- Drought Control Line (DCL) - the DCL is designed such that stocks will never fall below marginal storage when the reservoirs supply 85% of their calculated yield.
- Normal Control Line (NCL) - the NCL is designed such that stocks will never fall below the DCL when the reservoirs supply their calculated yield.

Once we have calculated the NCL and DCL, we linearly interpolate between the 100% full level and the NCL, the NCL and DCL, and the DCL and emergency storage level, to obtain the ten control lines (CLs) used in our modelling and reservoir stocks monitoring. The NCL is control line (CL) 3, the DCL is CL7, and we use CL4 as the Environment Agency trigger line. This is the trigger for Yorkshire Water and the Environment Agency to initiate communications around a potential emerging dry weather situation. The control lines are the grey curves shown in Figure 3.2; **Error! Reference source not found.**these provide Yorkshire Water's internal control lines, used to help manage the reservoirs.

The control lines are updated on a regular basis and were last updated in 2022 based on minimum inflows from 1900 to 2020. We have remodelled our historic inflows using GR6J rainfall runoff models and extended our historic record back to 1900. GR6J is part of the French Research Institute's (INRAE) suite of GR rainfall runoff models. It is a lumped conceptual model, and is now widely used by several UK water companies. HR Wallingford developed the models for Yorkshire Water for our Water Resources Management Plan 2022 after comparing the performance of both GR6J and the Probability Distributed Model (PDM) for a number of Yorkshire catchments. HR Wallingford's analyses and model development are fully described in the report on hydrological modelling.¹

Control lines have been revised since our most recent drought plan, but the triggers in our drought plan related to control lines are still applicable to the updated control lines. We will carry out a further review of our control lines after the current drought period has ended, and when inflows are updated to include this current period.

In the operation of our reservoirs, we aim to abstract the reservoir yield when stocks fall below the NCL, but at times of high demands or in response to other system constraints we will often use a source above its yield for periods of time, and then reduce to below yield later in the year to compensate.

The figures below show regional and area reservoir stocks for this year compared to the last few years and selected dry years.

Figure 3.2 shows the regional reservoir stocks as shown in our weekly water situation report. It shows that stocks in 2022 have been very low. Only 1995 and the start of 2020 have been drier during parts of the year, in recent times.

¹ HR Wallingford, 2022, Yorkshire Water Hydrology Update-Hydrological Modelling

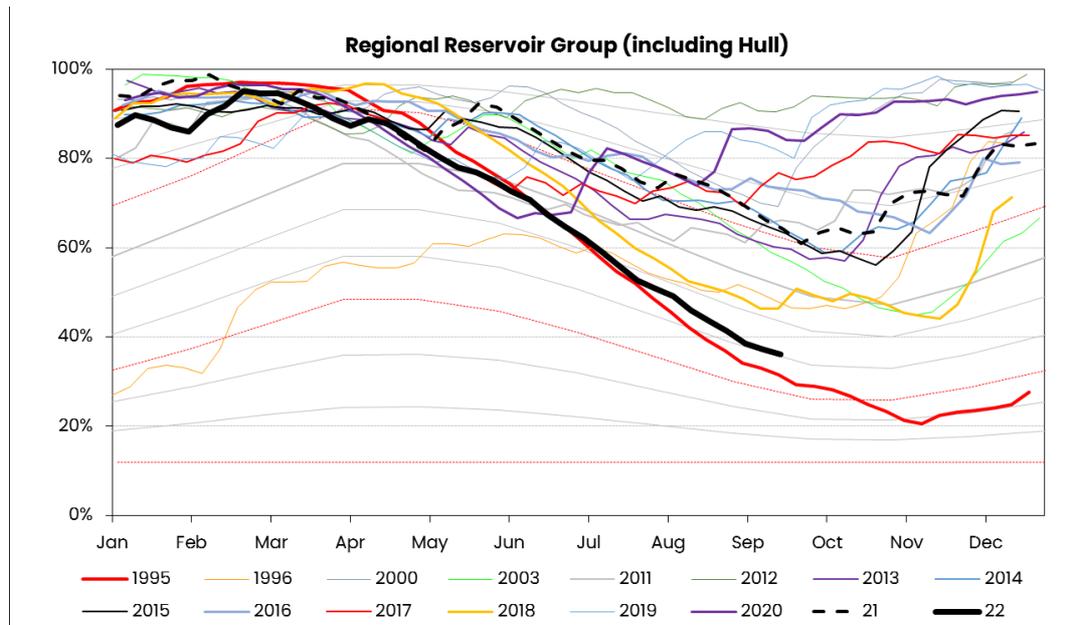


Figure 3.2 – Regional Reservoir Group stocks (from Water Situation Report)

When reviewing the below graphs, it is worth also looking at Figure 1.2 presented earlier in this document, which shows some of our major raw water and treated water transfers. The Moor Monkton abstraction is shown on that figure as a yellow dot just upstream of York, and the possible transfer routes from Moor Monkton – and hence its ability to provide regional support – can clearly be seen.

Figure 3.3 shows the area stocks for the North Group of reservoirs supplying Harrogate and Leeds. This area can be supported directly by the abstraction from Moor Monkton.

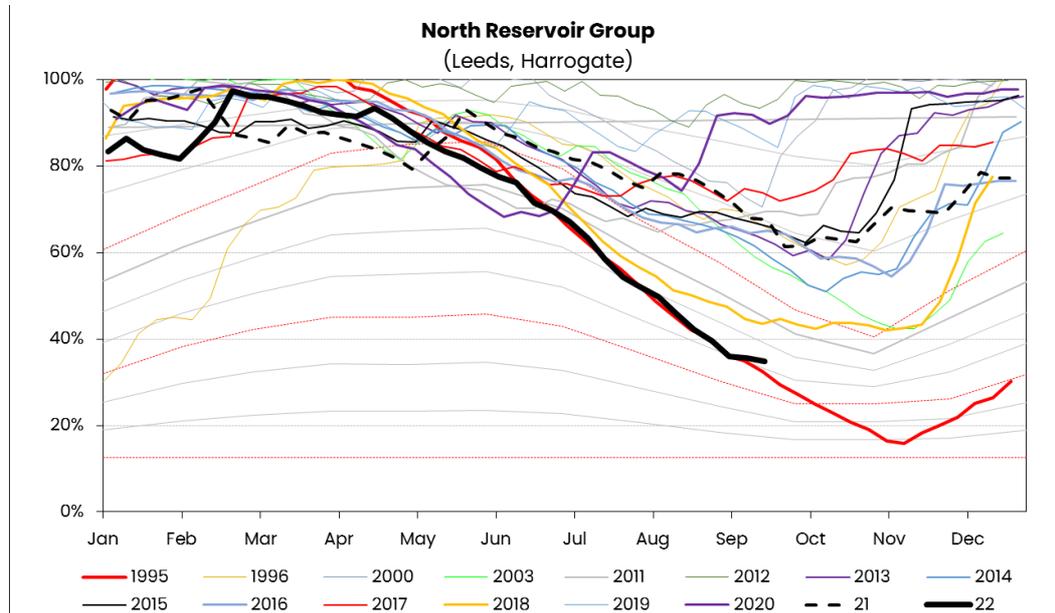


Figure 3.3 – North Reservoir Group stocks (from Water Situation Report)

Figure 3.4 shows the area stocks for the North West Group of reservoirs supplying Skipton, Keighley and Bradford. This area can be supported by the Moor Monkton abstraction by the transfer from Eccup in the North to Graincliffe in the North West.

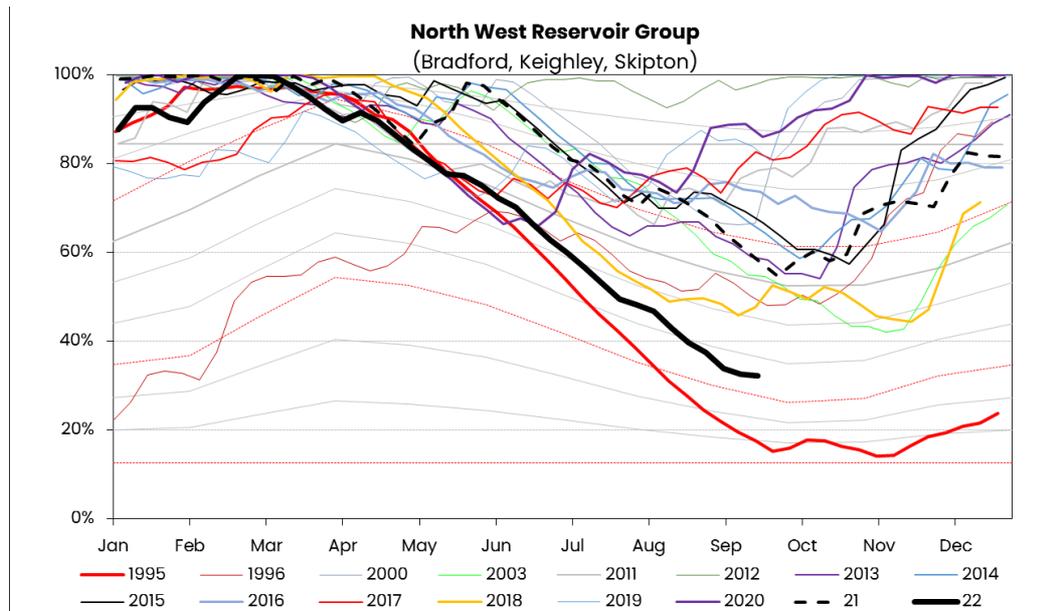


Figure 3.4 – North West Area Reservoir stocks

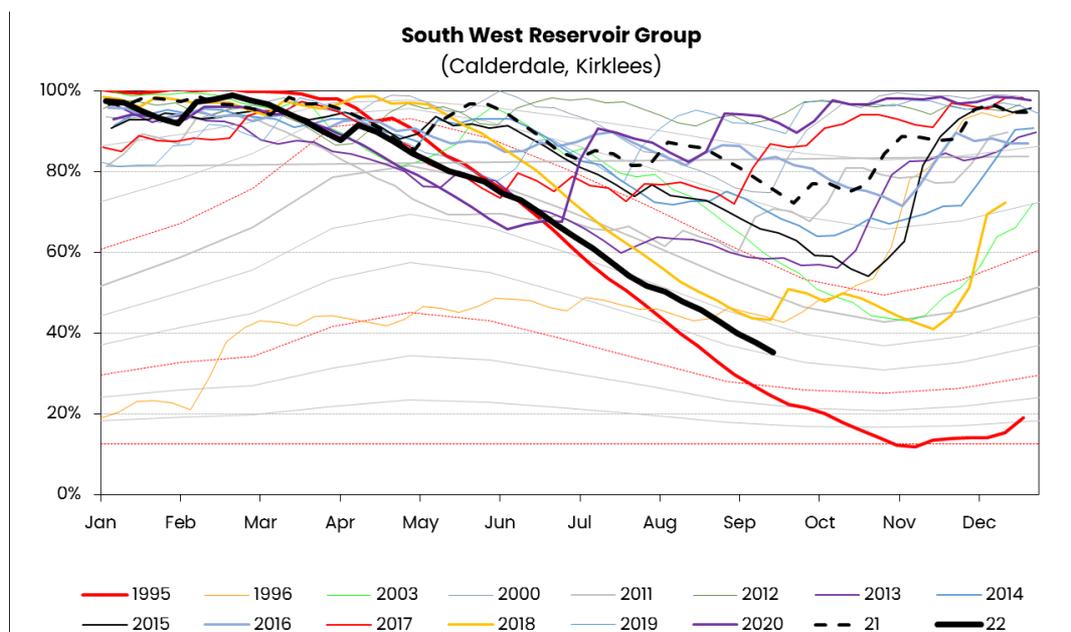


Figure 3.5 – South West Area Reservoir stocks

Figure 3.5 shows the stocks for the South West Reservoir group. Abstractions from the River Ouse can be transferred to this area via Brayton and Womersley pumping stations (after treatment at Elvington WTW).

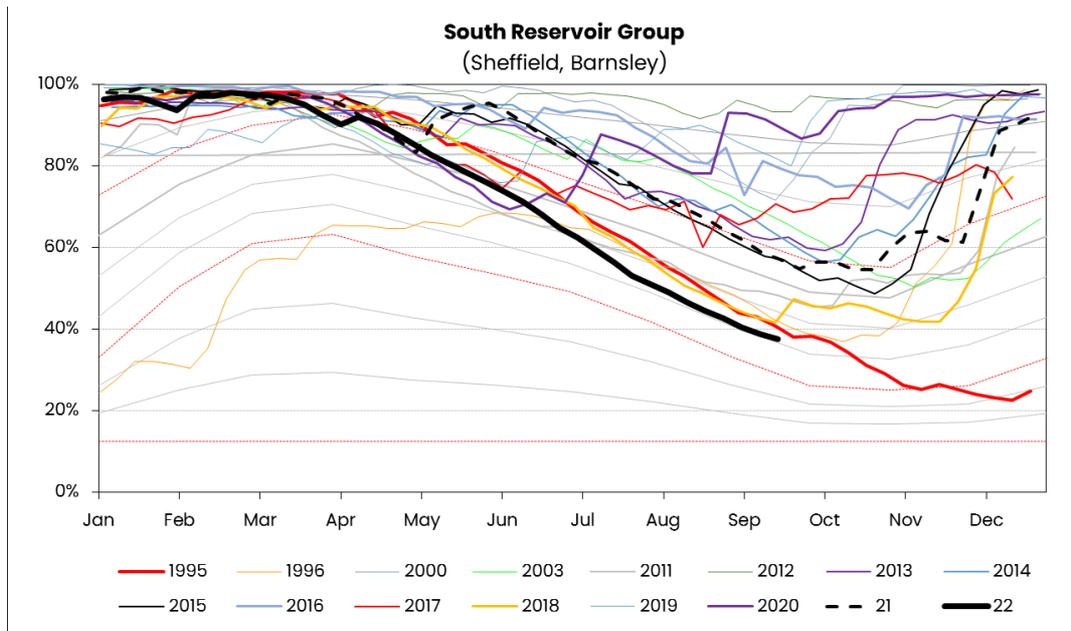


Figure 3.6 – South Area Reservoir stocks

Reservoir stocks in the South Group are shown in Figure 3.6. This area can be supplied by the River Ouse abstractions via Elvington WTW and Grid pumping stations.

Figure 3.7 shows the stocks for the East group, which is predominately made up of the Hull Boreholes, which we model as a reservoir. Hull is supplied by the Hull Borehole Group and River Hull abstractions at Tophill Low and can be indirectly supported by abstractions from the River Ouse, as a transfer from Moor Monkton to Elvington allows a reduction in abstraction at Elvington, leaving more water available in the River Derwent for abstraction at Loftsme Bridge which can also supply the Hull area.

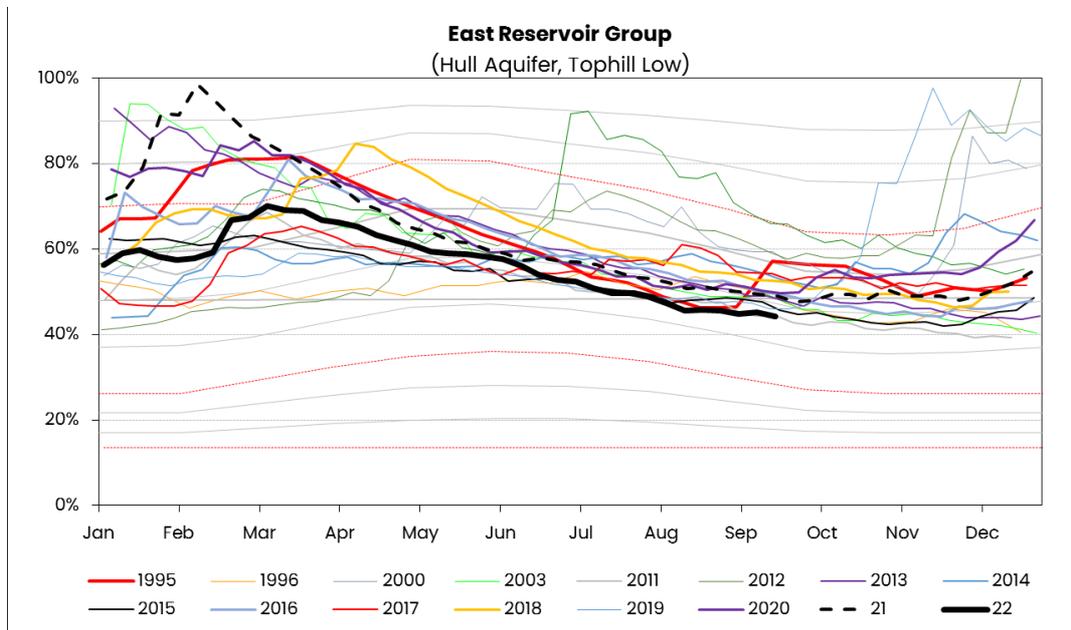


Figure 3.7 –East Group stocks

We have shown regional stocks and area stocks for all five of our operating areas in our Grid Resource Zone, as they can all be supported either directly or indirectly by our abstraction from the River Ouse at Moor Monkton.

3.6. River Flows

The graph below shows flows for the River Ouse gauge at Skelton and for our abstractions. It shows that when stocks fell below the normal control line at the end of March, we increased our abstractions from about 71MI/d up to about 85MI/d. We would usually have increased abstractions further, but an inverter failure on a pump at Moor Monkton No.1 pumping station meant we were unable to abstract the maximum 125MI/d to Eccup. This pump remained unavailable until late June due to the long lead in times associated with the import of spare parts from outside of the UK. This resulted in a loss of approximately 2,600MI, equivalent to about 1.4% of regional reservoir stocks. This means that this pump failure may have brought forward the time we have hit triggers by 1 week. We would still need to apply for a drought order to increase allowed abstractions even if this pump failure had not occurred. River flows fell below the 650MI/d threshold in mid June, but when they increased briefly in early July, abstractions were maximised. At the end of July, and for periods in August and September river flows have increased again following some rainfall, and abstractions were again maximised, as shown in Figure 3.8 below.

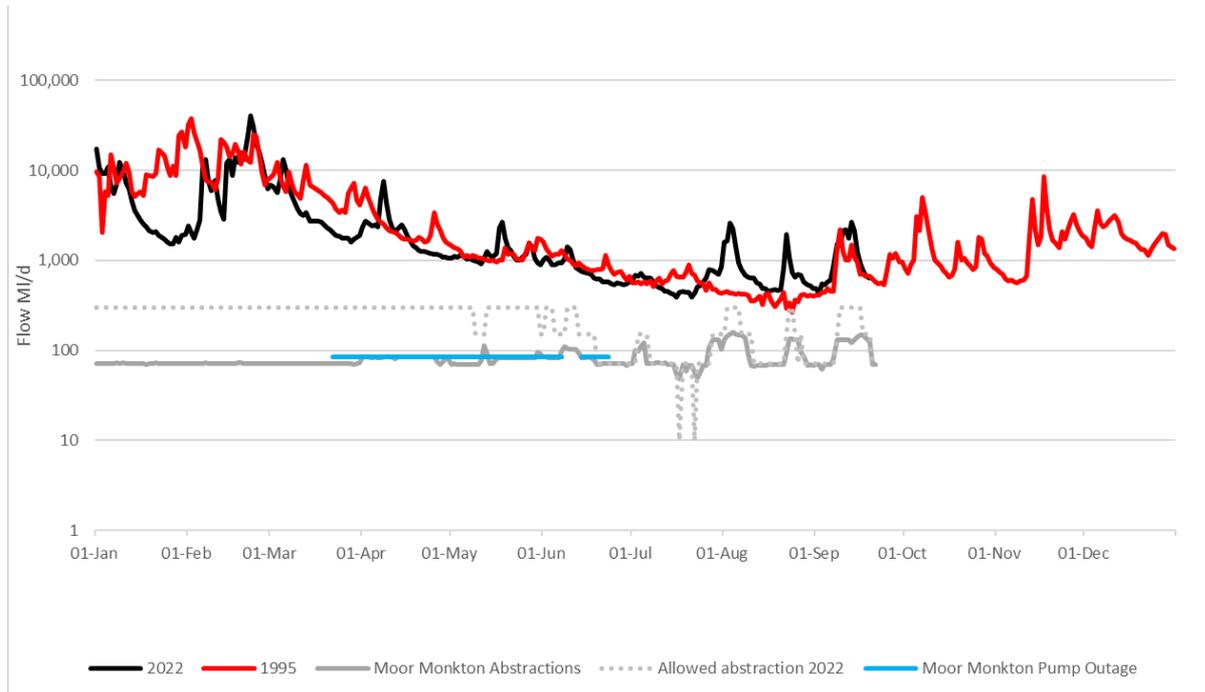


Figure 3.8 –River Ouse Flows and abstractions

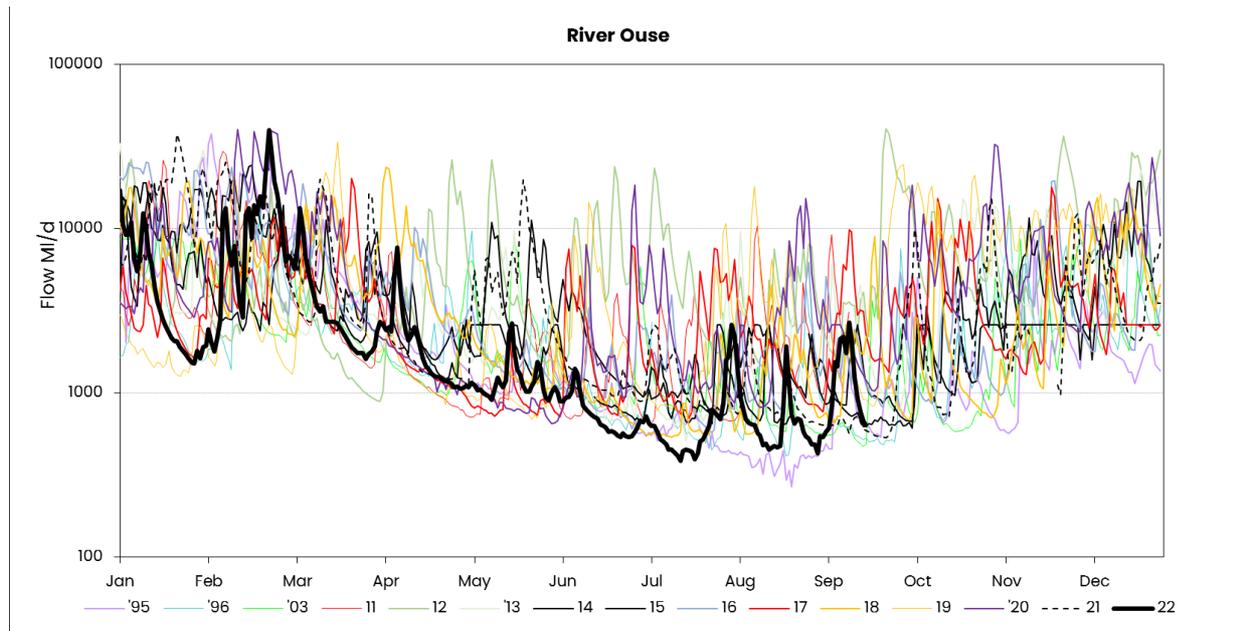


Figure 3.9 : River Ouse flows graph from WATSIT report

The graph of river flows from our WATSIT report shows that flows on the River Ouse have been lower in periods during June and July than in any other year since 1995.

3.7. The effects of the current water shortage

The current water supply situation is a result of the exceptional shortage of rainfall described in the associated report (Exceptional Shortage of Rainfall evidence) submitted with this application. As well as this exceptional shortage of rain, the situation has been exacerbated by exceptionally high temperatures, which resulted in very high demand for water during summer 2022 (demonstrated in Sections 3.11). Reservoir stocks are depleted and to reduce the risk to supplies and the environment, we are preparing for the possibility of continued dry weather by taking actions in line with our drought plan. There are specific hot-spots (e.g. Worth Valley, in the North West group), where stock levels are declining more rapidly than the average regional level and this has resulted in higher levels of risk which are a cause for increased concern.

Throughout the summer we have continually modelled and monitored our water resources situation, including estimates of the likely dates that temporary use bans (TUBs) and drought permit/order triggers could have been crossed. Since early June our modelling has consistently shown that if we had a repeat of 1995/96 inflows, we would expect to cross TUBs triggers in late August or early September 2022, and drought permit/order triggers (our drought control line) regionally in the winter. Although our modelling shows that in most scenarios these permits/orders will not be required, the fact that the rainfall patterns for 2022 are similar to those in 1995 and the rainfall quantities for the January to July period have been similar, means that we need to plan for this worst-case scenario (worst-case being a repeat of the 1995–96 inflows, or a more adverse situation than that).

We have operated according to the high-level strategy outlined in our drought plan, increasing the use of river sources as reservoir stocks fell through control lines. The continued low reservoir stocks have led us to plan for this order to increase the amount of allowed abstraction we can take at Moor Monkton when river flows are below 1000MI/d.

The potential threat to water supplies is a direct result of the weather conditions during this spring and summer. The threat will only occur if the conditions continue to be dry, or if we experience a prolonged period of high demands. We have acted in line with our drought plan triggers, preparing for TUBs in the summer when models suggested they would be required, and implementing TUBs from 26th August 2022.

We have modelled many scenarios for both inflows and demands and selected the permits/orders which we think will give the most benefit and put us in the best position we can be for winter 2022 and for 2023 if the dry weather continues.

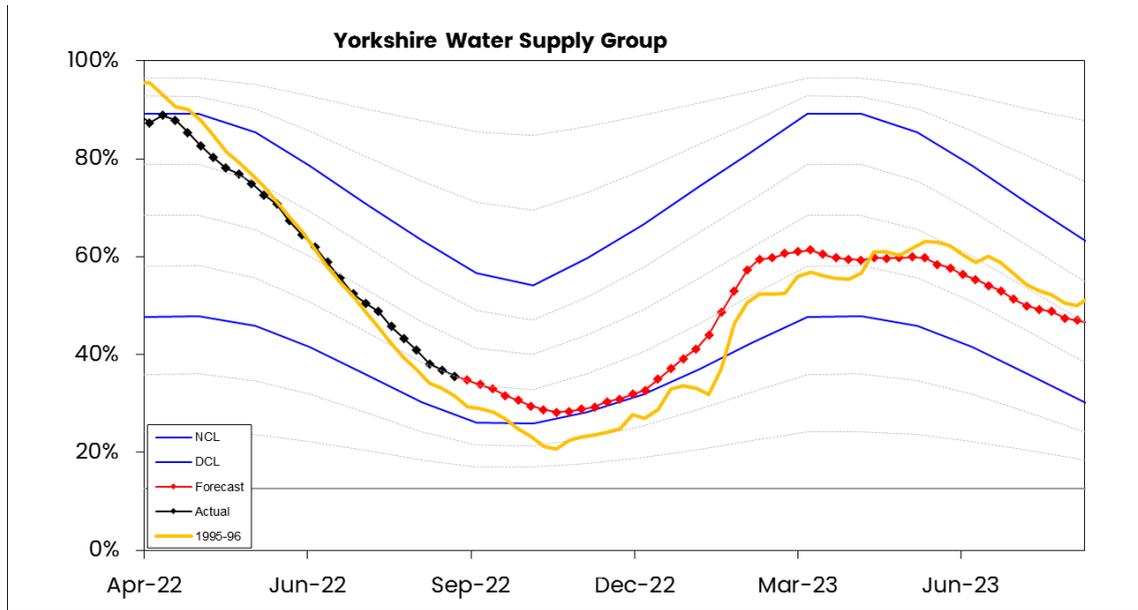


Figure 3.10: Actual and forecast Reservoir stocks

Figure 3.10 shows regional reservoir stocks as part of the output of our Water Resources Planning Report (WRPR) which we generally produce monthly during the summer but have been producing weekly this year as drought conditions have continued. We use it to forecast expected reservoir stocks based on current and future asset availability. This shows the results for a repeat of 1995/96 inflows, at an annual average demand of 1295MI/d. As well as the regional picture, we also produce graphs of area stocks, and predict WTW outputs which we use to inform our weekly production planning process. This forecast does not show regional stocks crossing the drought control line, but stocks do fall below the DCL in some areas, and some of our previous model runs showed regional stocks falling below the DCL.

3.8. Population affected by the drought order

The drought order, if granted, will alter how we operate our River Ouse at Moor Monkton abstraction which supplies water to our Grid SWZ. As this abstraction is part of our conjunctive use grid system and can be used to support (directly or indirectly) all of our five areas, the population affected by the water shortage is that of our Grid SWZ (5,316,740 for 2021/22 as estimated population from our final WRMP 2019).

3.9. Summer 2022 demand

Customer water use tends to increase in summer as a result of increased garden watering, jet washing, showering and use of paddling pools and hot tubs. In the summer of 2022, we have seen a much greater uplift in water use than in recent years.

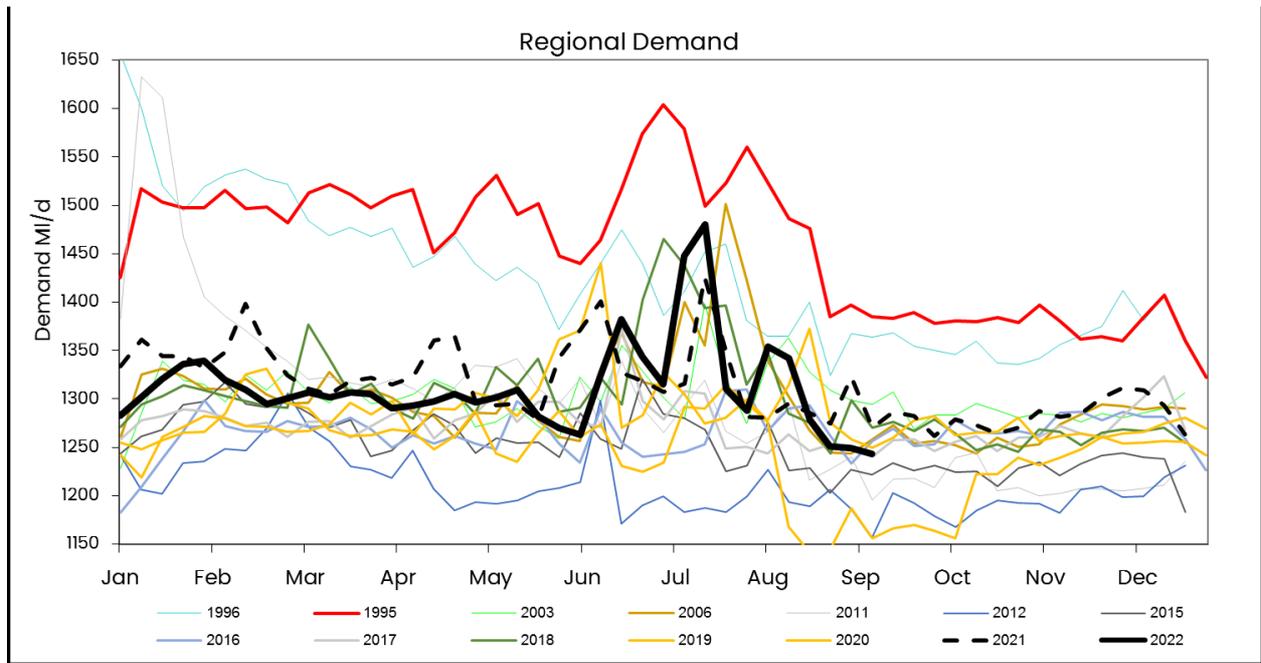


Figure 3.11: Regional Weekly Demand (from Weekly Water Situation Report)

Figure 3.11 shows the high demands experienced in 2022 compared to the preceding five years and other years selected to represent previous high demand years. This shows that in 2022 we had one of the highest weekly summer peak demands we have ever seen, except for 1996, although it should be noted that a higher proportion of the 1996 demand was due to leakage. Demand was close to levels seen in 2018, but high demand did not occur for as long. We had a weekly peak demand of 1480 MI/d in the week of 20th July, and peak day demand of 1573 MI/d on 19th July. This high demand has been driven by exceptionally high temperatures and dry weather, with the first ever Met Office Extreme Heat red weather warning issued on the 15th July 2022 for the 18th-19th July 2022. Further demand peaks occurred in August with an amber weather warning for extreme heat from 11th-14th August.

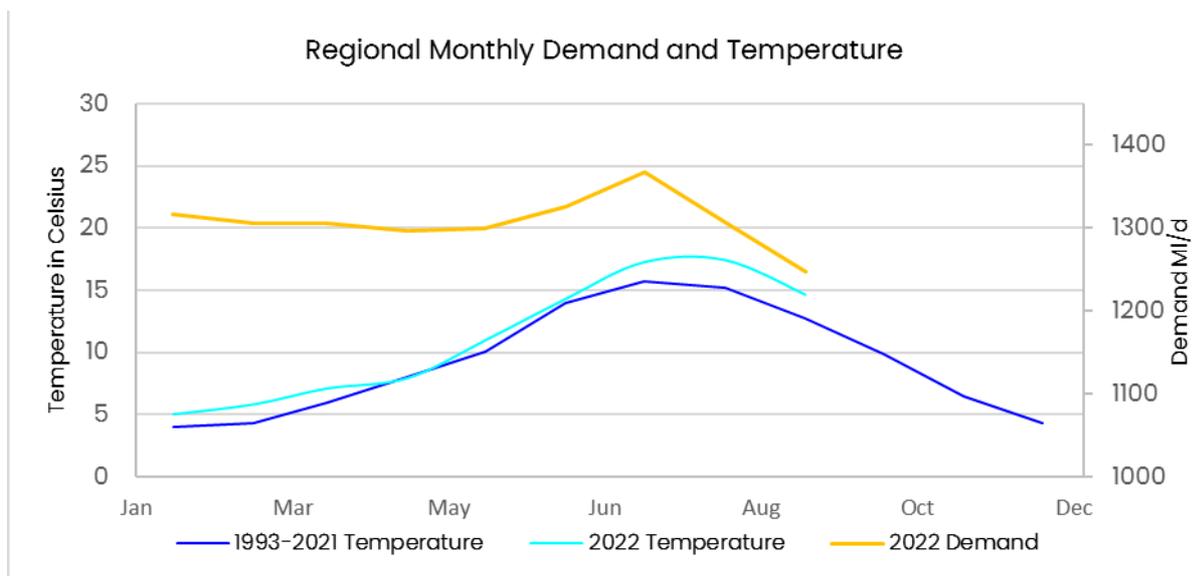


Figure 3.12: Regional Monthly 2022 Demand and Temperature

Figure 3.12 shows monthly 2022 regional demand plotted alongside monthly average temperatures (calculated from weekly MORECS data), for the 1993–2021 average and for 2022. The peak demand in July corresponds to the far higher than average temperatures.

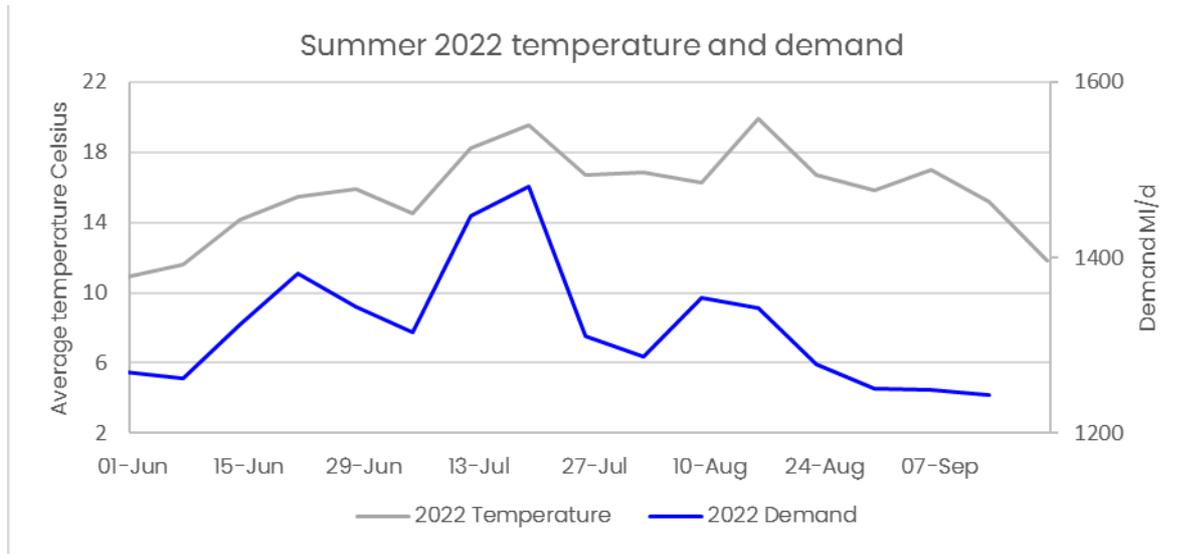


Figure 3.13 Relationship between average temperature and demand

Figure 3.13 shows weekly regional demand plotted alongside average weekly temperature, and Figure 3.14 shows weekly 2022 regional demand plotted alongside average weekly sunshine hours. Both show that demand increases in relation to high temperatures and longer sunshine hours.

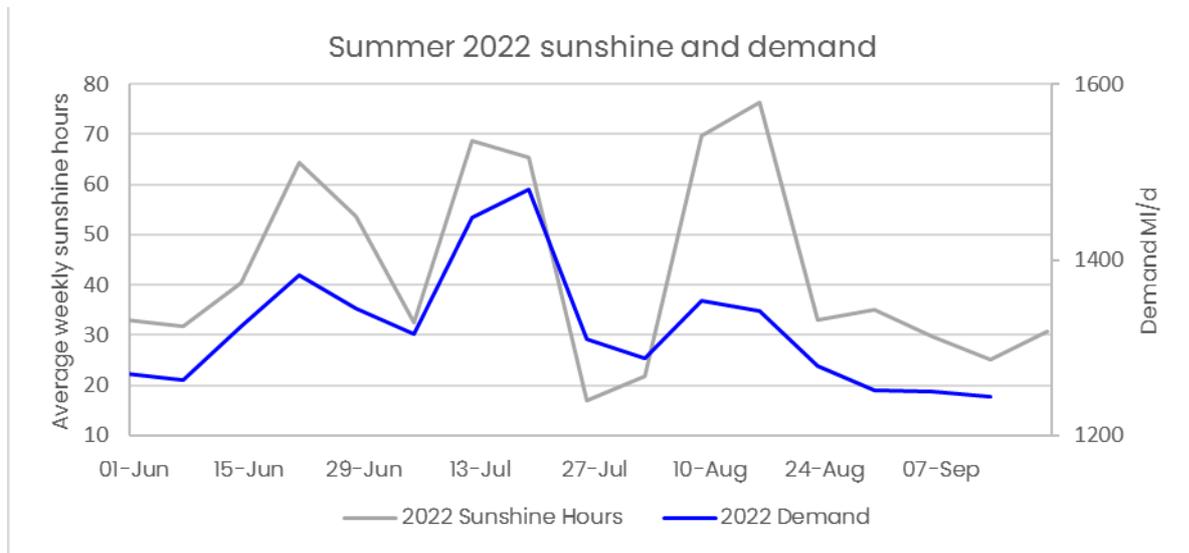


Figure 3.14 Relationship between average hours sunshine and demand

3.10. Leakage control

In the reporting year 2021-22 leakage was 283.08 MI/d which overachieved the Ofwat in year target of 286.3 MI/d this was a reduction of 7.9% in the AMP against the target of 7.4% after year 2. In years such as 1995-6 and 2017-18 when demand levels were higher leakage levels were also significantly higher at 535 MI/d in 1995-6 and 323 MI/d (when using modern leakage reporting methodology). The introduction of mandatory leakage targets, and significant investment in monitoring infrastructure to facilitate detection and repair, has resulted in a 47% reduction in reported leakage.

Each year we find and repair leaks on our distribution network to drive down our average daily leakage. These reductions in leakage are achieved through additional find and fix resources and new and innovative leakage detection techniques. Our regional leakage target for 2022-23 is 285.21 MI/d to hit the three-year rolling average and keep on track for a target reduction of 15% by 2025.

During hot, dry weather customer demand increases significantly, and the pattern of customer demand changes, making it much harder to determine where leakage is occurring and where increasing flows are due to leaks or increased customer demand. This summer we have experienced increased breakout of leaks as during hot, dry weather, ground movement increases causing our pipes to burst. In a normal year ground movement causes about half of our leaks, but the change in soil moisture this year is unprecedented, and the number of burst mains has increased by 33%.

We started this financial year ahead of this years' target, as shown in Figure 3.15, having overachieved during the mild winter of 2021-22. Our additional leakage activity reduced leakage to planned low levels after the normal winter peak by the middle of June. However, we saw an increase of 25MI/d at the beginning of July due to the extremely hot and dry weather spell which put pressure on the Water Network due to high demand and low soil moisture. Our current leakage figure (which relies on some in-year projections) is 286.34 MI/d, which is above our business plan due to the extreme weather but reducing and still within parameters to hit the year end regulatory target.

Figure 3.16 illustrates our regional DMA leakage for the same period, reported by number of DMAs with increasing and decreasing leakage in each month. We would expect the number of DMAs with reducing trends to consistently higher than the number increasing. The impact on the hot weather can be observed in July in particular where more DMAs increased than decreased.

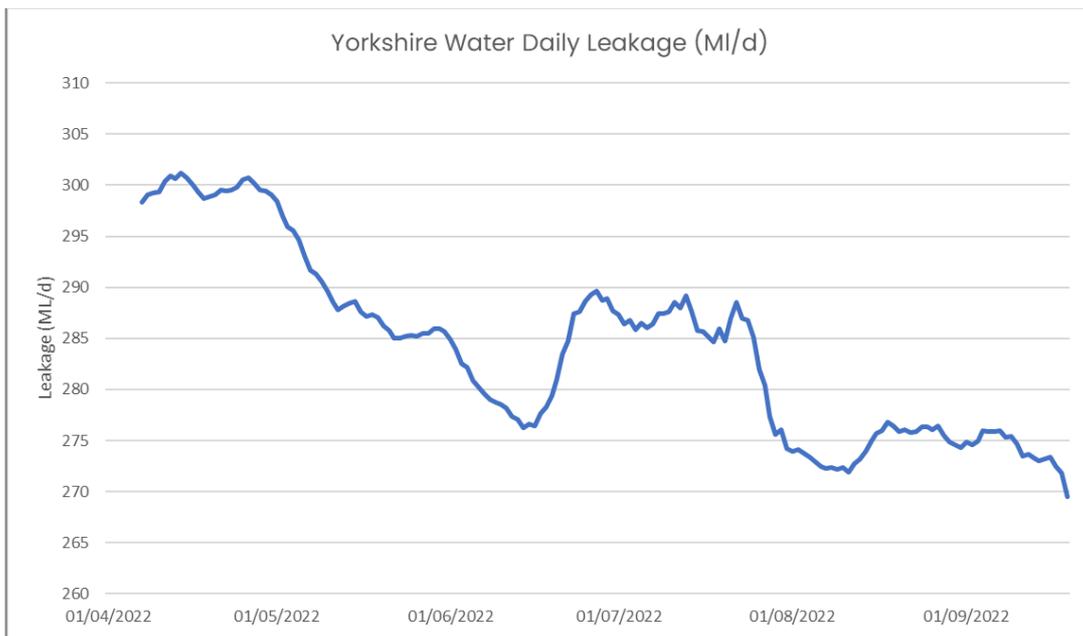


Figure 3.15 – Yorkshire Water Daily Leakage Reported Leakage

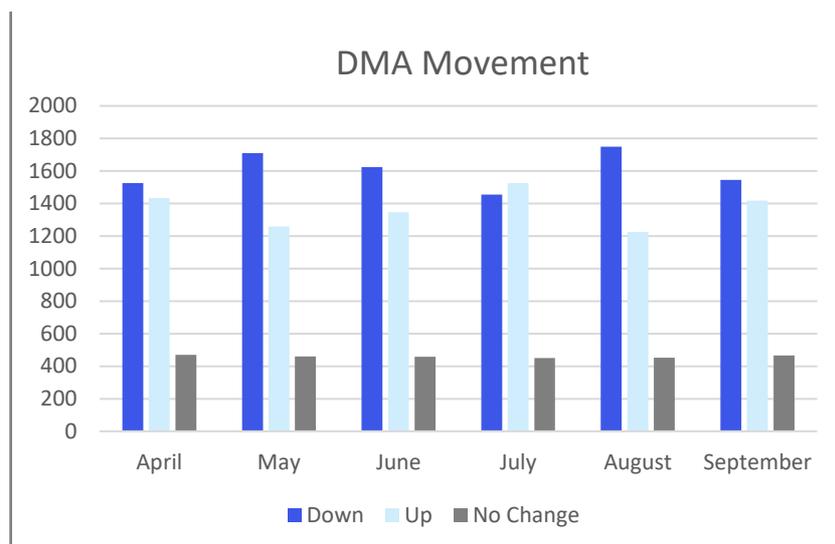


Figure 3.16 – DMA leakage trend (number of DMAs with decreasing and increasing leakage by month)

3.11. Demand on the affected water source

Table 3.3 shows demand volume in the Yorkshire Water region divided into forecasting zones. All zones can be supplied by the River Ouse at Moor Monkton either directly or indirectly, but the primary ones directly linked to this abstraction are shown in bold.

Yorkshire Water Forecasting Zones	Area	Demand in Zone (14th Sept 2022) MI/d
Leeds, Harrogate and Dales	North/Central	232
Sheffield	South	258
Bradford & Skipton	North West	169
Calderdale & Wakefield	South West	215
Hull	East	155
Malton, York, Doncaster, Selby	Grid and groundwater	214
Regional	Regional	1244

Table 3.3: Weekly Water Demand

The Yorkshire region is divided into forecasting zones (FCZ) for assessing demand. FCZs group parts of Yorkshire by the water treatment works which are most commonly used to meet their demand. The FCZs are not discrete areas and connections within the grid system allow water to be imported and exported between FCZs. Current and historical regional demand is shown in Figure 3.11. It shows the high demands experienced in 2022 compared to previous years including years selected to represent previous high demand years. This shows the peak demands have been high, and we have had some of the highest daily peaks we have seen. These high demands have been driven by exceptionally high

temperatures and dry weather in a series of heatwaves, including record breaking temperatures in July.

The Grid water network in the Grid SWZ utilises Elvington and Loftsme Bridge WTWs in the East and Chellow Heights WTW in Bradford to support the local supply sources in the Yorkshire region. Elvington and Loftsme Bridge WTW take water from the Rivers Derwent and Ouse, which is then transferred via the Grid network of pipelines across Yorkshire. Grid sources are currently being maximised to conserve reservoir stocks where possible across the region. Table 3.4 shows the water treatment works outputs supplying the Yorkshire Grid.

WTW	Current Output to Grid MI/d (11-15 August 2022)	Main Sources
Elvington	191	River Derwent at Elvington and River Ouse at Moor Monkton
Loftsme Bridge	63	River Derwent at Loftsme Bridge
Chellow Heights	136	Nidd Barden and Grimwith Group and Thornton Group and River Wharfe at Lobwood

Table 3.4: Grid Water Treatment Works

Graphs showing current and historical regional demands are included in Section 3.9. These graphs clearly show the high demands experienced in 2022 compared to previous years including years selected to represent previous high demand years. This shows the peak demands have been high, and we have had some of the highest daily peaks we have seen. These high demands have been driven by exceptionally high temperatures and dry weather in a series of heatwaves, including record breaking temperatures in July. In order to meet these exceptionally high demands, additional use of both reservoir stocks and river abstractions was required. This drought order, if granted, will allow for more water to be abstracted from the River Ouse through autumn 2022 and winter 2022/23, helping to protect remaining reservoir stocks and improve the chances of recharge after rainfall.

3.12. Drought order alternatives considered

We have so far managed the situation by promotion of water saving to customers, maximising leakage reduction activity and maximising our river abstractions where possible to conserve reservoir stocks. We have increased abstractions on the River Ouse, the River Derwent, and the River Ure, as well as at Arthington and Lobwood on the River Wharfe when river flows have allowed. River flows have been low for the time of year for much of the time, so our allowed abstractions have been limited.

All reservoir fed water treatment works have been minimised and the Grid has operated at higher flow rates for long periods.

Additional staffing and standby provision have been employed across all areas of Yorkshire to ensure that any interruptions due to mechanical failures are resolved as soon as possible.

We are also applying for drought permits to increase allowed abstraction below the hands-off flow for the River Ure, and to reduce the regulating release in the lowest flow band for abstractions from the River Wharfe at Lobwood.

We have followed the steps in our Drought Plan 2022 and are applying for these permits and orders in order to preserve stocks as much as possible in anticipation of an event worse than one we have experienced before. We believe applying for this order, and the others listed in Section 6.0 is the best course of action at this point in time. It will allow us to increase the amount of water we take from the

River Ouse, thereby conserving reservoir stocks and increasing the amount of time that reservoirs can provide water for compensation flows to rivers and public water supply.

3.13. Consequences if the drought order is not granted

We have considered not applying for this order, and our modelling of past events shows that we could maintain supplies through our historic droughts without permits or orders. However, in that scenario our reservoir stocks would be reduced, and since we have started with lower reservoir stocks than at the equivalent time in other droughts, there would be real risks to supply if we did not obtain this drought order.

The granting of this order will provide additional support to our grid, conserving reservoir stocks and providing additional resources to areas that are currently stressed.

If we had a repeat of 1995 inflows, with this order in place, reservoir stocks in our supply reservoirs could be increased by 3% regionally, if river flows are in the lower flow bands for 50% of the time, and far more if river flows are in lower bands for more of the time. The actual benefit of the drought order would depend on river flows and reservoir inflows during the period, and how much and where reservoir stocks had recovered.

If this order is granted, we will be able to manage our system in a more resilient way, allowing increased river abstractions and reduced reservoir abstractions if conditions require it. If this order is not granted (or the decision to grant it occurs too late for us to manage supplies as if it were granted), we will have to operate according to the current licence conditions, and this may result in the overdrawing of reservoirs.

4.0 Actions taken to reduce demand and conserve supplies

Promoting water efficiency to our customers is part of our day-to-day operations during all weather conditions. In line with our Drought Plan we implemented additional demand management actions in response to crossing drought triggers in 2022. Demand reduction helps us conserve supplies for later in the year if the situation does not return to normal. At the same time, we constantly review our raw water resources to make best use of the water available to us. Wherever possible, we operate to conserve supplies that can be stored for use later in the year by reducing the use of reservoirs and increasing the use of river abstractions.

Customer-use demand reduction actions are implemented in response to crossing drought control lines using a phased approach. This starts with appeals for voluntary reductions in use, escalating to imposing temporary use bans then applying for a drought order to restrict non-essential use. In 2022 lower than normal reservoir stocks triggered the need for appeals for voluntary reductions, and we are planning to impose Temporary Use Restrictions on the 26th of August.

In February 2022, our regional reservoir stocks were above 95% and we started the spring in a good position, with many reservoirs full. At this time, we were implementing our normal water efficiency measures and preparing for our annual summer campaign. We have had below average rainfall since March, and reservoir stocks have decreased steadily, with only 1 week at the start of April showing an increase.

High temperatures in June led to peaks in demand of 1413 and 1434 ML/d on the 17th and 22nd July, respectively. Further high temperatures in July led to demands of 1505ML/d and 1573 on the 11th and 19th of July. These July peaks occurred at a time of a heatwave and the first ever Met Office Extreme Heat red weather warning.

As a result of the peak demand and lower than average rainfall, reservoir stocks reduced to lower than average levels, and we crossed our normal control line and early warning Environment Agency control line. In line with our Drought Plan we implemented demand management actions to reduce demand and conserve available water resources in response to crossing these triggers.

The following sections list the actions we carried in response to crossing control lines. A timeline of the customer communications appealing for reductions in water use during 2022 is provided in Appendix 1. This provides a breakdown of the measures we used to raise awareness of the heightened need to use water wisely in our region and the number of customers exposed to the messages (the reach).

4.1 Demand management during normal operating conditions

During normal operating conditions, the Yorkshire Water website provides water saving information and a link for customers to order free water saving packs. It includes a page dedicated to water resource management where our current Drought Plan and Water Resource Management Plan (WRMP) are available to download.

We have education centres at several of our sites (Headingley WTW, Ewden WTW, Tophill Low Nature Reserve) and a Living with Water Learning Lab hosted by Wilberforce College (Hull), which schools and other groups can arrange to visit. We cover a range of topics including the water cycle and water conservation during the sessions, alongside other themes such as flooding, wastewater education and water safety. We also offer an outreach programme and virtual live assemblies. Our website offers our green classroom pack for teachers to download. These lesson packs provide educational material on the water cycle and the importance of water conservation.

Each summer the Yorkshire Water Brand and Communications Team delivers a water efficiency campaign, which educates customers on ways to save water in their homes and gardens and encourages customers to find out more information about water conservation via the Yorkshire Water website. This typically involves a media plan of activity such as 'paid for' social media advertising, digital display ads, a detailed content plan for organic social activity and customer emails, along with a mixture of other paid for advertising such as: radio (traditional and digital), press, digital out of home

adverts and TV advertising. The Communications team also ensure there is a presence at large events in the region, this year sponsoring The Great Yorkshire Show and having a stand dedicated to Water conservation messages to engage and educate customers of all ages about water conservation.

We also teamed up with local radio stations to deliver 'on the street' events in four busy town centres during the summer holidays (Leeds, Hull, Sheffield, and York) this gave us the opportunity to talk to customers face to face about ways to save water and answer any questions or concerns they have about water conservation, droughts, hosepipe bans etc. There is also a media plan of pro-active press office activity, including: joint press releases with other partners, paid for editorials in local newspapers and a PR campaign that works with social media influencers to recommend water saving tips and advice. Included in the Communications plan is a content plan for colleagues within the business as well as promotional material for the retail team to share with non-household customers to encourage them to improve water efficiency.

This year's campaign was developed from the insight and learning we gained following 2018, after carrying out research on customer's views on water efficiency and TUBs. The research that we conducted, told us that customers were more likely to get on board with messaging and change their behaviours when the advice feels achievable, and they can understand why there is a need for change. The research also showed for some segments of customers, a financial benefit is more likely to make them change too. We also had to take into consideration the current external climate and other financial or personal challenges that many of our customers might be facing. Having this in mind helped us develop the 'Use Less. Save more' campaign, in which we crafted messaging and creative that speaks to customers in the right tone of voice, feels relatable and includes enough of the 'why' (explaining why we need to save water) as well as practical, achievable tips that most people can apply in their everyday lives. Some of the more dynamic channels in our media plan, such as social and digital advertising allow the flexibility to be able to switch the messaging on ads depending on the weather, for instance: we have referred to 'There's not been much rain lately' or 'No need to water the lawn, there's been a bit of rain.' This was to help customers understand the link between rainfall, the impact on our reservoir levels and how they can help.

Our communications to customers during the hot, dry weather this year has been at a regional level aimed at targeting all Yorkshire Water customers. The River Ouse abstraction at Moor Monkton provides additional supply to the operating areas in our Grid SWZ and in line with our Drought Plan we implement water saving messages at a zonal level.

4.2. Metering

The number of domestic customers in the Yorkshire Water supply area receiving water via a metered supply is currently 58%. Most commercial properties are metered, with the exception being some small water users where metering is not practical. All new build properties receive a metered supply and unmetered households can opt to have a meter installed free of charge. The Yorkshire Water region is not classified by the Environment Agency as a severely water stressed area, therefore we are not able to compulsory install meters in domestic customers' properties.

We promote metering to our customers as a means of saving water and money. We are transparent on all unmeasured bills, showing the comparative metered costs to all customers. This allows customers to make informed decisions as to whether a meter is right for them. Demand for meters was impacted through COVID and is yet to return to expected volumes, although we have seen an increase. We believe this slow return to be due to the current financial crisis meaning customers prefer guaranteed bills. We anticipate an additional 25,000 customers to opt-in to a meter this year through our promotion in bills.

We have an extensive partnership network to help increase our reach to customers experiencing affordability challenges. We plan to continue to utilise this network in understanding where a meter could reduce charges for customers and continue with other forms of support to vulnerable customers.

4.3. Leakage reduction activity

Enhanced leakage reduction is included as a drought option in our Drought Plan for implementation when reservoir stocks are predicted to be 10 weeks from crossing the drought control line. We retained an increased number of leakage inspectors since the escalation of 2018 to meet our 2025 leakage target. This year we have employed additional resources to fix leaks and bursts in our region. This additional activity includes a new 'Smart Leakage Team' to support leakage reduction through the integration of 'smart technology' in our networks. As the River Ouse at Moor Monkton abstraction is inherently a part of our grid network, it is appropriate to summarise the enhanced leakage reduction activity relevant to this drought order application at a regional level, because the regional activity helps to reduce demand on the systems supplied from this abstraction. Enhanced leakage activities that we have carried out across the region include:

- Overtime, including 7-day working, for leakage inspectors, support staff and field technicians.
- Additional personnel fixing leaks - We had 56 contractor teams (112 people) on primary leakage work in July 2022. This is a 25% increase on the 45 teams (90 people) we had in July 2021, despite the workbasket being 25% lower this year.
- We have found and fixed 10,968 leaks in the first 4 months of this financial year.
- 295 Pressure Reducing Valves (PRVs) maintained and or optimised in the last 4 weeks to reduce bursts and leakage.
- We have repaired or renewed 2,000 customers' leaking supply pipes to help our customers tackle their leakage.
- We have dedicated teams to find leaks on trunk mains - using satellites in rural areas where leaks are more difficult to identify.
- We have optimised our fleet of 38,000 acoustic loggers to more quickly and efficiently find and fix breakout leakage.
- We are utilising a live hydraulic model across several of our most challenging leakage areas to understand underlying causes of network performance. The hydraulic model solution aims to reduce leakage in these areas to their lowest ever level.

4.4. Trigger: Reservoirs crossed our normal control line

We meet customer demand through use of our licensed water resources, which include reservoir, river and groundwater supplies. In most years, we have sufficient rainfall to balance our resources to ensure regional reservoir stocks remain above the normal control line. If the normal control line is crossed it is a trigger for us to review our operations and identify where the use of river supplies can be increased in preference to reservoir supplies. This conserves reservoir stocks during periods of low rainfall.

In 2022 regional reservoir stocks crossed the normal control line on 28th March 2022. In response to this we reduced our use of reservoir supplies in our Grid SWZ and increased our use of river and groundwater abstractions to meet demand. This included increased abstraction from the River Derwent at Loftsome Bridge to reduce abstraction from reservoirs across our region. Although regional stocks crossed the NCL on 28th March, the NCL for individual reservoirs and groups was crossed at different times. Our operating strategy is to try to balance the rate of fall of reservoirs as much as possible to ensure a balanced risk across the region.

All year, free water saving packs are available for customers to order through the Yorkshire Water website. Our Communications Team started to talk to our customers about water saving in April, followed by advertising using social medial channels and our website in May.

4.5. Trigger: Reservoirs crossed Environment Agency early warning trigger line

Regional reservoir stocks reached the Environment Agency early warning trigger on 23rd May 2022, and we started implementation of our drought communications plan. At this stage, our region was not considered to be in drought and this trigger ensures we start implementing actions early to lessen the impacts if the situation worsens.

In reaction to the dry weather and elevated temperatures our 'Use Less. Save More.' customer education campaign was heightened to raise awareness of the lack of rainfall, increasing demand and the heightened importance for reducing water use. The messages for the campaign have escalated since commencement in April 2022, in line with our triggers, demonstrating to customers the reasons why they need to use water carefully, whilst also highlighting how.

By changing the artwork and messages in media promotions we were aiming to keep customers' engaged, helping them understand the escalating reasons why we need their support and reiterate the water saving message.

The actions included:

- Raising awareness of the developing situation, such as increased demand due to high temperatures and declining water stocks due to low rainfall.
- Promoting the importance of reducing demand for water in our region and requesting customers to make voluntary reductions in water use.
- Promoting our free retrofit devices and tips on how to save water.
- Requesting customers to report any leaks or bursts in our region.
- As part of our advertising for our priority services we asked any customer who needed extra care, support or are vulnerable during the hot weather to contact us.
- Our Wholesale Service Desk opened discussions with retailers and in collaboration with Water UK and other water companies provided advice to commercial users on saving water. This was made available through our website and proactively highlighted to Retailers by email and the 'Retailer Portal.'
- Liaised with retailers and commercial water users on any changes to water services such as re-routing supplies, which can impact on the products or processes of commercial users.
- Free flushsaver devices offered to commercial water users on our website.

Information was communicated to customers through a variety of media channels. A programme of media promotions during summer 2022 and the number of customers reached is provided in Appendix 1. Social media and digital advertising offer the ability to reach a large number of customers, although only a proportion will click on the links for further detail. Radio and newspaper advertising were used to reiterate the messages and reach those customers not exposed to digital advertising; and TV advertising gets the messages to broad audiences on a highly recalled channel.

In total our paid for advertising to the end of August has created over 82 million opportunities to hear and see messaging, meaning that an average person in Yorkshire will have heard the message over 16 times.

The media channels are outlined below:

- The Yorkshire Water homepage banner focused on water saving, directs people to further water saving/hosepipe ban content. Detailed FAQ's provide strong advice and guidance.
- Any supplementary bills sent out contain a water saving advice leaflet
- And the Yorkshire Water intranet contains regular news updates and FAQ areas to keep colleagues updated on all things water saving/drought management related.
- An integrated marketing campaign has been live since the beginning of April, escalating in July with additional spend to maximise amplification of messages across multiple channels. The campaign has been live across social media advertising, radio advertising (terrestrial and digital), programmatic advertising (on relevant websites across Yorkshire), bill boards, bus advertising, ITV terrestrial TV advertising, ITV Hub, SKY Go and All4 advertising, Newspaper

advertising, YouTube, customer emails; and through customer events in major cities and the Great Yorkshire Show. Since July these have created over 30 million opportunities to hear and see our messages each month. From April – August we've created over 82 million opportunities to hear and see the messages, with more activity planned to continue into the Autumn/Winter

- Organically through our owned channels, we've had a comprehensive content plan across Facebook, Twitter, Instagram, TikTok and LinkedIn using content to create engagement
- Media coverage on everything water saving and drought management has been highly topical and since July 12th we've had 5580 pieces of coverage, with a reach of 2.5 billion; 336 of these were broadcast pieces, Yorkshire Water representatives have been interviewed for 15+ of these; and finally, we've dealt with over 336 incoming media enquiries.

In addition to heightened water saving messages, we continued to optimise operations across our Grid SWZ to preserve regional reservoir stocks;

- We maximised river abstractions where possible, but due to low river flows and asset availability this was limited at times.
- We maximised groundwater abstractions within licence constraints.
- We experienced extremely high demands most notably in late June and into July, and at times we had to maximise use of reservoirs as well as river abstractions where available. River sources and our grid system were used strategically to support each area of our Grid SWZ as much as possible and balance the drawdown of reservoirs across the region to ensure no area was unnecessarily exposed to a greater reduction in available resources.
- Normally we release approximately 10% above our required compensation flow releases, to ensure that we are meeting our statutory obligations for compensation and to take into account any inaccuracies in, for example, meter or weir readings. This summer, to help preserve reservoir stocks, we reduced this tolerance on compensation releases from 10% to 5%. This is in line with our operating strategy when the Environment Agency trigger line is crossed.

Where possible we have taken action to reduce the output of water treatment works supplied by the reservoirs and meet demand through increased use of our grid system in order to reduce the rate of draw down from the reservoirs. The actions to reduce the use of reservoir sources are explained below;

- We have maximised all river abstractions where river flows and asset availability allow.
- We have maximised abstractions on the River Ouse at Moor Monkton to Eccup and Wetherby when assets and river levels allowed.
- We have supported Leeds with treated grid water from the River Derwent abstractions, allowing Harrogate to be supported with treated water from Leeds.
- Reduction in Compensation flows to allow lower margin of tolerance above required.

4.6. Trigger: Reservoir stocks predicted to be 10 weeks from crossing the drought control line

The next trigger for implementing drought actions is when regional stocks are predicted to be 10 weeks from the drought control line. During dry periods we model reservoir stocks against forecasts of a repeat of previous droughts in our region. On the 6th of June 2022, our modelling predicted a risk of reservoir stocks reaching the 10 weeks from crossing our drought control line (4 weeks before implementing TUBs) on 1st August if we had a repeat of the 1995/96 rainfall. The modelling was repeated weekly to represent the actual demand and rainfall experienced each week. By re-modelling declining stocks each week, we were able to monitor the situation and the likelihood of meeting the 10-week trigger line. The modelled data of crossing the 10-week trigger stayed relatively constant throughout the summer, and we crossed this trigger (4 weeks before TUBs implemented) on 25th July.

We took the decision to start implementing some of the actions triggered by stocks being 10 weeks from crossing the drought control line, rather than wait until we reached this trigger. These actions were to ensure we were prepared for restrictions on use and drought permits/orders if required later in the year, and included:

- Preparation of notices, adverts and website content for temporary use bans in case needed.

- Preparation of supply side drought permit/order application templates with details on the 2022 dry period.
- Environmental assessments, including walkover surveys of potentially affected river reaches, and updating of our Environmental Assessment Reports to reflect the drought situation (see Section 6).

4.7. Trigger: Reservoir stocks predicted to be 8 weeks from crossing the drought control line

This trigger was predicted to be crossed on the 15th August in our 1st August model runs. We ramped up our drought permit application work and our TUBs preparation, and, in line with our Drought Plan process, on 12th August we advertised that TUBs would be implemented on 26th August. TUBs were duly implemented on 26th August.

Following the implementation of TUBs on 26th August 2022 we have seen an estimated 2% reduction in Distribution Input (DI) resulting in a demand reduction of 88MI/d on our network.

In the following analysis, we have compared our current DI and PCC data from June 2022 to September 2022 with the equivalent data in 2018. We have chosen 2018 as the comparative year as we experienced similar conditions to 2022, due to the hot dry summer where we issued drought permits but didn't need to enact a TUB.

Figure 4.1 shows our DI since 1st June 2022 and the reflective data in 2018, summer demand in 2018 was on average 1351MI/d which reduced to 1286MI/d in the 2 weeks following the August bank holiday resulting in a demand reduction of 65MI/d. Historic data shows that over the same period leakage reduced by 5MI/d therefore, overall demand reduction was 60MI/d in 2018.

In 2022, summer demand was on average 1343MI/d which reduced to 1248MI/d resulting in a demand reduction of 95MI/d. Over the same period in 2022 leakage reduced by 7MI/d therefore, overall demand reduction was 88MI/d.

Compared to 2018 demand in 2022 is 28MI/d lower than expected. We consider that TUBs will be a major factor in this reduction, although the slightly wetter weather, compared to the same period in 2018, will also have an impact. We have estimated a 25MI/d impact of TUBs, allowing a small drop due to weather, which is around 2% of average September/October demands.

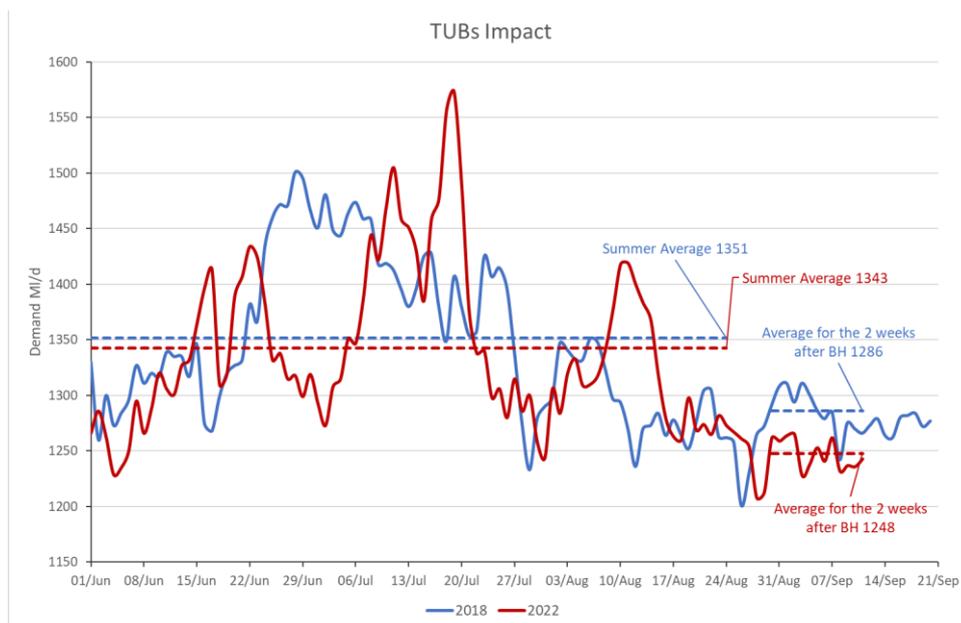


Figure 4.1: Distribution Input (DI) since 1st June 2022 to present with 2018's DI included as a comparable year

We have also seen an associated reduction in consumption based on data from our various consumption samples and monitors. For the purpose of this application, we have used PCC from our Domestic Customer Monitor (DCM) sample as this data is available daily, so we are able to see the impact that a TUB has had on this sample. Our measured household data is only obtained monthly via volumetric reads which means we don't have the granularity required to see the impact of a TUB on these households.

Figure 4.2 shows our PCC taken from a sample of circa 1000 households on our DCM sample across Yorkshire. We can see from the data that consumption in summer 2018 was on average 141 l/h/d which reduced to 126 l/h/d in the 2 weeks following the bank holiday - a reduction in consumption of 15 l/h/d. In 2022, that consumption in summer was on average 133 l/h/d which reduced to 109 l/h/d resulting in a consumption reduction of 24 l/h/d.

Compared to 2018 consumption in 2022 is 9 l/h/d lower than expected which equates to an estimated 45MI/d. TUBs are likely to be a contributing factor in this reduction. However, when analysing both DI and PCC reductions since TUBs were implemented, we also need to take into consideration other factors that can impact demand including weather conditions, customer holidays, water conservation activity and non-household consumption. These factors can all influence changes to demand and any decreases that we may see in the data.

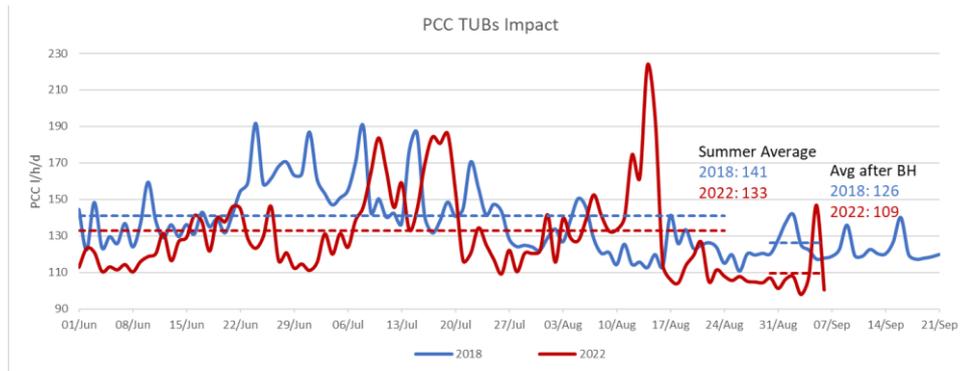


Figure 4.2: Per Capita Consumption (PCC) from our DCM sample since 1st June 2022 to present with 2018's PCC included as a comparable year

4.8. The use of sources in 2022

Due to the high demands in the summer of 2022, we have produced more treated water than in most years. This section describes source outputs this year in comparison to recent years and explains our operation of our sources this year.

Figure 4.1 shows total abstractions for the Yorkshire Water supply area, and also shows the proportion of those abstractions supplied by the different source types for the licencing years April to March. The figures for 2022/23 are based only for the period until July 2022, so do not include any additional winter demand or the usual increase in the use of reservoir sources when reservoir levels tend to be high in the winter but do include the higher summer demands to date.

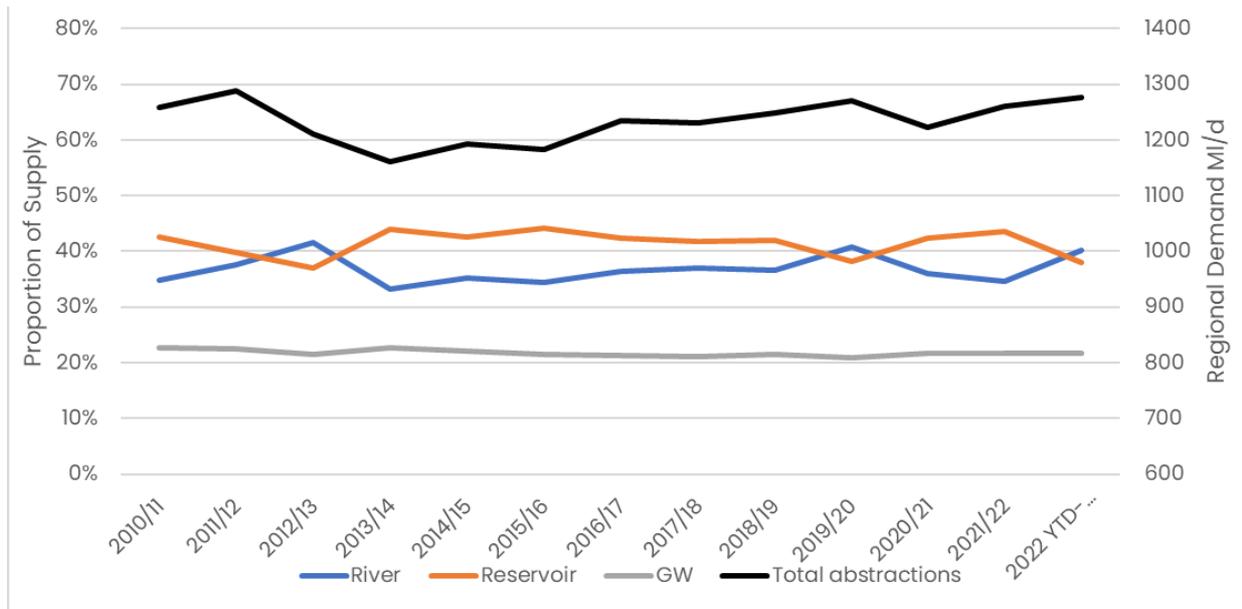


Figure 4.1: Total abstractions and proportion supplied by different source types

The figure shows that for most years the proportion of use of reservoirs is greater than that of rivers, apart from 2011/12 and 2018/19. In 2011/12 there was high water production and river use in the winters due to cold conditions and associated freeze thaw events causing increased bursts. The 2022 data shows a higher proportion of river abstractions compared to the previous wetter years, and this is likely to continue to increase as river flows increase in the autumn and winter and we maximise these sources to allow reservoirs to recover. The increased abstractions in 2020 and 2021 reflect the uplift due to the high Covid-19 demands.

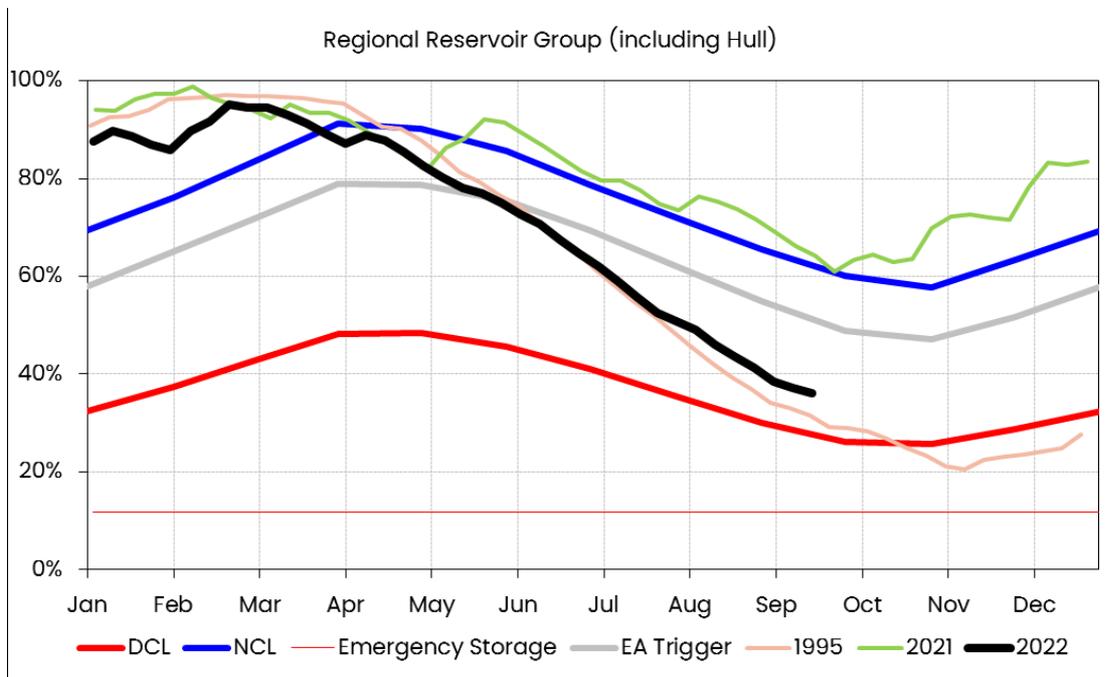


Figure 4.2: Regional Reservoir Stocks

Figure 4.2 shows regional supply reservoir stocks for 2021 and 2022. In 2021 stocks crossed the Normal Control Line in April, but significant rainfall meant that the EA Trigger was not crossed, whereas this

year, the NCL was crossed two weeks earlier, but no significant refill has been experienced. When reservoir stocks fall below the Normal Control Lines, we increase the use of river sources. The use of two key rivers that supply our 'grid' system are shown in the below figures. Figure 4.3 and Figure 4.4 show daily and cumulative abstraction from the River Derwent at Loftsome Bridge and Elvington.

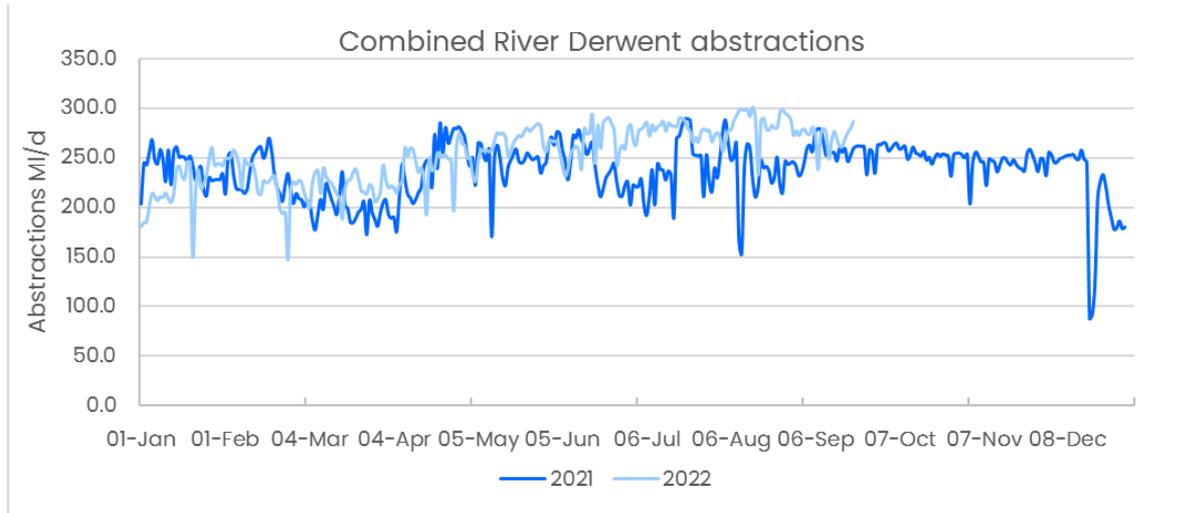


Figure 4.3: Abstractions from the River Derwent 2021 and 2022

The graph in Figure 4.3 shows the use of the abstractions on the river Derwent at Elvington and Loftsome Bridge in 2021 and 2022. They show a similar pattern of use until summer, when this year we increased our use of river sources in response to high demands and decreasing reservoir stocks. Figure 4.4 shows the cumulative abstractions in relation to the average licence and shows that this year we have used the River Derwent abstractions more than last year since early July.

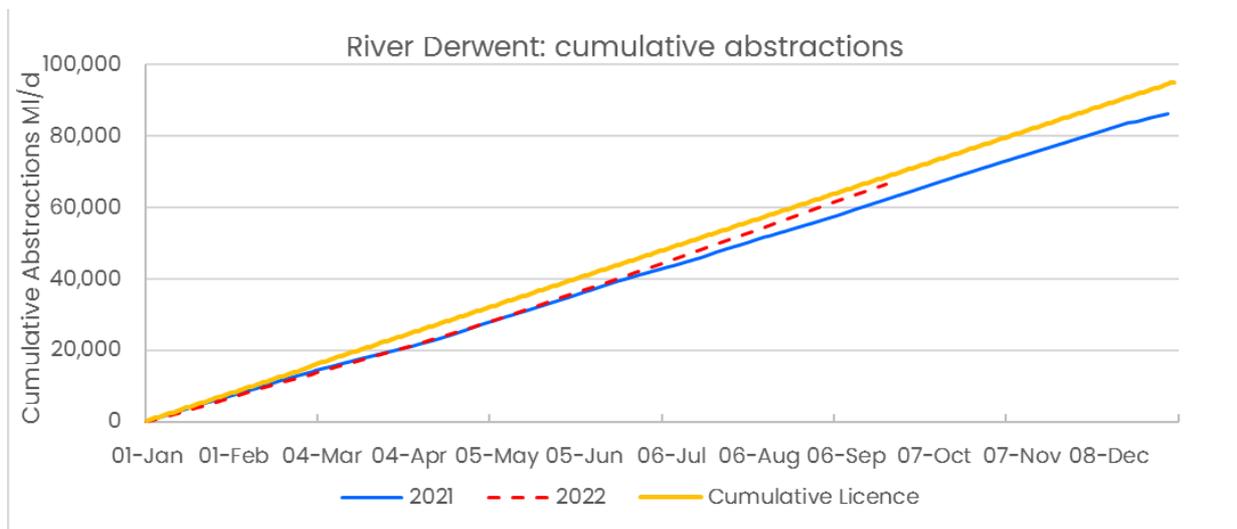


Figure 4.4: Cumulative Abstractions form the River Derwent 2021 and 2022

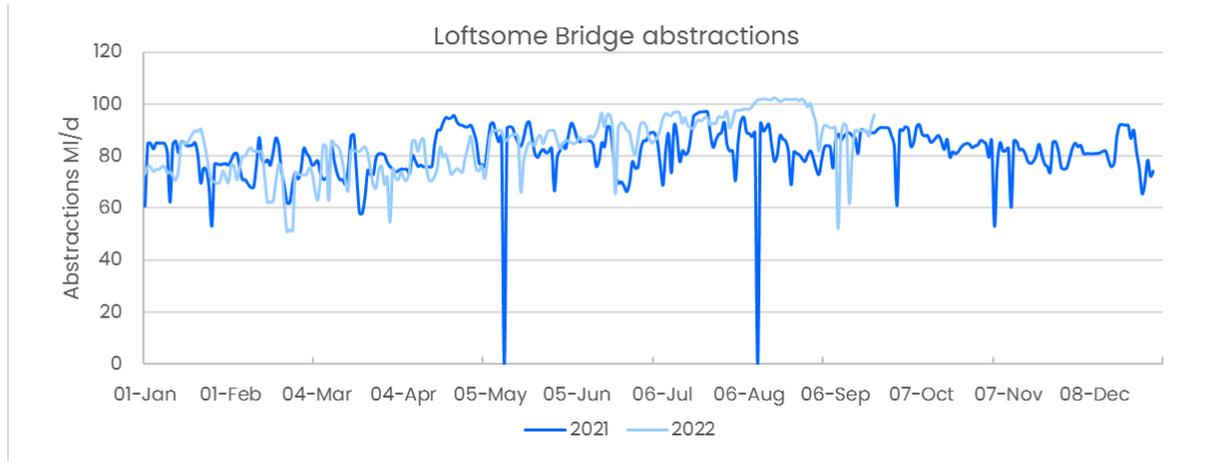


Figure 4.5: Loftsome Bridge Abstractions from the River Derwent 2021 and 2022

Figure 4.5 shows abstractions for just Loftsome Bridge on the River Derwent, and Figure 4.7 shows abstractions for just Elvington on the same river.

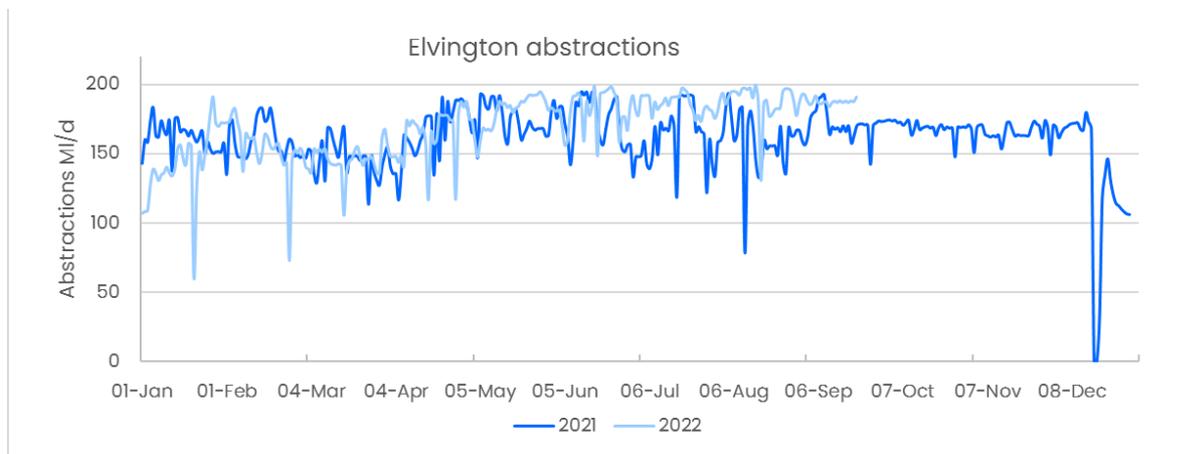


Figure 4.6: Abstractions from the River Derwent at Elvington 2021 and 2022

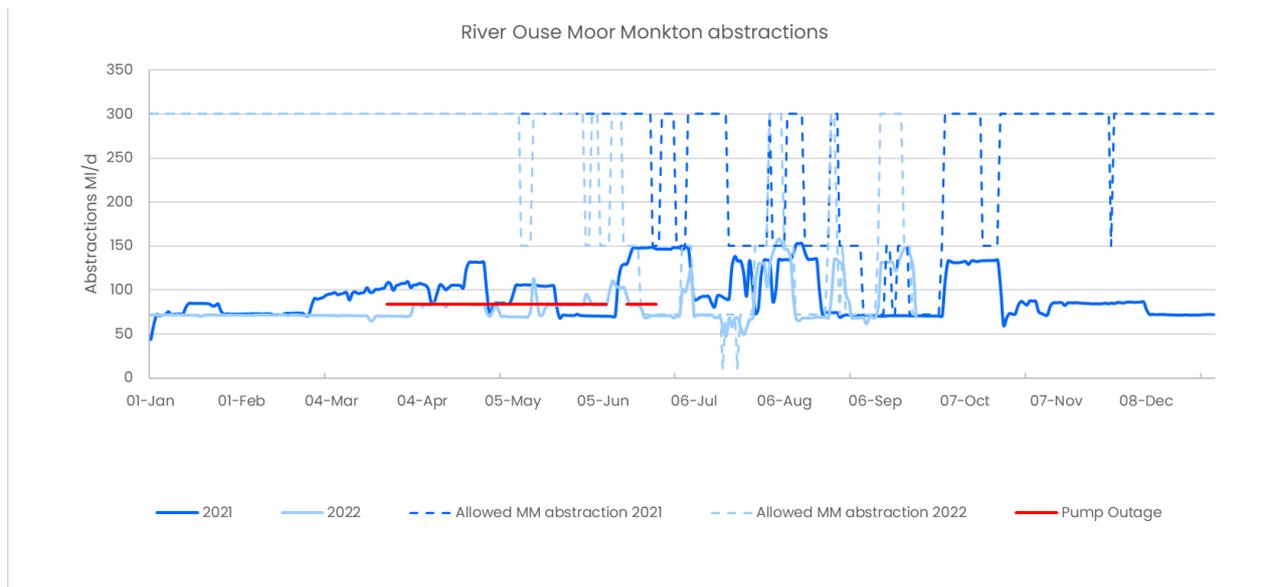


Figure 4.7: Abstractions from the River Ouse at Moor Monkton 2021 and 2022

Figure 4.7 shows the licenced and abstracted amounts for the River Ouse at Moor Monkton. We have not shown the cumulative abstraction for Moor Monkton as the allowed abstraction is dependent on the river flow, so comparisons between years is not appropriate. It shows that we have maximised the abstraction within operating constraints and requirements. In the highest flow band (at river flows above 1000Ml/d) we are licensed to abstract 300Ml/d, although the infrastructure required to abstract that volume is currently not in place. The red line shows the period when our abstraction was limited by asset availability. Before this reservoir stocks were below the normal control line, so in line with our operating policy we had not maximised the abstraction. During the period of pump unavailability we were limited to about 84Ml/d, with a few periods of higher abstractions when repairs and tests on these repairs were attempted. The pumps returned to service in late June, and were used at higher rates in early July when river flows increased, allowing higher flows to be abstracted. They have been used at about 130Ml/d whenever the river has been available. It should be noted that this graph shows the 24 hour average flow and abstraction at midnight, and that compliance is monitored on a 15 minute basis using the rolling 24 hour average flow, so on days where a flow threshold is crossed, the allowed abstraction may be different to that shown using the 24 hours at midnight.

The two pumping stations at Moor Monkton contain multiple pumps that allow us to pump water to treatment sites at Eccup No 2 WTW, Headingley WTW, Huby WTW and Elvington WTW. Pump availability at Moor Monkton was reduced in spring and early summer due to a pump failure, which initially constrained the volume of water abstracted from the river. The repair was completed in June 2022, and the pumps returned to full operation in early July when river levels recovered sufficiently to allow their use (see section 3.6).

Most of the time we only use up to 125Ml/d to Wetherby, 6Ml/d to Huby, and a sweetening flow of 5-15Ml/d to Elvington if it is required to support the River Derwent abstractions or preserve the River Derwent Licence.

5.0 Environmental impacts of drought order

During the preparation of our Drought Plan 2022, a 'shelf copy' Environmental Assessment Report (EAR) was produced for each supply side drought option or group of options. The EAR provides an independent and robust assessment of the potential environmental effects of the implementation of our drought options.

The environmental assessment was conducted in accordance with Government regulations and using the Environment Agency's 2020 Drought Plan Guideline (DPG) and the Environment Agency's July 2020 'Environmental Assessment for Water Company Drought Plans- supplementary guidance', and comprised the following components:

- an assessment of the likely changes in hydrology (flow/level regime) due to implementing the proposed drought options;
- identification of the key environmental features that are sensitive to these changes and an assessment of the likely impacts on these features;
- identification of mitigation that may be required to prevent or reduce impacts on sensitive features; and
- recommendations for baseline, in-drought and post-drought order monitoring requirements.

The environmental assessment focuses on the potential changes to water availability (levels and flows) and any consequent implications for geomorphology, water quality, ecology and other relevant environmental receptors, for example, landscape, navigation, recreation and heritage. Cumulative impacts with other drought options are also considered.

The assessments undertaken confirm the features requiring consideration of monitoring and mitigation; which are provided in full in the Environmental Monitoring Plan (EMP).

Throughout the environmental assessment process, Yorkshire Water have proactively engaged key stakeholders, including the Environment Agency and Natural England.

During the prolonged dry weather, dialogue was initiated with the Environment Agency and consultants were instructed to prepare 'application-ready' EARs and undertake the onset of drought walkovers. The application ready EAR, and EMP, are provided alongside this drought order application.

6.0 Water Supply Strategy for the Continuation of Drought

Our grid system allows us to move water around the region and we aim to balance resources so that our customers receive the same levels of service. This makes us resilient to drought conditions and in recent dry years (2003, 2006 and 2011) we have not been required to apply for drought permits or orders. However, following an exceptionally dry year and unprecedented summer demand in 2018 we applied for winter drought permits to aid reservoir stock recovery, but did not need to implement them when reservoir stocks recovered after heavy rainfall.

Our Grid SWZ has an interconnected network (grid system) that enables highly effective conjunctive use of the available water resources using raw and treated water pipelines. During dry weather we aim to maximise use of river sources to conserve reservoir stocks for longer. However, during 2022 we have experienced exceptionally low rainfall as well as periods of very high demand; this has led to greater draw down of reservoirs, and the below average rainfall has meant reservoirs have not refilled.

Reservoir stocks crossed our 'Normal Control Line' in mid-March 2022. This triggered additional activity to manage water resources and to abstract, treat and distribute more water from rivers to reduce our draw on reservoir stocks. This activity continued during the summer and will continue into autumn and winter until the water resources position recovers. We have used our grid system to move water up to 70 miles from river sources to areas in the south and west of the region which are usually supplied by local reservoirs. Throughout this period, we have been managing reservoir levels to ensure, as far as possible, that stocks are drawn down evenly across all areas.

We will continue to closely monitor the water resources position and alter our operational activities to preserve stocks across the region. We have taken mitigating actions in line with our drought plan, with actions undertaken to date listed in section 4. We will continue to operate in accordance with our drought plan and expect to apply for additional drought permits and orders as listed in Table 6.1.

Table 6.1. lists all the permit and order applications we have discussed with the Environment Agency and plan to submit in 2022.

Permit / order application	Drought Action
North West Area (applied 15/09/22)	Reduce compensation releases
River Ouse at Moor Monkton (this application)	Increase allowable abstraction in all except highest river flowbands
River Ure at Kilgram	Allow abstraction below HOF
River Wharfe at Lobwood	Reduce regulating release from Grimwith in the lowest flow band
South Area	Reduce compensation releases
North Area	Reduce compensation releases
River Derwent at Loftsome Bridge	Transfer abstraction licence permissions from Elvington abstraction point on the River Derwent to Loftsome Bridge abstraction point downstream.

Permit / order application	Drought Action
South West	Reduce compensation releases
River Wharfe	Increase annual licence (if licence increase application not received)
River Hull	Alter hands off flow requirements

Table 6.1: Drought permit/order applications

If the Environment Agency (and Defra, as appropriate) grant the drought orders and permits we are applying for in 2022, they will be valid up to the end of March 2023. We may not implement the drought permits/orders if we receive sufficient rainfall.

If we do not receive sufficient reservoir refill for our region to be no longer in drought by 1st April 2023 further drought actions may need to be implemented. We would consider the situation to have returned to “normal” if regional reservoir stocks are above the normal control line and none of our area reservoir groups are below control line 4 (the Environment Agency Early Warning Trigger line). We will continue to maximise use of river resources until the situation recovers and our communications to customers will continue to target water conservation.

To mitigate the impact of the drought, we will continue to promote the need for water saving to our customers throughout the Yorkshire region. This will be delivered through press releases, public engagement and collaborations with third parties. By collaborating with others, we will be able to provide a stronger message that reaches a wider audience.

We will seek to work with other water companies, the Environment Agency, Natural England, Consumer Council for Water (CCW), local authorities, health authorities, emergency services, other organisations such as NFU, CBI and trades unions. We recently began publishing our water situation report monthly as part of our ‘open data’ initiative.

If the water resources situation continues during the winter, we will deliver a “winter campaign”. Customer water use is generally lower during winter months compared to summer. However, we can still experience peaks in demand due to leaking pipes, which freeze in the cold weather then burst when temperatures increase again. Our winter campaign will look to provide advice to customers on how to protect their home when temperatures drop, which will reduce the risk of pipes leaking or bursting.

The winter campaign will focus on raising awareness of the key messages across Yorkshire through media relations, stakeholder relations and bought on and offline media, including digital advertising, radio and potentially print and we will have the ability to upscale activity should the weather take a turn for the worse. As part of the campaign, we will offer a limited number of free items to customers, such as outdoor tap covers, which will be available to order via our website.

Alongside our campaign, we will be promoting our Priority Services Register to ensure we know about customers who need an extra bit of help. Media activity and campaign messaging will be targeted on the relevant channels to have maximum impact.

We will continually monitor the situation, making decisions about applying for winter drought permits/orders or whether we need further spring/summer permits in line with our Drought Plan.

Should a severe shortage of rainfall continue this year, it is possible that permit applications beyond those listed in Table 6.1 will be required. The decision to apply for additional permits will depend on reservoir stocks and forecasts, which we will be monitoring closely.

6.1. Operational changes we will make to avoid future drought-related problems

Our Drought Plan includes long term options that we will consider if the drought continues into 2023. These options will provide additional resources for public supply and will only be implemented if there is a risk that our current available resources will not be able to meet demand if the drought continues.

The decision to implement long term options will be dependent on the severity of the situation and scenario modelling to assess the potential risk. The trigger in our drought plan is to review the need for long term options if we are six weeks away from our regional drought control line in the second year of a drought. We are currently reviewing the scope of the long-term options and the timescales for delivery. If we were approaching the trigger for implementing long term options, this information will help determine which long-term options we should implement if required.

In line with our drought planning process, once the situation recovers, we will carry out a full review of our drought triggers and actions and their impacts. We will produce a “lessons learnt report” within six months of the situation returning to normal. This will include a review of operations and any opportunities to operate differently to improve our resilience to future droughts. For example, we will review drought triggers and reservoir control lines incorporating 2022 data. If this review leads to material changes to our current Drought Plan, it will be revised and resubmitted to Defra.

7.0 Notices and advertisements relation to application

Written notice of the drought order application for the River Ouse abstractions at Moor Monkton have been to organisations and individuals with potential to be impacted, which include:

- The local authorities covering the areas downstream of our River Ouse abstraction points:
 - Selby District Council.
 - York City Council.
 - East Riding Council.
- Other abstractors operating on the River Ouse downstream of the Moor Monkton intake.
 - Internal Drainage Boards
 - Natural England

The notices provide information on where the full application can be inspected free of charge and states objections can be made by 5pm on Thursday 6th October 2022. A copy of the notice is provided in Appendix 2.

The notice will be advertised on Thursday 29th October 2022 in the York Press, which is circulated in the area potentially affected if the permit is granted, and in the London Gazette, in accordance with Environment Agency guidance. If the application is successful, we will provide notice the order has been granted in the same newspapers.

A Yorkshire Water webpage has been created to provide information on drought permit/order applications. Copies of the River Ouse notice and notices for other applications will be available on our website and further permit/order application notices will be added on the dates we apply. The webpage includes information to explain why we are making the applications and a list of frequently asked questions.

7.1. Public inspection arrangements

Documents relating to the River Ouse at Moor Monkton drought order application will be made available, free of charge, for inspection by any interested parties from the date it is advertised.

The documents include a copy of the drought order application and supporting information including an environmental report and will be made available at the following locations and on the Yorkshire Water website:

- Yorkshire Water, Western House, Halifax Road, Bradford, BD6 2SZ.
- Green Hammerton Post Office, York Road, Green Hammerton, York, YO26 8BN
- Nether Poppleton Post Office, 10-12 Allerton Dr, Nether Poppleton, York YO26 6HN
- Market Place Post Office, 4 Colliergate, York, YO1 8BP
- Environment Agency, Lateral, 8 City Walk, Leeds, LS11 9AT.

The supporting documents are available at the Yorkshire Water Head Office in Bradford. The Environment Agency guidelines state drought permits/orders must be advertised at the water company's head office and the office most local to the relevant area. We have water treatment works nearby the permit/order application sites however, they are not suitable for public access, and we are therefore only able to provide the information at our head office in Bradford, which can be accessed by the public.

7.2. Environment Agency

We met with our local Environment Agency in May following reservoirs stocks crossing the Environment Agency early warning trigger line. We have continued to consult the Environment Agency on the drought situation as it has escalated. We will continue to meet regularly until the situation recovers.

7.3. Natural England

We have notified Natural England of our intention to submit drought permit/order applications for the late summer of 2022. If there is potential for a proposed drought permit/order to impact on a designated area, we are required to consult Natural England prior to submitting the application. The Environmental Assessment Report (EAR) of this drought option confirmed there would be a negligible impact on five SSSI's (Naburn Marsh SSSI, Clifton Ings and Rawcliffe Meadows SSSI, Church Ings SSSI, Acaster South Ings SSSI and Fulford Ings SSSI). Further details of the assessment carried out can be found in the accompanying EAR.

7.4. Navigation Authority

We have consulted with the Canal and Rivers Trust, and they provided consent for this Drought Order application as it will have minimal impact on an inland navigation. This consent is provided with this application.

7.5. Internal Drainage Board

We have informed the local Internal Drainage Boards of our intention to apply for a drought order on the River Ouse.

7.6. Retailers

Since retail separation in April 2017 commercial water users are now customers of retail companies. The Yorkshire Water Non-household Management Team will ensure retailers operating in the Yorkshire Water supply area are notified of the permit/order applications in advance of public notices being published in newspapers. Notification will be provided by email and will include a copy of the frequently asked questions. We will highlight to the retailers that the drought permit/orders we are applying for will not impact on customers' supplies and we are providing the information in case they get any calls or queries from their non-household customers. We will also provide retailers with contact details for raising questions relating to the permits/orders.

8.0 Appendices

8.1. Appendix 1: Summary of water saving communications

The table below summarises the communication activity we have carried out to raise awareness of the dry weather situation and encourage demand reduction.

Water Saving		W/C 20 th June	W/C 27 th June	W/C 4 th July	W/C 11 th July	W/C 18 th July	W/C 25 th July	W/C 1 st August	W/C 8 th August	W/C 15 th August
Customer Communications				July			July	August		August
MEDIUM	PLATFORM	REACH / IMPRESSIONS	REACH / IMPRESSIONS	REACH / IMPRESSIONS						
ONLINE	Facebook	Impressions: 1,406,328	Impressions: 895,032	Impressions: 1,144,058	Impressions: 1,021,400	Impressions: 1,261,645	Impressions: 1,354,586	Impressions: 1,552,557	Impressions: 1,552,557	Impressions: 1,675,002
	'paid for' Adverts									
	Programmatic/ Digital Display Advertising	Impressions: 271,828	Impressions: 252,118	Impressions: 503,115	Impressions: 1,212,554	Impressions: 714,940	Impressions: 478,719	Impressions: 505,055	Impressions: 521,527	Impressions: 582,369
RADIO ADS	Traditional	Impressions: 3,234,500	Impressions: 3,234,500	Impressions: 4,737,500	Impressions: 4,737,500	Impressions: 4,737,500	Impressions: 4,737,500	Impressions: 3,182,395	Impressions: 3,931,375	Impressions: 3,931,375
	Radio									
	Digital Audio 'Instream'	Impressions: 130,000	Impressions: 130,000	Impressions: 312,500	Impressions: 312,500	Impressions: 312,500	Impressions: 312,500	Impressions: 312,500	Impressions: 312,500	Impressions: 312,500
LOCAL NEWSPAPERS	Metro Yorkshire	N/A	98,889	49,229						
	Yorkshire Post/Doncaster Free Press/Hull Daily Mail/Malton and Pickering Mercury/York Press/Harrogate Advertiser/Sheffield Star/Bradford T&A/ Ilkley	N/A	49,229	49,229						
OUTDOOR	Digital	Impressions: 9,260	Impressions: 41,372	Impressions: 120,064	Impressions: 116,284	Impressions: 44,839	Impressions: 67,877	Impressions: 92,370	Impressions: 83,597	Impressions: 74,800
	6 Sheet									
	Bus	N/A	N/A	N/A	N/A	N/A	Impressions: 1,083,333	Impressions: 1,083,333	Impressions: 1,083,333	Impressions: 1,083,333
TV / YouTube	All 4	N/A	N/A	N/A	N/A	N/A	Impressions: 52,102	Impressions: 52,102	Impressions: 122,237	Impressions: 93,595
	Sky Go	N/A	N/A	N/A	N/A	N/A	Impressions: 55,719	Impressions: 43,215	Impressions: 47,907	Impressions: 18,408
	YouTube	N/A	N/A	N/A	N/A	N/A	Impressions: 55,127	Impressions: 55,096	Impressions: 80,865	Impressions: 65,987
	Terrestrial ITV Yorkshire	n/a	N/A	N/A	N/A	N/A	Impressions: 3,620,870	Impressions: 3,546,137	Impressions: 3,731,744	Impressions: 1,260,205
	ITV HUB	n/a	N/A	N/A	N/A	N/A	Impressions: 55,250	Impressions: 71,000	Impressions: 71,000	Impressions: 71,000
MEDIA	Media reach	Reach: 407,112	Reach: 8,169	Reach: 20,650,458	Reach: 370,117,387	Reach: 80,600,000	Reach: 19,300,000	Reach: 104,000,000	Reach: 1,100,000,000	Reach: 700,000,000

Water Saving				W/C 4 th			W/C 25 th	W/C 1 st		W/C 15 th
Customer Communications		W/C 20 th June	W/C 27 th June	July	W/C 11 th July	W/C 18 th July	July	August	W/C 8 th August	August
MEDIUM	PLATFORM	REACH / IMPRESSIONS	REACH / IMPRESSIONS	REACH / IMPRESSIONS	REACH / IMPRESSIONS	REACH / IMPRESSIONS	REACH / IMPRESSIONS	REACH / IMPRESSIONS	REACH / IMPRESSIONS	REACH / IMPRESSIONS
IN HOUSE	Customer Emails	N/A	N/A	N/A	N/A	Impressions: 29,755	N/A	N/A	N/A	Impressions: 51,000
	YW Website: Save water page	Hits: 815	Hits: 678	Hits: 794	Hits: 1,802	Hits: 2,612	Hits: 1,515	Hits: 2,465	Hits: 4,103	Hits: 1,531
	YW Website: Hosepipe page	Hits: 25	Hits: 11	Hits: 70	Hits: 657	Hits: 761	Hits: 422	Hits: 2,858	Hits: 38,431	Hits: 19,737
	Organic Social Channels: Facebook, Instagram & Twitter	Reach: 19,982	Reach: 16,628	Reach: 33,758	Reach: 45,070	Reach: 75,688	Reach: 42,000	Reach: 41,846	Reach: 47,452	Reach: 50,483

Water Saving			W/C 29th		W/C 12th
Customer Communications		W/C 22nd August	August	W/C 5th September	September
MEDIUM	PLATFORM	REACH / IMPRESSIONS	REACH / IMPRESSIONS	REACH / IMPRESSIONS	REACH / IMPRESSIONS
ONLINE	Facebook 'paid for' Adverts	Impressions: 1,766,389	Impressions: 2,374,199	Impressions: 783,833	Impressions: 944,757
	Programmatic/ Digital Display Advertising	Impressions: 499,222	Impressions: 631,586	Impressions: 491,587	Impressions: 331,281
RADIO ADS	Traditional Radio	Impressions: 2,183,755	Impressions: 2,183,755	Impressions: 2,107,088	Impressions: 2,107,088
	Digital Audio	Impressions: TBC	Impressions: TBC	Impressions: TBC	Impressions: TBC
	'Instream'				
LOCAL NEWSPAPERS	Metro Yorkshire	N/A	N/A	N/A	n/a
	Yorkshire Post/Doncaster Free Press/Hull Daily Mail/Malton and Pickering Mercury/York Press/Harrogate Advertiser/Sheffield Star/Bradford T&A/ Ilkley	N/A	N/A	186,464	241,521

Water Saving			W/C 29th		W/C 12th
Customer Communications		W/C 22nd August	August	W/C 5th September	September
MEDIUM	PLATFORM	REACH / IMPRESSIONS	REACH / IMPRESSIONS	REACH / IMPRESSIONS	REACH / IMPRESSIONS
OUT-DOOR	Digital	Impressions:	Impressions:	Impressions:	Impressions:
	6 Sheet	69,891	191,513	62,683	29,151
	Bus	Impressions:	TBC	N/A	N/A
		1,083,333	1,083,333		
TV / YouTube	All 4	Impressions:	Impressions	Impressions:	N/A
		87,724	29,674	146	
	Sky Go	Impressions:	Impressions	Impressions:	N/A
		9,809	2,960	N/A	N/A
	YouTube	Impressions:	Impressions	Impressions:	Impressions:
		81,646	103,835	49,605	42,079
	Terrestrial ITV Yorkshire	TBC	TBC	TBC	N/A
	ITV HUB	TBC	TBC	TBC	N/A
MEDIA	Media reach	Reach:	TBC	Reach:	TBC
		TBC		TBC	
IN HOUSE	Customer Emails	N/A	N/A	N/A	N/A
	YW Website: Save water page	Hits:	Hits:	Hits:	Hits:
		1,224	1,026	916	618
	YW Website: Hosepipe page	Hits:	Hits:	Hits:	Hits:
		44,368	22,750	13,876	19,905
	Organic Social Channels: Facebook, Instagram & Twitter	Reach:	Reach:	Reach:	Reach:
	70,090	15,970	9,179	21,435	

Samples of creative used during the campaign are provided below





8.2. Appendix 2: Notice relating to the River Ouse drought order application

YORKSHIRE WATER SERVICES LIMITED

NOTICE OF APPLICATION FOR DROUGHT ORDER

River Ouse Catchment

TAKE NOTICE that due to the threat of a serious water shortage in the **Yorkshire area** caused by an exceptional shortage of rain, **YORKSHIRE WATER SERVICES LIMITED (company number 02366682) whose registered office is at Western House, Halifax Road, Bradford, BD6 2SZ** is applying to Defra for a drought order in the River Ouse catchment under section 79a of the Water Resources Act 1991 (as amended).

The drought order is intended to apply for six months and proposes an increase in the volume of water that Yorkshire Water can abstract at Moor Monkton when River Ouse flows at Skelton are below 1,000,000 cubic metres per day.

Moor Monkton (grid reference SE 52 57)

Yorkshire Water is authorised to abstract water from the River Ouse at Moor Monkton under terms specified in licence serial numbers NE/027/0024/065 and 02/027/0024/158. The aggregate maximum quantity of water Yorkshire Water is authorised to abstract from Moor Monkton, under the terms of both licence agreements, is limited to 12,500 cubic metres per hour; 300,000 cubic metres per day and 73,000,000 cubic metres per year.

Under the terms of licence numbers NE/027/0024/065 and 02/027/0024/158, the abstraction is limited to: 300,000 cubic metres per day when flow at Skelton monitoring station is more than 1,000,000 cubic metres per day; 150,000 cubic metres per day when flow at Skelton monitoring station is between 650,000 and 1,000,000 cubic metres per day; 72,000 cubic metres per day when flow at Skelton is between 400,000 and 650,000 cubic metres per day; and 10,000 cubic metres per day when flow at Skelton is less than 400,000 cubic metres per day.

The drought order applications for the River Ouse at Moor Monkton is to temporarily alter the conditions specified in licence numbers NE/027/0024/065 and 02/027/0024/158 to allow Yorkshire Water to abstract an additional 60,000 cubic metres per day when flows are below 1,000,000 cubic metres per day. This would limit abstraction to: 300,000 cubic metres per day when flow at Skelton monitoring station is more than 1,000,000 cubic metres per day; 210,000 cubic metres per day when flow at Skelton monitoring station is between 650,000 and 1,000,000 cubic metres per day; 132,000 cubic metres per day when flow at Skelton is between 400,000 and 650,000 cubic metres per day; and 70,000 cubic metres per day when flow at Skelton is less than 400,000 cubic metres per day. The aggregate volumes specified in both licence numbers NE/027/0024/065 and 02/027/0024/158 would not change.

The drought order will allow Yorkshire Water to abstract an additional 60,000 cubic metres per day at flows below 1,000,000 cubic metres per day from the River Ouse at Moor Monkton for up to six months. This will mean that Yorkshire Water can continue to supply customers

using river water, helping reservoir stocks to recharge, which will help maintain supply to customers in the Yorkshire area. An assessment of the potential environmental impacts of implementing the drought order has been carried out in consultation with the Environment Agency and Natural England.

Anyone may inspect the proposals at the following locations, free of charge, during normal working hours for a period of seven calendar days from the publication of this notice;

- Yorkshire Water, Western House, Halifax Road, Bradford, BD6 2SZ.
Monday – Friday 8:00-17:00; Saturday – Sunday closed.
- Green Hammerton Post Office, York Road, Green Hammerton, York, YO26 8BN
Monday – Friday 9:00 – 17:30; Saturday 9:30-12:30; Sunday closed.
- Nether Poppleton Post Office, 10-12 Allerton Dr, Nether Poppleton, York YO26 6HN.
Monday – Friday 9:00 – 17:30; Saturday 9:30-12:30; Sunday closed.
- Market Place Post Office, 4 Colliergate, York, YO1 8BP
Monday – Friday 9:00 – 17:30; Saturday 9:30-12:30; Sunday closed.
- Environment Agency, Lateral, 8 City Walk, Leeds, LS11 9AT.
Monday – Friday 9:30-16:30; Saturday – Sunday closed.

Copies of the proposals are also available to view on our website

<https://www.yorkshirewater.com/drought-permits>

Objections may be made in writing to Defra at:

Department for Environment, Food and Rural Affairs, Water Resources Policy, Seacole 3rd Floor, 2 Marsham Street, London, SQ1P 4DF or

water.resources@defra.gov.uk

Objections should be made immediately and in any event by 5pm on Thursday 6th October 2022.

Objectors may send a copy of their objection to Western House, Halifax Road, Bradford, BD6 2SZ or publicaffairs@yorkshirewater.co.uk.

Dated: 26th September 2022

Signed: Neil Dewis

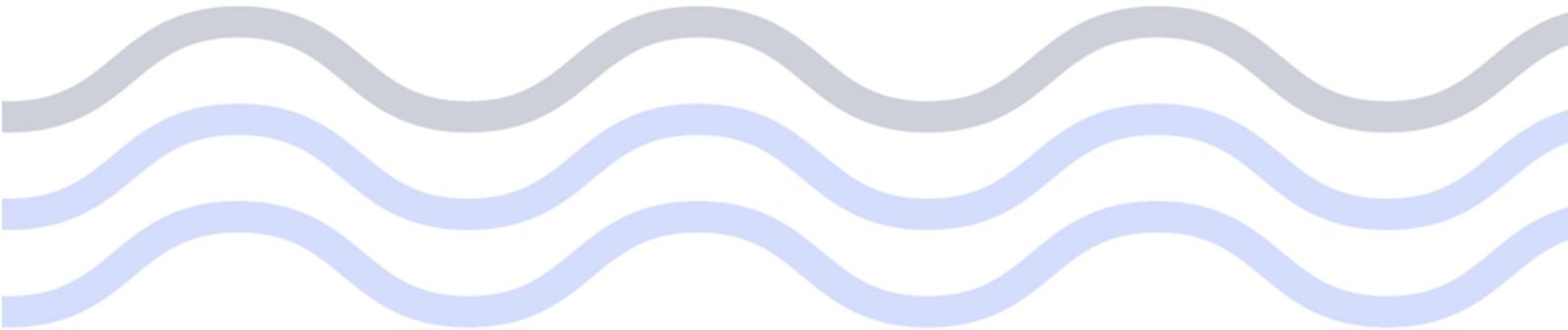
Director of Water Service Delivery

Perminder Kaur

Head of Legal Services

Yorkshire Water, Western House, Halifax Road, Bradford, BD6 2SZ

Thank you



YorkshireWater