

# Revised Draft Drought Plan

2022





# Executive Summary

United Utilities provides water for seven million customers and 200,000 businesses across the North West of England. Although this region is relatively cooler and wetter than other parts of the U.K. (e.g. South East), droughts and other extreme events, such as floods, are a natural feature of the region's climate. We have a surface water dominated system which means we need to be reactive to the region's climate. Our drought plan outlines our approach to managing water supplies to make sure there is always enough water for customers, businesses and the environment. Our plan ensures that we will meet our pre-defined levels of service for restrictions, including; Temporary Use Bans (TUBs), drought permits, non-essential use bans and emergency drought orders.

This drought plan provides a high level guide of how United Utilities will manage a drought in the North West. It includes details on the likelihood of a drought occurring, how we forecast a drought, the actions we will undertake to protect customers' supply and the environment, finishing with how we track recovery following a drought event and capture lessons learnt. The main drought plan has been created as an accessible operational document with the accompanying appendices covering more technical detail, such as analysis and modelling. The structure of the plan can be seen below.

## 1 Introduction

<b>1.1 Water supply area</b>	Details the North West area of England which United Utilities provides water to	4
<b>1.2 How vulnerable is the North West?</b>	The North West contains some of the wettest places in the UK and some areas comparable to parts of Southern England. The North West is resilient to a greater than 1 in 500 drought event with less than 0.2% annual chance of Emergency drought orders (standpipes and rota cuts)	6

## 2 Operational plan

<b>2.1 Forecasting a drought</b>	We continually monitor a range of water resource indicators (meteorological, hydrological, demand and water assessments) which provide the basis for recognising drought conditions at an early stage	9
<b>2.2 Actions leading up to and during a drought</b>	Summary of the high level actions which are associated with each drought level. The drought levels help define the severity of the drought event, from normal operations to level 4 (rota cuts and standpipes)	10
<b>2.3 Water resource zone drought levels</b>	The drought levels are based on reservoir storage or proportion of licence use, these sources are representative and give a clear indication of the water resource status for each resource zone	11
2.3.1 Strategic Resource Zone	Drought levels have been applied to Haweswater Reservoir and the River Dee	12
2.3.2 Carlisle Resource Zone	Drought levels have been applied to Castle Carrock Reservoir	13
2.3.3 North Eden Resource Zone	Drought levels have been applied to the licence usage of the boreholes	14
2.3.4 Barepot Resource Zone	Drought levels have been applied to the flow of the River Derwent	15
<b>2.4 Drought-management actions</b>	A series of actions which United Utilities will undertake to protect the supply to customers and the environment	16

2.4.1 Operational actions	The operational actions which United Utilities can make to each reservoir zone against the associated drought level	17
2.4.2 Demand-side actions	This includes additional water efficiency messaging and actions, leakage detection and repair, and pressure reductions	18
2.4.3 Water use restrictions	These are additional measures a water company can impose to reduce the demands for water, they include: voluntary water use restraint, temporary use ban, non-essential use ban, and emergency drought orders	24
2.4.4 Supply-side Actions	These are additional resources a water company can bring online during dry weather, which may bring more water in to the system, or conserve the current supply	26
2.4.5 Drought permits and orders	United Utilities has 14 possible drought permit applications which if granted allow an alteration to the current licence or act to help protect availability of water supply to customers	27
2.4.6 Extreme drought measures	This is the use of stand pipe and rota-cuts, the modelling shows that our system would not require this measure under historic drought scenarios. We have modelled more extreme events to fully test our plan and system	29
2.5 Incident management structure	This outlines the management structure we would use within our company in a drought	30
2.6 Agreements with other licenced water suppliers	We currently have three licenced imports and five exports in our geographical area. This section covers the import/export arrangements we have with these and neighbouring companies and how we would engage with them during a drought	31
<b>3 After a drought</b>		34
3.1 Lessons learnt	A range of indicators are used to help define the end of a drought and a return to normal operation. Once the event is over we review the entire management process along with our regulators to highlight lessons learnt and identify where improvements can be made	34

## Appendices

<b>Appendix A</b>	<b>How we have developed the plan</b>	This details the changes we have made to the content and structure of the plan in comparison to the previous drought plan and the latest guidance
<b>Appendix B</b>	<b>Communications plan</b>	Details how we would communicate with customers, stakeholders, regulators, government and other water companies. It also contains several examples of the messaging we would be putting on our website and sending externally to keep everyone informed of the drought event as it develops and through the recovery
<b>Appendix C</b>	<b>Demand side options</b>	The demand side options include; Water use restrictions (from voluntary use restraint, Temporary Use Ban to Non-essential use ban and standpipe and rota cuts), leakage reduction, and pressure reduction
<b>Appendix D</b>	<b>Supply side options and permits</b>	The supply side options include additional water sources or measures which prolong the storage which could be used in a drought event. A major section of this Appendix covers the drought permits and orders, and the environmental assessments on the options
<b>Appendix E</b>	<b>Drought scenarios and testing of plan</b>	This details the testing of the drought plan against a variety of dry weather scenarios and sensitivity testing on the supply and demand side options. The likelihood of certain drought events occurring and the resilience of the North West are outlined in this Appendix
<b>Appendix F</b>	<b>Operation of strategic pumping</b>	This details how we determine whether to pump water to support one of our drought level reservoirs to reduce the chance of crossing through the drought levels
<b>Appendix G</b>	<b>Compensation only reservoirs</b>	This is a new section of the drought plan following the latest guidance released. This details the reservoirs which do not provide any benefit to the supply of water to customers, but instead support the environment through releases of water to downstream rivers. To protect those releases, drought triggers have been applied to the reservoirs for monitoring and management actions

<b>Appendix H</b>	<b>Non-Public water supply</b>	There are several private water supplies in the North West, this appendix details United Utilities policy and approach to these supplies during a drought
<b>Appendix I</b>	<b>Water Resources West</b>	United Utilities is part of the regional group Water Resources West, this appendix details the joint working this group will undertake and the expectation of support to/from other water companies during a drought
<b>Appendix J</b>	<b>Drought resilience in the North West</b>	This is a detailed study which was undertaken to determine the resilience of the North West to increasing severity of drought events beyond the historic record. This appendix details the findings of this study
<b>Appendix K</b>	<b>Extreme drought measures</b>	This details the drought measures we would consider prior to entering drought level 4 and further restrictions

# 1 Introduction

---

We, United Utilities Water Limited, have produced this revised draft drought plan for the North West of England. Under section 39B(7) of the Water Industry Act 1991, water companies must prepare drought plans following consultation with regulators, and with customers and other interested parties (stakeholders), and make them available to the public. Our plan is based on current law and guidance, including the Water Industry Act 1991 and Defra's Drought Plan Guidance (Defra, March 2020).

Drought plans are updated every five years (or earlier if necessary) and we expect this plan to be in place until 2027. We provide annual updates as part of our annual Water Resources Review, which are available on our website ([unitedutilities.com](https://unitedutilities.com) – water resources). This drought plan builds on the previous Drought Plan 2018 and the subsequent dry weather events in 2018 and 2020. Our drought plan is also linked to our Water Resources Management Plan (WRMP), which can also be found on our website.

This revised draft drought plan sets out our approach to managing water supplies so that we can make sure there is always enough clean safe water available for seven million customers and 200,000 businesses across the North West, even during a drought. This plan explains the actions we will consider taking during a drought to protect essential water supplies to customers and minimise damage to the environment.

We have worked closely with our regulators and stakeholders to develop this revised draft drought plan. A draft of this drought plan went through public consultation during May and June 2021, following this we have published a Statement of Response setting out how we have dealt with each of the issues raised. We have submitted this revised draft drought plan 2022 to the Secretary of State for Defra. In a drought there is always a fine balance to be achieved between providing water supplies for customers and businesses and protecting the environment, and we believe that this plan achieves that balance.

Droughts do not follow any predictable pattern and can happen at any time of the year. Our plan sets out a range of options available in a drought and the relevant processes and timescales that we will follow. The plan will be used for any drought, including those more severe than previously recorded. To maintain a water supply for customers, we follow operating policies and control measures as well as carrying out frequent monitoring with the Environment Agency. This monitoring means that we can recognise drought conditions and identify the need for, and timing of, any drought-management measures.

The way we manage water supplies during droughts, and the actions we take, will reflect the severity and geographical area of the drought, how quickly it develops and at what time of year. Initially we will take actions that are within our control. Specific legal powers or exceptional measures will only be used in severe drought conditions. We will only take actions that are right for the particular drought, as not all the measures set out in this plan will be of benefit during every drought event, because no two droughts are the same. Drought actions may be applied either regionally (company-wide or by resource zone (see below)) or locally to target a specific geographical area, depending on the nature of the drought. This plan also sets out drought levels for each resource zone. The levels show when we need to decide what measures are required to address the situation at the time. They represent a balance between passing drought levels at an acceptable frequency and the time needed to take drought actions.

## 1.1 Water supply area

---

United Utilities provides water for North West England. Our region covers a large area from Cumbria to Cheshire, and from the Pennines to the West coast. We own and operate over 100 water supply reservoirs, river and stream intakes, as well as lake abstractions and numerous groundwater sources. On average more than 90% of the water we supply comes from rivers and reservoirs (termed surface water sources), with the remainder from groundwater. We divide our region into water resource zones in accordance with Environment Agency guidance (Water resource zone integrity, EA 2016). These zones were defined during development of our Water Resources Management Plan 2019, and are applicable for use in this drought plan. A water resource zone is an area within which water sources can be shared and customers should experience broadly the same level of service and risk of supply failure from a shortfall of water resources.

Figure 1 shows which areas of the North West are included in each resource zone. We have four zones:

### Strategic Resource Zone

- A regional network serving west Cumbria, south Cumbria, Lancashire, Greater Manchester, Merseyside and most of Cheshire. This zone represents over 90% of the total water supplied by us and the vast majority of customers. This zone is a surface water dominated zone supplemented by groundwater.

### Carlisle Resource Zone

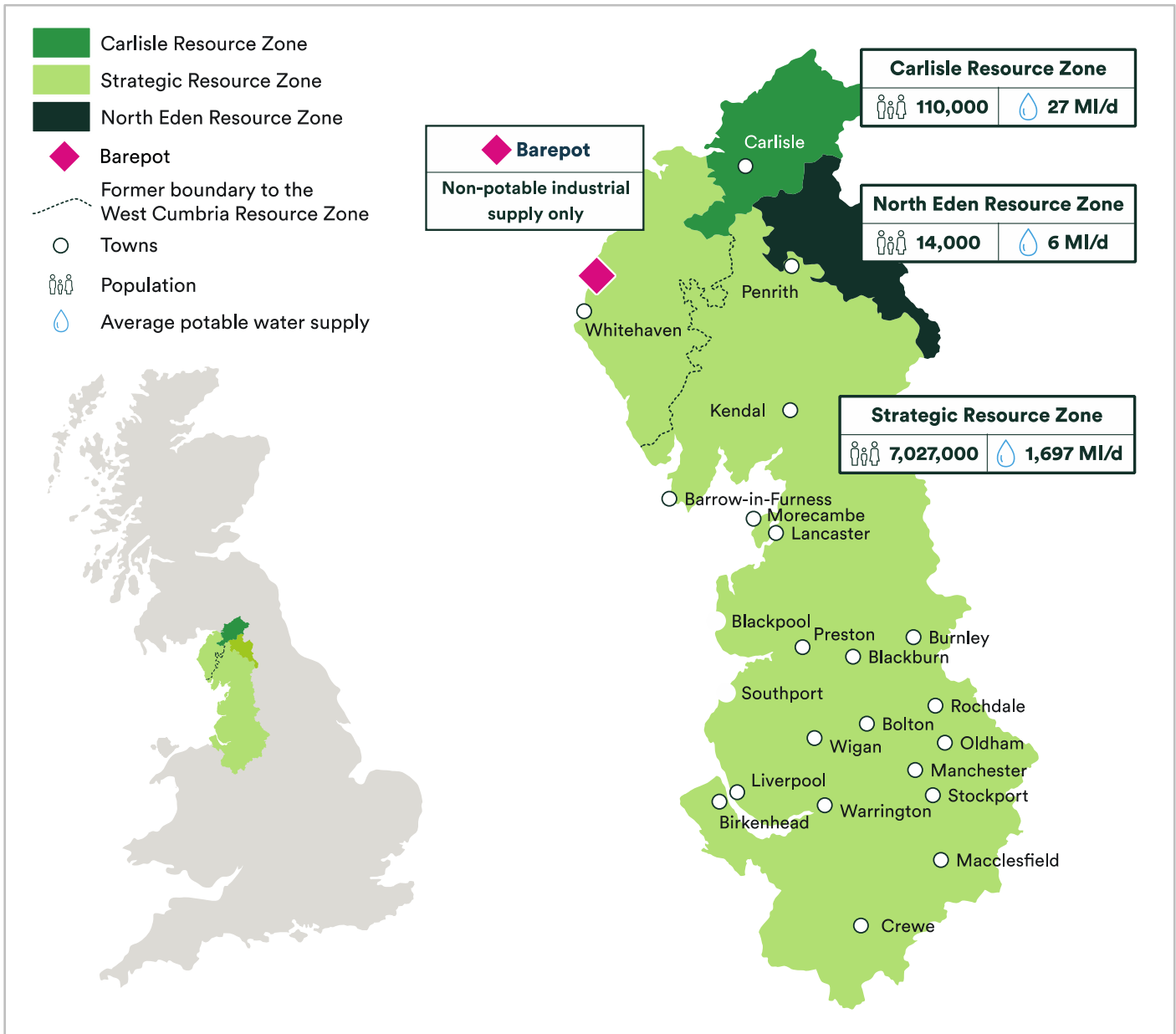
- Serving the Carlisle area. This is a surface water only zone.

### North Eden Resource Zone

- Comprising boreholes that serve the rural, northern part of the Eden district of Cumbria. The Alston area is supplied by a bulk water supply from Northumbrian Water. This zone consists of groundwater sources only with no surface water sources.

### Barepot Resource Zone

- This is a non-potable industrial supply and is a surface water source.



**Figure 1** Resource zones in the North West, detailing the population each zone serves and the average demand for potable water

## 1.2 How vulnerable is the North West?

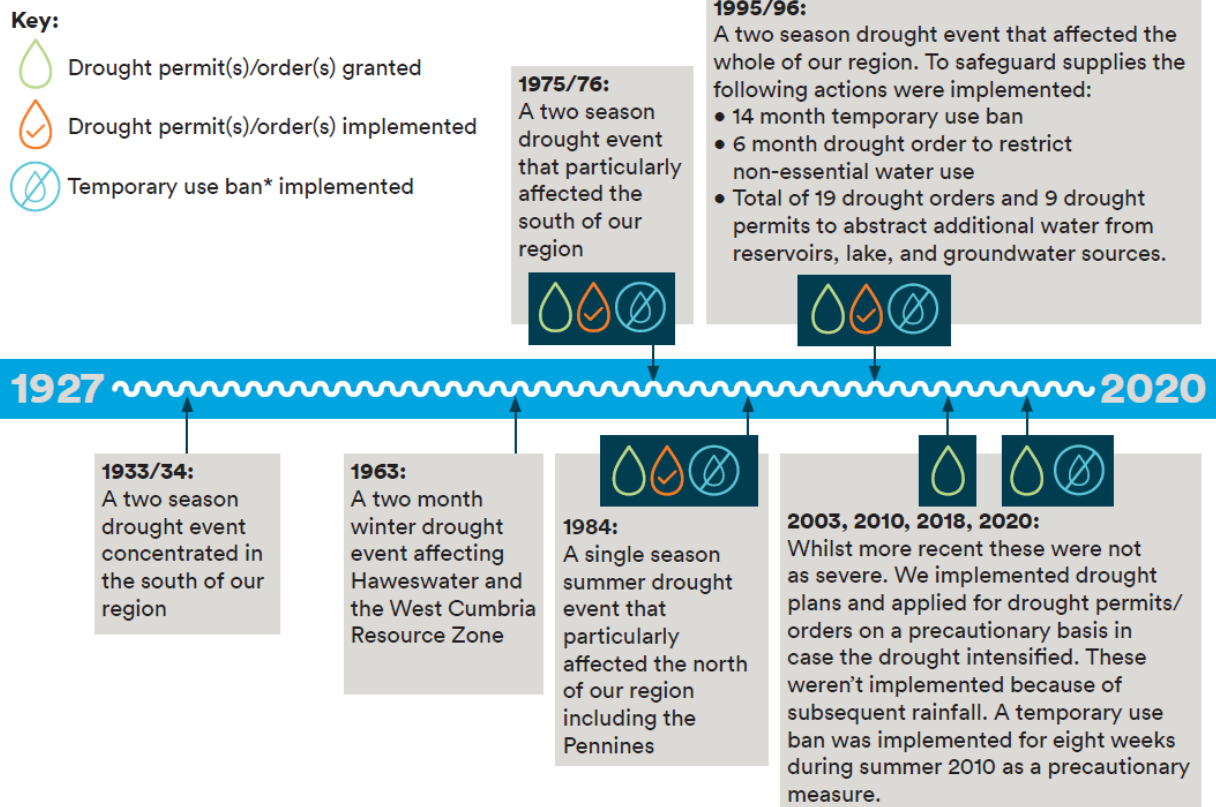
North West England has a variable climate as a result of wide-ranging topography and altitude, which includes the lowland areas of Cheshire, south-west Lancashire and Fylde, and the Pennine and Cumbrian upland areas. The region has some of the wettest places in the UK, with average total rainfall in the Lake District of 3000mm each year. In contrast, some of the lowland areas, such as Cheshire, receive less than 1000mm on average. Although the North West is relatively cooler and wetter than other parts of the UK (for example, the South East), droughts are a natural feature of the region's climate, as well as other extreme events such as floods.

In order to produce an effective drought plan, it is important to understand the type of drought events that we are at risk of experiencing. This can be done in several ways including; looking back at droughts we have experienced in the past or by applying sophisticated techniques to develop alternative, plausible future drought scenarios for our region. For this plan we have chosen to explore both of these methods to develop our understanding of droughts. This has helped us design the right drought levels and actions (outlined in Section 2) and prepare a robust plan.

The most significant historic droughts that occurred within our supply area are detailed in Figure 2, and Appendix J includes details of all of our innovative work on possible future droughts. It should be noted that while more recent

droughts have been identified on the diagram, there have actually been many such events in the past too that have not been mentioned.

## Historic droughts



\*Since 2010, hosepipe bans have been replaced by 'water use restrictions' under the Flood and Water Management Act 2010. This Act introduced a new Section 76 within the Water Industry Act 1991 and allows water companies to temporarily restrict a range of water uses by customers. It allows companies to restrict a greater range of water uses than before (the powers under the original Section 76 were generally referred to as a "hosepipe ban") it also requires companies to publicly consult before such restrictions are imposed.

Data used to indicate if drought actions were used dates back to 1975/76

**Figure 2** Drought events between 1927 and 2020 in the North West

**Table 1** shows the agreed level of resilience of each resource zone (details provided in sections 2.4.3 and 2.4.5 respectively).

**Table 1** Level of resilience in each resource zone

Resource zone	Estimated frequency of drought actions during 2022-2027							
	Temporary use bans		Drought permits		Non-essential use bans		Emergency drought orders	
	Level of service	Annual chance	Level of service	Annual chance	Level of service	Annual chance	Level of service	Annual chance
<b>Strategic</b>	Less than 1 in 20 years	Less than 5%	Less than 1 in 20 years <sup>1</sup>	Less than 5%	Less than 1 in 80 years	Less than 1.25%	Less than 1 in 500 years	Less than 0.2%
<b>Carlisle</b>	Less than 1 in 20 years	Less than 5%	Never (no drought permits)		Less than 1 in 80 years	Less than 1.25%	Less than 1 in 500 years	Less than 0.2%

<sup>1</sup> The level of service for drought permits increases to 1 in 40 years from 2025, as per the 2019 Water Resources Management Plan



Resource zone	Estimated frequency of drought actions during 2022-2027							
	Temporary use bans		Drought permits		Non-essential use bans		Emergency drought orders	
	Level of service	Annual chance	Level of service	Annual chance	Level of service	Annual chance	Level of service	Annual chance
<b>North Eden</b>	Less than 1 in 20 years	Less than 5%	Less than 1 in 20 years <sup>1</sup>	Less than 5%	Less than 1 in 80 years	Less than 1.25%	Less than 1 in 500 years	Less than 0.2%
<b>Barepot</b>	Never or extremely unlikely in the lifespan of the drought plan							

Through the drought levels and actions, which we have designed based on our greater understanding of drought events (explained in section 2), our plan successfully makes sure that we meet our pre-defined levels of service for temporary use bans, drought permits, non-essential use bans and emergency drought orders. In line with our Water Resources Management Plan 2019, our minimum level of service for water supply is for us to use temporary use bans and drought permits or orders no more than once every 20 years on average (1 in 40 for drought permits or orders from 2025), and to use drought orders to restrict non-essential water use no more than once every 80 years on average.

We consider circumstances where we have to resort to using standpipes (stopping supply to households with the use of a pipe at the end of customer streets) and rota cuts (allowing supply only at certain times of the day) to have a great effect on customers, and we believe that if the actions set out in this plan are taken, the need for standpipes and rota cuts, would be extremely unlikely. More information on this is given in section 2.4.6.

# 2 Operational plan

In this section we will outline our operational plan that we will employ in times of drought. We will set out our approach to:

- forecasting (explained in 2.1);
- actions (explained in 2.2);
- operation (explained in 2.4); and
- communication (explain in 2.5).

We have developed this plan to allow choices to be made on the specific action that is needed, depending on the conditions at the time.

## 2.1 Forecasting a drought

The earlier we can identify emerging drought conditions, the sooner we can take decisive action to manage our supplies. This means it is essential that we have a good approach to forecasting droughts. We routinely monitor key water resources, demand and leakage information, such as; reservoir and groundwater levels, river flows, abstraction rates, reservoir compensation flow releases to downstream rivers, leakage volumes and demand for water. Every week, these data sources are analysed and used to produce water resources situation reports. We share this information with the Environment Agency and the Centre for Ecology and Hydrology who report on water resources at the national scale. This regular monitoring and reporting means we can spot when things start to deviate from normal (e.g. storage in reservoirs falls below control curves), which indicates that dry weather and drought conditions are occurring. Table 2 provides details of all the indicators of drought that we use per resource zone. One or more of these indicators can identify the start of a drought, depending on the nature of the drought event. As a drought progresses, we expect more of the indicators will start to show drought conditions.

Table 2: Water resource indicators of a drought

Water resources indicator	Strategic Resource Zone	Carlisle Resource Zone	North Eden Resource Zone	Barepot Resource Zone
Analysis and modelling indicates sources failing to refill sufficiently	✓	✓	✓	✓
Storage in reservoirs below control curve levels	Substantial numbers of local reservoir sources in the Pennines and south Lakes	Storage in Castle Carrock reservoir causing concern	N/A	N/A

Water resources indicator	Strategic Resource Zone	Carlisle Resource Zone	North Eden Resource Zone	Barepot Resource Zone
Rapid weekly decline in storage (or slow recovery of storage during winter) in key reservoirs and/or reservoir groups	✓	✓	N/A	N/A
Low, and declining, river flows at our river sources resulting in abstraction being limited	River Lune, Eamont, Dee and Leven	River Gelt and/or River Eden	N/A	River Derwent
Significant reduction in the output from spring and/or groundwater sources, or significant decline in groundwater levels as measured at key observation boreholes (e.g. Scales and T74 Franklaw) in the principal aquifers	Aquifers such as Fylde, Manchester and East Cheshire, Wirral and West Cheshire and Lower Mersey Basin	Low inflows from Geltsdale Springs	Significant reduction in the output of groundwater sources	N/A
Magnitude and duration of 'peak' customer demand for water significantly higher than normal for the time of year	✓	✓	✓	✓
Rainfall significantly below average, and/or soil moisture deficits significantly above average for period of three months and longer	✓	✓	✓	✓

## 2.2 Actions leading up to and during a drought

In normal operating times, we already undertake several activities which would be ramped up, as the status moves from normal operation to enhanced monitoring and operations. We continuously monitor several parameters to predict when a drought may occur and its severity defined by a series of drought levels (section 2.3) and associated actions which may be required.

Table 3 shows a breakdown of our normal operations and additional actions we may take as a drought develops. Each level shows a series of actions which could be taken, depending on the situation. Actions are explained in more detail in the following sections of this plan.

Table 3: Summary of associated actions within drought levels

Status	Summary of normal activity
Normal operation	On-going water efficiency programme
	Leakage reductions in line with our stretching ambitions
	Optimise supply system, manage available sources (taking into account water quality and other considerations) and balancing cost
	Regular liaison with regulators on water resources situation as appropriate
Status	Summary of additional actions (if appropriate in specific drought)
Enhanced monitoring and operations	Configure supply system to manage risk of possible drought
	Implement enhanced water efficiency communications informed by our behavioural change insight

	Preparation for enhanced leakage control activities, rezoning and pressure management
	Tightening of compensation flow releases
	Establish United Utilities drought management structure
<b>Increased risk from dry weather: Level 1</b>	Establish United Utilities, Natural England and Environment Agency dry weather liaison
	Collaborate with regulators and key stakeholders to manage developing situation including sharing event-specific action plans
	Enhanced leakage control activities, rezoning and pressure management
	Further Implement enhanced water efficiency communications informed by our behavioural change insight
	Consider the need for a campaign for voluntary water use restraint
<b>Drought: Level 2</b>	Forecast requirement for commencing representation period to introduce temporary use bans
	Forecast potential drought permits and orders
	Introduction of Temporary Use Ban, as appropriate, we will use agile communications to delay the introduction of a temporary use ban
	Applications for drought permits and orders
	Implement powers granted under drought permits and orders
<b>Emergency planning: Level 3</b>	Apply for and introduce drought order to restrict non-essential use (dependent on level of customer demand for water)
	Introduction of non-essential use bans
	Consider all actions to reduce the likelihood of level 4 actions (Appendix K Extreme drought measures')
<b>Deadwater: Level 4</b>	Introduction of rota cuts and standpipes
<b>Recovering from dry weather</b>	Monitor rainfall and reservoir levels to determine when status can move down through the levels
	Collaborate with regulators and key stakeholders to monitor the situation
	De-escalate tone of communications in line with the Red, Amber, Green messaging
	De-escalate drought management actions according to progression through levels

## 2.3 Water resource zone drought levels

In the 2018 Drought Plan we referred to our drought triggers. These have now changed to drought levels following a change in the Drought Plan guidance. This section explains the drought levels for each resource zone, based on reservoir levels, river levels or the amount of water abstracted as a proportion of the maximum we are allowed to abstract each year. Drought levels are in bands, within which we need to consider drought-management actions (see section 2.4) to address the ongoing situation. The sources which hold the drought levels have been selected as the best indicators of water availability in the resource zone. The drought levels have been derived using modelling techniques (see Appendix A) and fully tested against a range of past and plausible future droughts (see Appendix E).

The drought level sources have remained consistent with the previous Drought Plan, as modelling confirmed these to be the most suitable locations. However, the drought levels for each source shown below are different to the drought triggers in the Final Drought Plan 2018. This is a result of changes in government guidance, recent dry weather experience and more sophisticated modelling techniques (detailed in Appendix A). When setting the drought levels, we considered the likelihood of crossing drought levels and the time each drought level would need to be in place before we took drought management actions. The timescales were calculated using historic and stochastic data sets to maximise resilience and confidence in the new drought levels.



### 2.3.1 Strategic Resource Zone

The Strategic Resource Zone is our most complex zone. The system is surface water dominated and sources are used in a 'conjunctive' nature. The supply network means that water from different sources can be moved around the resource zone to balance water resources risk. Drought levels have been assigned to two sources in the Strategic Resource Zone – Haweswater Reservoir and the Dee System (combined storage for Celyn and Brenig reservoirs). Both of these sources feed into the regional network and provide a significant quantity of water into the system. They are therefore good indicators of the resource position in the Strategic Resource Zone.

The drought levels for Haweswater Reservoir and Dee System vary from month to month to reflect seasonal drought patterns. The drought levels are slightly higher in spring to protect against earlier drawdowns prior to the start of the summer period. The drought levels for Haweswater are shown in Figure 3 and the Dee system in Figure 4. The Haweswater resource state curve is shown by the blue dotted line, the enhanced monitoring and operational drought level is shown below by the red dotted line, with each subsequent drought level defined by a coloured section on the graph. For the Strategic Resource Zone the actions (section 2.4) assigned to each of the drought levels as shown in Figure 3 and Figure 4 would be undertaken if one or both sources were to enter a drought level. Actions are undertaken within the range of the level and not immediately when crossing into the level.

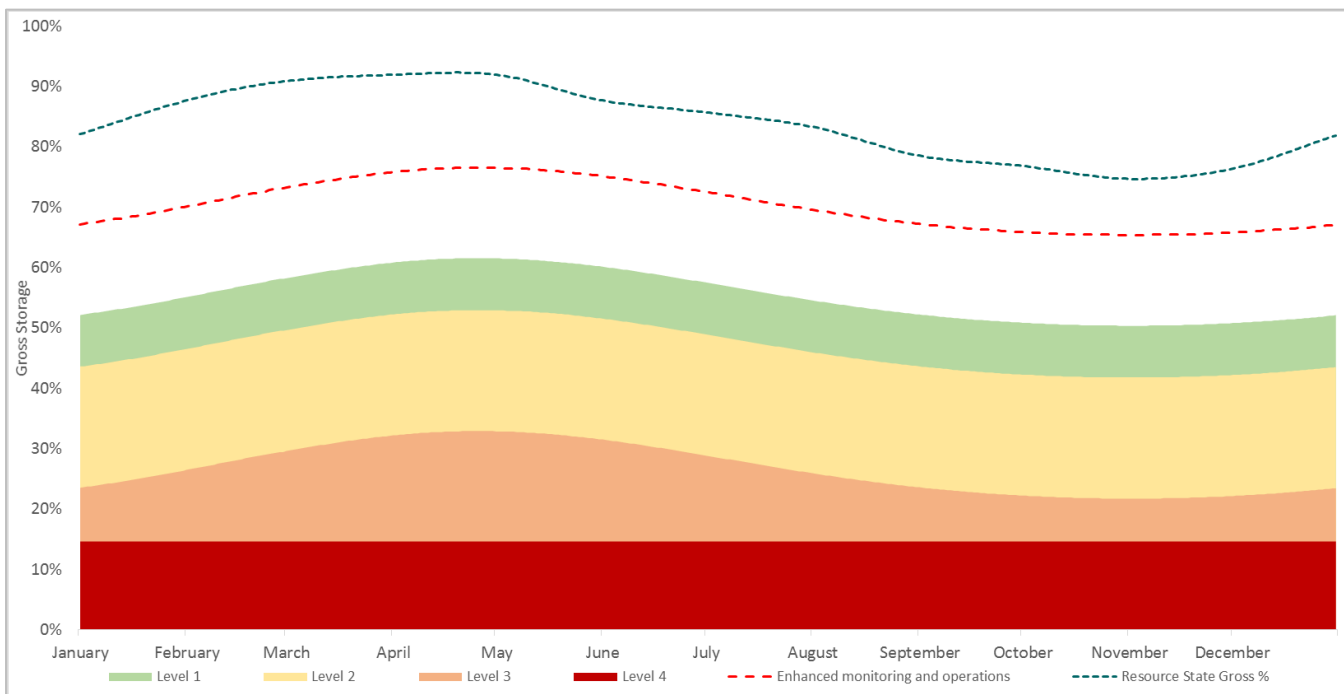


Figure 3: Haweswater drought levels

Our Dee System drought levels (Figure 4) have been designed to work with the Dee General Directions (DGD). These are a set of operating rules for the day to day operational management of the Dee Regulation Scheme governed by

Natural Resources Wales (NRW). We manage our abstraction from the River Dee in line with these directions, including reducing abstraction according to the various drought stages in the DGD.

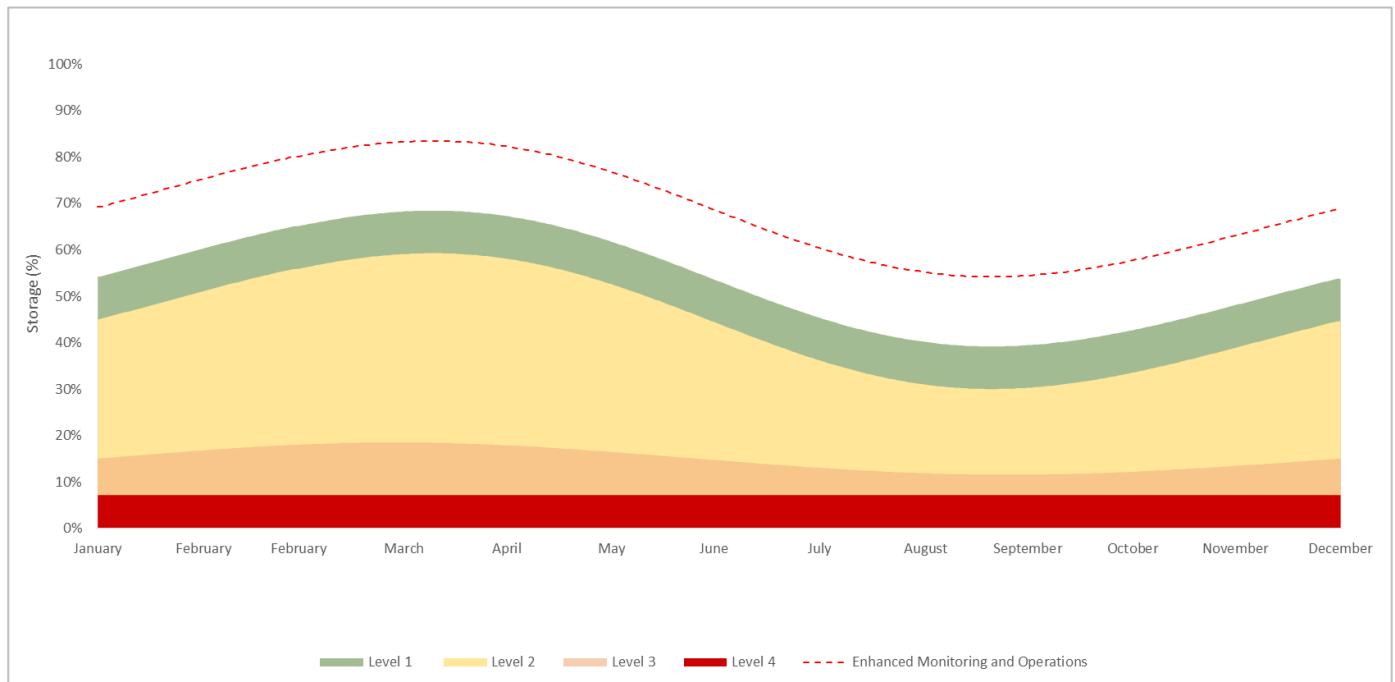


Figure 4: Dee drought levels

Table 4 shows the estimated frequency of crossing the Haweswater Reservoir and Dee system drought levels. Our current minimum level of service for introducing a temporary use ban is 1 in 20 years. This action is contained within Drought Level 2, which as illustrated in the table, shows us meeting this service level for both sources.

Table 4: Estimated likelihood of restrictions in the Strategic Resource Zone

Level	Strategic <sup>2</sup> Return Period	Annual risk
Level 2 (Temporary use bans and drought permits)	>1 in 20 years <sup>3</sup> Drought permits 1 in 40 from 2025	<5%
Level 3 (Non-essential use bans)	>1 in 100 years	<1%
Level 4 (Emergency restrictions)	>1 in 500 years	<0.2%

### 2.3.2 Carlisle Resource Zone

The Carlisle Resource Zone, though still conjunctive in nature, is simpler than the Strategic Resource Zone. Carlisle Resource Zone is a surface water only resource zone and is much smaller in size compared to the Strategic Resource Zone. Castle Carrock Reservoir has been identified as being the best indicator of water availability for the zone. The drought levels shown in Figure 5 are flat instead of varying throughout the year because of the relatively short amount of time the reservoir can go from full to empty, which can be described as a 'critical draw down period'. This term is given to this reservoir because of the hydrologically 'flashy' catchments (river flows may recede and in turn recover rapidly following rainfall) that supply water to the reservoir, which can cause this particular reservoir behaviour. As a result winter droughts could also pose a risk to supplies.

<sup>2</sup> The likelihood of restrictions is dependent on a range of future uncertainties such as weather, climate change and customer demand for water. For this drought plan we have estimated the likelihood of restrictions across a range of different conditions and the returns periods quoted in the table are exceeded in all cases.

<sup>3</sup> Drought permit return period to be higher than stated due to implementation after temporary use bans

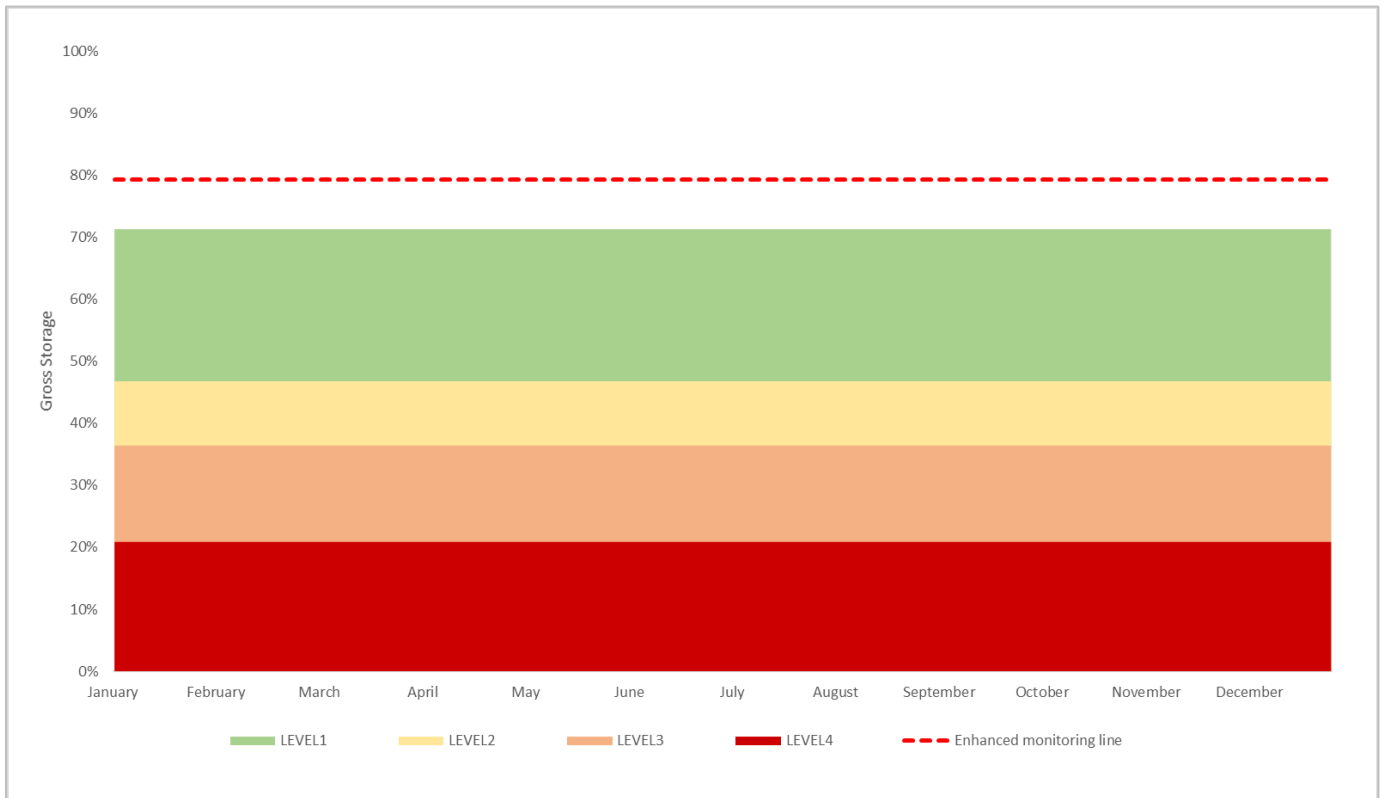


Figure 5 Castle Carrock drought levels

The likelihood of crossing into each of the drought levels is shown in Table 5. Our current level of service for introducing a temporary use ban is 1 in 20 years at drought level 2. The return periods show that Carlisle is resilient to beyond this level of service.

Table 5: Return period for each reservoir in the Carlisle Resource Zone

Level	Carlisle Return Periods	Annual risk
Level 2 (Temporary use bans)	>1 in 20 years	<5%
Level 3 (Non-essential use bans)	>1 in 100 years	<1%
Level 4 (Emergency restrictions)	>1 in 500 years	<0.2%

### 2.3.3 North Eden Resource Zone

The North Eden Resource Zone is groundwater dominated. The drought levels have therefore been developed for boreholes: Bowscar, Cliburn, Eden Hall, Gamblesby and Tarn Wood. Since the drought levels are assigned to these boreholes, the levels are linked to the usage of the combined annual licence total for all the boreholes. The drought levels are only at risk of being crossed towards the end of the year. These drought levels are shown in Figure 6.

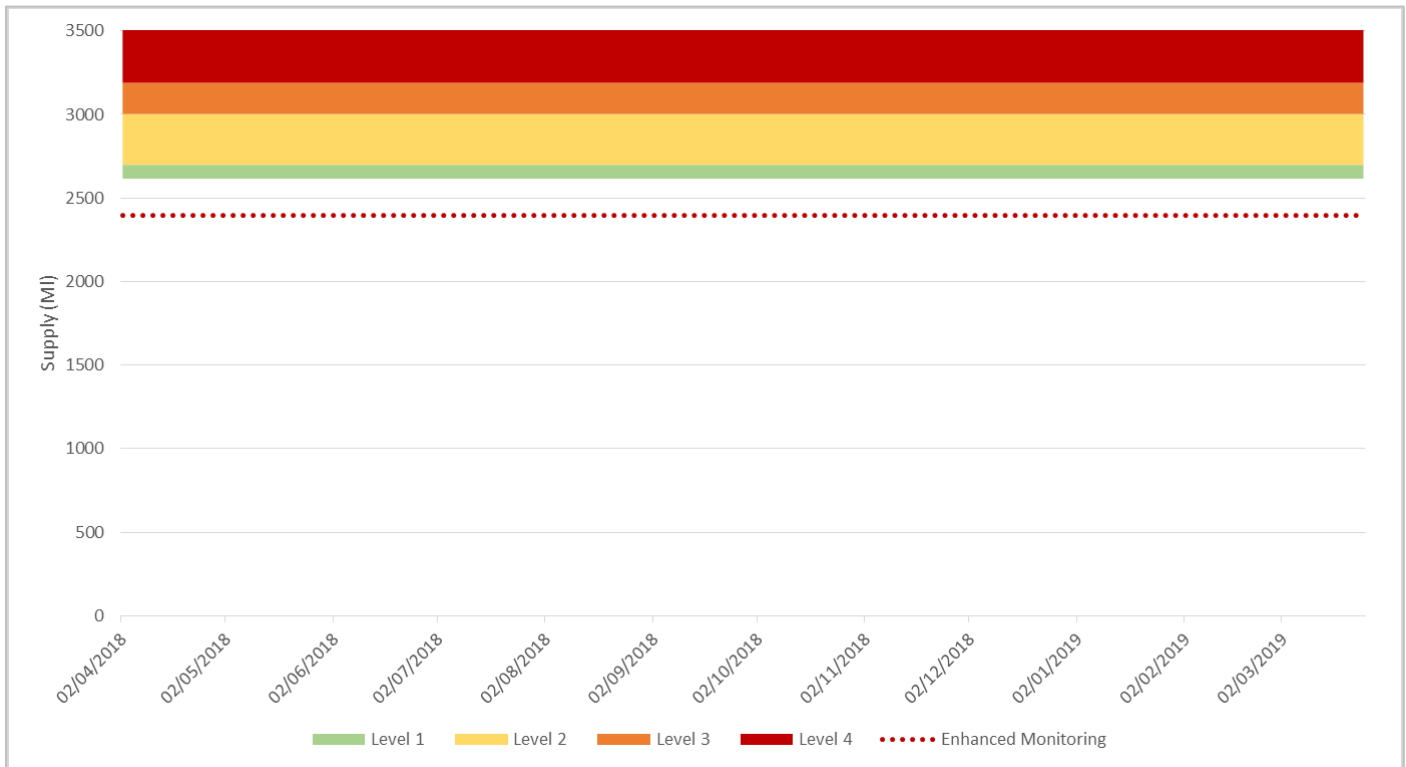


Figure 6 North Eden borehole system drought level

The likelihood of crossing into each of the drought levels is shown in Table 6. Our current level of service for introducing a temporary use ban is 1 in 20 years at drought level 2. The return periods show that North Eden is resilient beyond that level of service.

Table 6: Return period for boreholes in the North Eden Resource Zone

Level	North Eden Return Period	Annual risk
Level 2 (Temporary use bans)	>1 in 20 years	<5%
Level 3 (Non-essential use bans)	>1 in 100 years	<1%
Level 4 (Emergency restrictions)	>1 in 500 years	<0.2%

### 2.3.4 Barepot Resource Zone

Barepot Resource Zone is a simple single surface water source (River Derwent) system. The drought levels shown in Figure 7 have been defined by the flow in the River Derwent, which will determine if abstraction can take place, the Q95 is 304 ML/d.



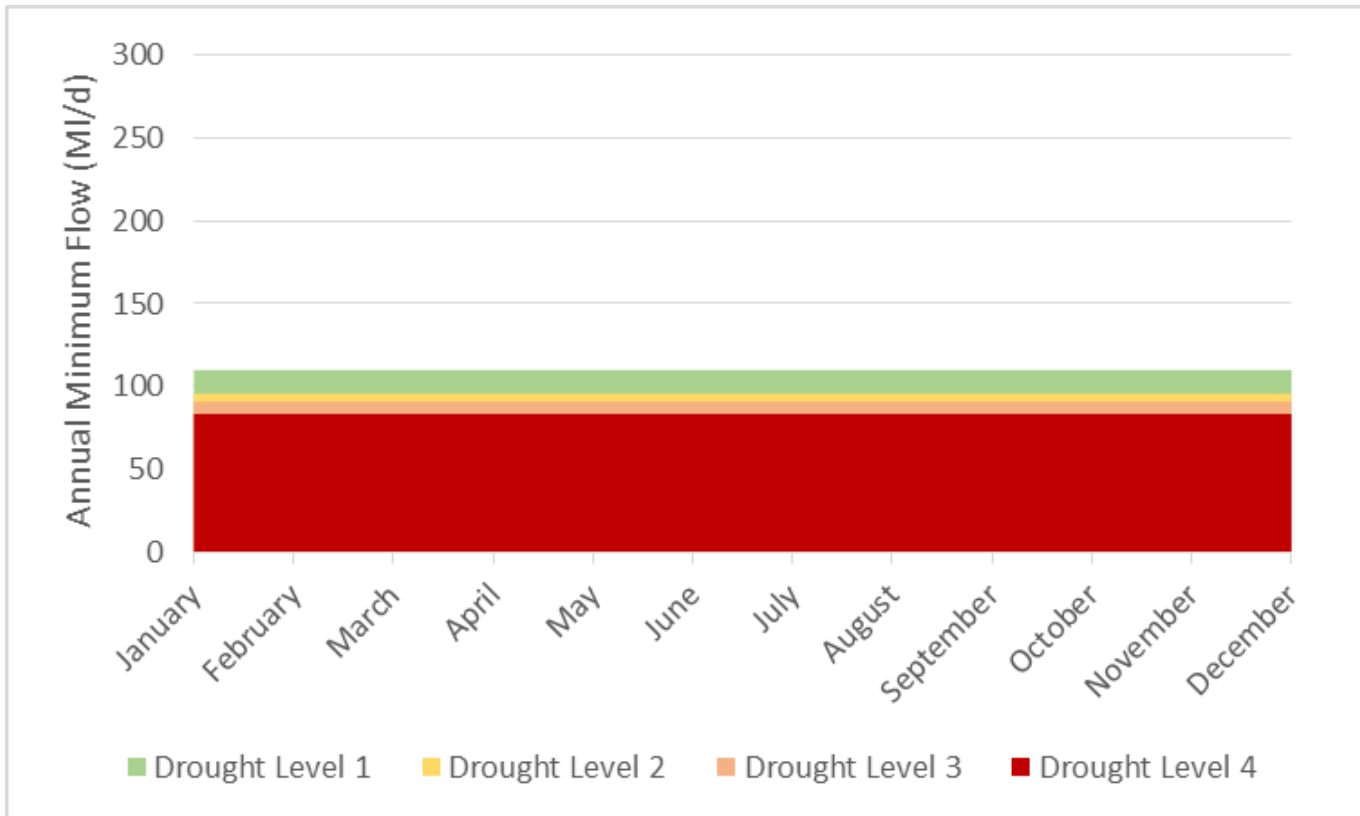


Figure 7 Barepot river flow drought levels

The likelihood of crossing into each of the drought levels is shown in Table 7. The crossing of these levels would result the action detailed in Table 9.

Table 7: Return period for river flow in the Barepot Resource Zone

Level	Barepot
Level 1	1 in 50
Level 2	1 in 100
Level 3	1 in 200
Level 4	1 in 1000

## 2.4 Drought-management actions

This section explains the drought management actions that we would consider taking during dry weather. The order of the actions has been carefully considered to protect the environment and customers' supplies. We identify four categories of drought-management actions:

- Operational actions;
- Demand-side actions;
- Supply-side actions; and
- Drought permit or order actions.

Drought-management actions may be applied company-wide, across a resource zone, or to target a specific geographical area, depending on the nature of the drought at the time. The drought levels set out in the previous sections are designed to provide enough time between them to allow the drought-management actions to be effectively taken in turn. Within the levels we will review possible actions, and decide the most appropriate course of action in a particular drought situation. It can take time to implement actions and not all actions will be appropriate in a given situation and therefore they will not all be implemented immediately after a level is reached.

During drought periods we actively work to protect and support the environment. For example, having set trigger levels across all our reservoirs detailing when we need to undertake water quality monitoring to inform the need for fish and/or crayfish rescues. We also support a multi-agency approach to deal with agricultural issues and moorland fires. We affirm our continuing commitment to providing such support in the future.

### 2.4.1 Operational actions

Operational actions are a set out in Table 8. The operational actions relate to the availability of our water sources and the setup of our supply network. Once actions are implemented they will reduce the chance of crossing into the next drought level and preserve our water resources to ensure supply to customers. For each resource zone there are a different set of actions depending on the complexity of the resource zone and the sources available. As the drought develops and the drought levels are crossed, the impact on customers and the environment due to the drought actions increases. We will continue the actions of the previous drought levels as the drought continues.

Table 8: Operational actions for each drought level and resource zone

Action	Strategic	Carlisle	North Eden	Barepot
<b>Enhanced monitoring and operations</b>				
Assess ongoing and planned outages and continuously monitor the water resource situation. Reduce outputs from local sources to sustainable levels	✓	✓	✓	✓
Issue internal reminder to closely control compensation and prescribed flows (these are managed closely at all times)	✓	✓		
Increase pumping and boreholes across the resource zone dependent on licence conditions, demand levels and water quality	✓	✓	✓	
<b>Level 1</b>				
Increase focus on water resources and balance system to ensure risk is balanced across the resource zone	✓	✓	✓	
Where necessary rezone the network to meet demand, including temporary pipelines or pumping stations	✓	✓	✓	
Where possible conclude or postpone ongoing and planned outages until zone recovery. Discuss mitigation plan for major outages with regulators.	✓	✓	✓	
Initial discussion with Environment Agency to review the use of water banks <sup>4</sup> (This is being discussed and will be updated for the Final Drought Plan <sup>5</sup> )	✓			
<b>Level 2</b>				
Apply for drought permits	✓		✓	
Implement drought permits where granted	✓		✓	
Engagement with Local Resilience Forums	✓	✓	✓	✓
Consider use of Deadwater in Castle Carrock reservoir (Supply side option)		✓		

<sup>4</sup> A water bank is a volume of water set aside to provide benefit for the environment; in particular to aid fish migration. The arrangements for release of this water are often defined in a Section 20 agreement (under the Water Resources Act 1991) with the Environment Agency. Some of our water banks are associated with abstractions affecting Habitats Regulations sites such as at Heltondale river intake and Thirlmere reservoir.

<sup>5</sup> We are discussing altering the Stocks reservoir water bank with the Environment Agency; depending on these discussions this option may be removed from future drought plans

Action	Strategic	Carlisle	North Eden	Barepot
Implement any actions agreed with the Environment Agency in relation to the use of water banks and their Windermere fish sluices	✓			
<b>Level 3</b>				
Consider all options to reduce the likelihood of level 4 actions (Appendices K 'Extreme drought measures')	✓	✓	✓	✓
Review locations and requirements for Level 4	✓	✓	✓	✓
<b>Level 4</b>				
Put in place standpipes and emergency planning procedures	✓	✓	✓	✓

## 2.4.2 Demand-side actions

All year round, we reduce leakage from our water network and encourage customers to be water efficient (e.g. through metering), in line with the programme of activity set out in our Water Resources Management Plan 2019. These activities play an important role in making sure we abstract a sustainable amount of water from the environment and meet the water needs of customers. Since PR19, we have committed to halving leakage and reducing per capita consumption, or PCC, (in a 'normal' year) to 110 litres by 2050.

During a drought, demand activities play a vital role in managing the event, along with other types of activities (supply, communications etc.). As a drought progresses, we will introduce more demand activities to maintain a secure water supply. We will ask customers to play their part to reduce usage through a series of phased interventions designed to deliver a targeted reduction in their demand at each point. These interventions combine a variety of activities, which are more specifically directed at customers and their particular circumstances, tariff type and lifestyle.

The savings required will be measured against the modelled peak of demand during a dry weather scenario to demonstrate whether customer usage is below, in line or above those predictions. Achievement of those savings will be tracked through a dynamic dashboard which will aggregate usage data from metered and unmetered customers and businesses and be operated in real-time to allow changes to be made in the interventions being used.

Therefore, anything we can do to increase demand savings will increase our resilience and reduce the risk of implementation of a temporary use ban. This is described in more detail in Appendix B and C.

In the sections below, we will describe the methods that we will use to reduce demand, which are:

- Water efficiency measures;
- Identifying and repairing leaks;
- Managing pressure in our water network; and
- Water use restrictions.

### Water efficiency measures

Since 2018, our communications strategy has been built upon using interventions which will encourage and lead to a change in customer behaviour, reducing demand for water. Pursuing this strategy to focus on understanding what drives the best response, and to which customer segment, means the likelihood of having to implement more formal restrictions is reduced. An analysis of the extent to which the likelihood of temporary use bans will be reduced by reducing demand is provided in Appendix C.

### Water Efficiency 365

Our always-on water efficiency strategy builds scale and momentum by taking an integrated approach to communications and interventions. The strategy aims to create awareness and appreciation of the true value of water and to drive long-term behaviour change by giving customers the knowledge, tools and motivation to act. For metered customers, this may mean increasing understanding of the value of water and how being water efficient

can save money. While for unmetered customers, we bring them up to the same level of understanding but unpack the story of how being more water efficient benefits the environment, encouraging them to install a meter.

In practical terms, awareness raising activities that we could use include broadcast channels, such as our sponsorship of the ITV weather bulletins in the Granada and Border areas, to place year round messages on water efficiency and leakage detection. These can be further reinforced with always-on social, video content and digital activity on channels such as Facebook, YouTube etc. promoting water efficient behaviour, tips and hacks, together with use of more traditional media and direct mailings, depending on the particular circumstances.

We provide support and education to schools in order to share knowledge regarding the importance of saving water. Our online education hub supports both parents and teachers with engaging material containing educational videos, worksheets and quizzes with messages such as water efficiency, leaks and flushables. This has also been done in conjunction with Kingfisher and Lake District National Park Authority. We will continue to promote our education offering on our website and social media channels.

In parallel to the above, we use meter data analysis to identify high usage consumers across the region. These populations are subsequently targeted through a rolling weekly direct email programme, using research informed insights to tailor messaging to various demographic segments and delivering tips and hacks, ultimately aiming to 'nudge' them into more water efficient water behaviour.

We promote metering throughout the year and will ramp up this promotion in times of drought. We are also currently implementing an enhanced metering programme, where we will be proactively installing meters to better understand water use, but also to engage with customers regarding their water use. Through this programme, we will be encouraging customers to move to a measured bill via dual billing and our lowest bill guarantee, but the meters will allow us to identify high users and potential leaks, so we can target interventions more effectively. Where the customer is willing, have high consumption and/or for those identified with a leak on their property, we will carry out a water efficiency home audit to provide water efficiency advice, fit devices and fix simple leaks, where applicable.

### Agile Communications

We have developed an agile communications approach that aims to reduce water usage through customer led behaviour, understanding the right incentives to encourage and sustain this, as well as how and when best to encourage voluntary restraint. This also enables us to deliver a dynamic plan in recognition of the fact that there may be different external factors operating within the wider context of the drought, some of which could impact response to the interventions – as seen most recently in the case of the Coronavirus pandemic.

Our communications encompass a flexible plan that uses a wide range of innovative channels so it adapts to being as effective as possible at reducing water usage. Our customer communications response is informed by a number of key inputs, such as:

- How severe is the dry weather event and how widespread? Is there more specific and local activity required or is this applicable to the region in general?
- How high are current demand levels?
- What intervention and message will encourage the necessary change in behaviour and for which audience – such as whether a metered or non-metered customer or whether they have particular needs, such as Priority Service customers?
- What else might be happening which impacts or influences the behaviour of customers at that time – whether that is in respect of how they are using water or other macro or micro factors affecting their communities, such as the Covid pandemic of 2020, or cultural influences, for example Ramadan
- What other factors will be important to support and encourage water-saving with others, such as businesses and sectors for example agriculture or market gardening
- How else, who else and what else can support the awareness of the messaging and help drive customers to adapt their behaviour – so setting community based incentives around water saving to raise funds for an important local cause, using education as a route to inform and influence families, utilising environmental or customer champions to target the right message to the right customer or partnerships with others which



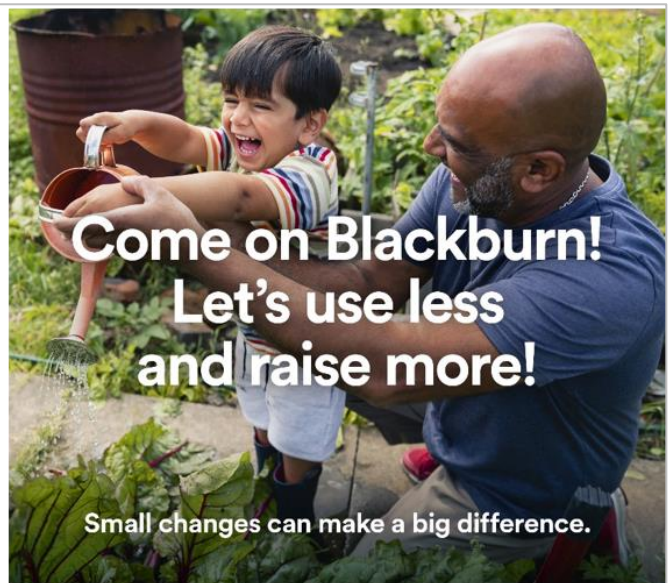
might generate incentives, such as other retailers and manufacturers where there's a water footprint in their products and services

- What mix of channel activation (described in Appendix B) is required – whether that is to ensure reach and inclusivity, to allow for more targeting to specific audiences or locations, whether speed of deployment is critical or whether there are any limitations on some aspects, such as face to face activities within the community

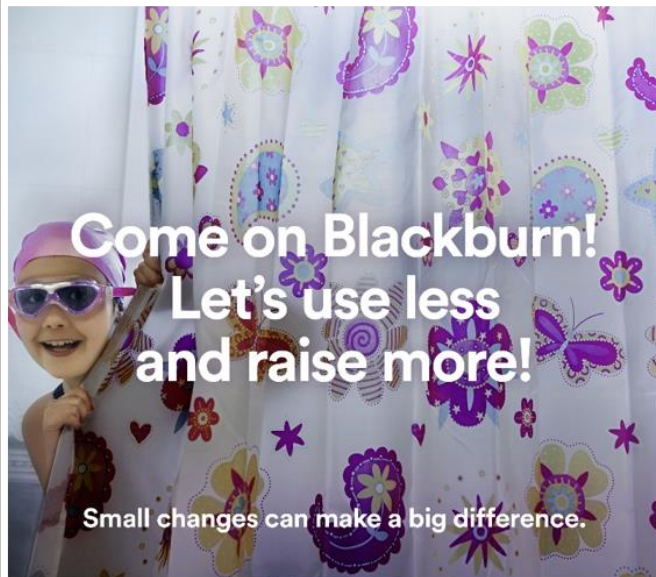
The water efficiency campaign is continuously evaluated and adapted to improve its effectiveness. In Appendix B, we provide further details of how our agile communications works and set out the channels that will be used. These range from conventional approaches such as direct communications and traditional media advertisements to innovative social media campaigns. Specific examples of these are provided below.



Water for the North West



Water for the North West



Water for the North West



Water for the North West





## Community based trials

In the dry summer of 2020, we developed two community based water-saving incentives. These were designed to encourage residents in two specific areas where we could see higher than average consumption to achieve a target which would raise money for a popular local cause.

This approach enabled us to engage a wide network of influencers in those areas to get behind the cause, such as hospices and their supporters, schools and clubs. This also generated media coverage in newspapers and on the radio.

The trials asked the respective communities to aim to save 10 litres of water per person per day to achieve an overall target saving of 100 million litres over the campaign period, with ways on how to save.

These targets were achieved with the help of those communities and donations, totalling £50,000, made to the two local hospices. There is more information on this approach and other interventions used in Appendix B.

## Messages for communication at each Drought Level

Our agile approach provides the flexibility to achieve the most effective method of behaviour change. However, we also have a Green, Amber and Red framework which helps influence the tone of our messaging in line with each drought Level. Our PCC targets demand an 'always on' aspect to our water efficiency advice and communications to customers throughout the year. This activity is enhanced and becomes more intensive during the 'enhanced monitoring and operations' level and will strengthen thereafter within Levels 1, 2 and 3. This is shown in Table 9 below. The plan also describes the lead-in times for the actions and the frequency of communications. These actions and key messages are also aimed to influence customer's behaviour accordingly to help achieve our targeted demand saving benefits.




The Green and Amber levels relate to our 'Let's all save' campaign and will be used as escalation to reduce demand and promote customer behavioural changes. The levels will also be an indication to introduce additional trials and techniques such as community and individual incentive tests in order to achieve our demand saving benefit targets.




These are outlined in Appendix B and will use data and images to evidence the impact of dry weather on the wider community and environment.

The Red status will come into force during level 1 and will continue through levels 2 and 3 with increasingly strong messaging with a clear 'Act now' call to action, also positioned to avoid the use of formal enforcement through voluntary restraint. By using this in addition to our agile approach, we will reduce demand, thus reducing the likelihood of the resource position worsening and therefore requiring further actions such as a temporary use ban and drought permits. The same messages to customers and stakeholders will apply when coming out of a drought. Once we are in 'Recovering from dry weather' status, we will use the same Green, Amber and Red methodology to progressively de-escalate the tone of our communications.

During a drought, we work with other relevant organisations to reinforce the message to save water and to help highlight the effect the drought is having on people and the environment (for example, wildlife habitats, gardens, rivers and lakes). Partnerships with some other organisations, such as the Royal Horticultural Society, enable us to provide more expert advice on how customers can be water-efficient in a number of ways and to ensure our advice is relevant to how water is being used around the home and garden at the time. Our detailed stakeholder engagement approach is provided in Appendix B.

Table 9: Key messages for behaviour change at each drought level

Drought Level	Audience	Message
Enhanced monitoring and operations	 Customers <i>Let's all save</i>	Enhanced water efficiency communications 1. The weather has been drier than normal and reservoirs are lower than we'd like for the time of year 2. You can help by saving water where you can around the home and garden 3. We have lots of ways to help you save water and money – get your free water saver's pack 4. If you spot a leak when out and about, please report it to us
	Internal	1. Assessment of current water resources situation (set up incident meeting) 2. United Utilities initiate operational actions to ensure resilience to drought 3. We have crossed our Enhanced monitoring and operations curve – the risk of drought is higher than normal 4. Keep a record of operational steps being taken to protect water resources and reduce demand
Level 1	 Customers <i>Please do what you can to save it now</i>	1. The weather has been drier than normal and reservoirs are lower than we'd like for the time of year 2. Please do what you can to use less – there are many ways to save 3. Increase region-wide messaging (Media and Radio sponsorship, social media messaging, direct messages) 4. Plan behavioural change campaigns (individual incentive tests, community incentive test) 5. Promote our campaign for voluntary use restraint
	 Customers <i>Act now - help us by using only what you need for essential purposes</i>	1. The weather continues to be drier than normal and this is now impacting the environment and our ability to keep water flowing for everyone 2. Act now to avoid restrictions 3. Analyse behavioural change campaign results (have we achieved our desired % benefit) 4. Provide updates on community incentive tests (progress towards incentive targets)
	Regulators and Stakeholders	1. We have crossed into Level 1 – we are implementing drought actions to manage the possible risk of a drought 2. Increased assessment of current water resources situation and updates on the actions we are taking. 3. EA and United Utilities dry weather meetings

Drought Level	Audience	Message
		4. Managing leakage and pressure 5. Please support us by promoting water efficiency and using your organisation's social media to raise general awareness of the dry weather and the need to save water
Level 2	 Customers – Phase 1 <i>Act now - help us by only using what you need for essential purposes</i>	1. The weather continues to be drier than normal and this is now impacting the environment and our ability to keep water flowing for everyone 2. Help avoid the need for restrictions by acting now 3. Only use what you need in the home and garden 4. Further updates on community incentive tests
	 Customers – Phase 2 <i>Introduce water use restrictions</i>	5. A Temporary Use Ban is in place (if restrictions are introduced, 2-5 days to implement) 6. Please visit our website or contact us if you feel you should be exempt from these restrictions 7. Drought permits/orders are now in place (application and approval required)
	Regulators and Stakeholders	1. We have crossed into Level 2 2. Assessment of current water resources situation 3. Updates on the actions we are taking (including water use restrictions and drought permit/order applications if appropriate) 4. Please support us by promoting water efficiency and restricting your own use of water where appropriate (e.g. vehicle washing) and using your organisation's social media to raise general awareness of the drought 5. Provide update on the situation in regards to Temporary Use Ban 6. Provide update on the status of drought permit applications
Level 3	 Customers	1. We have crossed into Level 3 2. Assessment of current water resources situation 3. We are taking further action to protect water supplies 4. Restrictions are now in place 5. A Temporary Use Ban is still in place 6. Drought permits/orders are still in place 7. Apply for ordinary drought order to restrict non-essential use of water by specified business customers 8. Implement non-essential use ban if application approved
	Regulators and Stakeholders	1. We have crossed into Level 3 2. Assessment of current water resources situation 3. Updates on the actions we are taking (including water use restrictions and drought permit/orders) 4. Provide updates on the situation in regards to Temporary Use Ban 5. Apply for ordinary drought order to restrict non-essential use of water by specified business customers 6. Implement non-essential use ban if application approved

### Identifying and repairing leaks

Driving an improvement in our leakage performance is an ongoing activity, but during a drought we will commit extra resources to detecting and repairing leaks. We will evaluate the effectiveness of these leakage reduction campaigns in reducing demand for water and will tailor activities to the weather conditions at the time. We will begin the preparations during the 'enhanced monitoring and operations' level, enabling the actions set out below to be delivered within drought level 1. As the drought gets more severe, we will continue to ramp up the activities to detect and repair leaks. See Appendix C for more details. We will:

- Increase resources for detecting and repairing leaks. This will include the usage of sensors to identify leaks more efficiently;
- Review and adapt our leakage targeting approach, ensuring we're reducing leakage in the areas supplied by water resources that are relatively low;
- Work with our partners and supply chain to speed up leak repairs;



- Work with local authorities and the Highways Agency to reduce the notice periods required before we can carry out a repair in the road;
- Increase advertisement of our free 'Leakline' service and online channels for customers to use to report leaks;
- Encourage customers to report leaks using tools such as our app;
- Increase the frequency of our leakage performance reviews and operational meetings; and
- Use our partner and United Utilities vehicles with digital messaging capability to run specific messaging across the region, alongside existing partner and United Utilities livery which now carries all-year round leakage related messaging.

During dry weather, leaks can become more volatile because of changes in how water is being used and the amount of moisture in the soil. Changes in soil moisture can cause the ground to move, which can also move our pipes and cause them to crack. Further information can be found in Appendix C.

### Managing pressure in our water network

In drought level 1, we will consider reducing the pressure in certain parts of our water network, to help reduce demand. A comprehensive assessment of customer impact and risk will be undertaken before any measures are implemented. This will ensure that key services are not impacted. As a drought develops, we may consider further reductions in pressure. Table 10 below shows the minimum pressure that would be targeted in parts of the water network where it is feasible to control.

We would concentrate on areas that would provide the biggest demand saving benefits and where there is a low risk of impacting customers and businesses. This activity will be communicated to customers through our Agile Communications (See Appendix B).

Table 10: Pressure-reduction scenarios

Drought Level	Level 1	Level 2	Level 3
Minimum pressure at the high point in the network	18 metres	15 metres	10 metres

### 2.4.3 Water use restrictions

There are three types of water use restrictions included in this plan:

- Temporary use bans;
- Ordinary drought orders to ban non-essential use; and
- Emergency drought orders.

In line with the UKWIR Code of Practice and the Guidance for Water Companies on Water Use Restrictions (2014):

- We have adopted a phased approach to demand restrictions, with voluntary measures coming before agile communications, temporary use bans and drought orders to ban non-essential use; and
- We will take demand restrictions on domestic customers before commercial customers.

Table 11: Water-use restrictions associated with each drought level

Level	Type	Action
2	Temporary use ban	<p>Primarily target domestic customers.</p> <p>Customers must not use hosepipes connected to the mains water supply to water gardens, wash cars, fill a domestic swimming pool, and similar uses. Exceptions will be offered to priority services and sensitive customers. We will apply all the discretionary concessional exceptions included in the UKWIR Code of Practice and Guidance for Water Companies on Water Use Restrictions (2014).</p> <p>A representation period is required prior to the implementation of a temporary use ban, this can be between 2 and 5 days.</p>
3	Drought order to ban non-essential use	<p>Primarily target commercial customers.</p> <p>The Drought Direction 2011 sets out the uses that can be banned including the use of mechanical vehicle washes, filling non-domestic swimming pools (exclusions include public pools) and using hosepipes to clean the exterior (including windows) of non-domestic buildings.</p> <p>We will apply all the discretionary concessional exceptions included in the UKWIR Code of Practice and Guidance for Water Companies on Water Use Restrictions (2014).</p>
4	Emergency drought order	<p>Put in place standpipes and emergency planning procedures, this would require an application to the Secretary of State.</p> <p>If water is cut off because of emergency drought restrictions the following applies:</p> <p>Household customers – we will automatically pay you £10 for each day (or part day) you are without water. The maximum we will pay is equal to the average household water bill the previous year.</p> <p>Non-household customers - we will pay £50 per day to a maximum of the amount of water charges payable by the customer for the premises for the previous charging year. If the customer has not paid a full year's water charge, or a third party is responsible for the water charges, a maximum of £500 applies.</p>

The benefit of a temporary use ban during the winter is considered negligible due to the limited use of hosepipes in the garden in particular. During winter droughts, we will increase communications to customers to reinforce how they can help save water and use water wisely inside the home (for example, by lagging pipes to prevent burst pipes in freezing temperatures). For this reason, we do not plan to introduce water-use restrictions during the winter (October to March). We may still consider applying for a drought permit in the winter however historically this has never been a requirement. The only drought permit that was in place during a winter was in 1995/1996, however this was implemented earlier in the year to aid with reservoir refill. If storage is below the relevant drought levels only for the Dee, and the storage is not required to regulate flows in the river, then we may not introduce water use restrictions as this may not benefit storage in the Dee regulating reservoirs. However, if there were wider zonal benefits, or a forecast that Dee regulation may be imposed, we would consider implementing water use restrictions.

### Measuring the success of water restrictions

During a drought, we will collect extra information on demand activities. This will help us quantify the benefit of the demand activities we have implemented, including the benefits of any water restrictions (see section 4 Appendix C for further details). The reasons for evaluation of success are:

- Refinement of the communications plan as per our agile communication methodology (See Appendix B);
- Refinement of operational activities during a drought; and
- Evidence to support Drought Permit applications (see Appendix D).

## 2.4.4 Supply-side Actions

Prior to the requirement for supply-side options we will operate our available licenced water sources in a drought appropriately to conserve water supplies. In the past, it has proven infeasible to bring non-commissioned sources online within the timescales of droughts which typically occur in the North West. A more effective approach is the regular use and maintenance of back-up sources, making sure they are quickly available. Therefore, we now use some previously non-commissioned sources during normal operation, which has the additional benefit of increased resilience to asset failure. During a drought, we will aim to increase the use of these sources (summarised in Table 12). We will also:

- Drive increased use of boreholes across the region (closer control to acceptable water quality blend);
- Enforce tighter compensation control (controlling closer to legal limits); and
- Utilise strategic pumping, where available.

The Carlisle Resource Zone has an additional supply-side option which can be used, placed under drought level 3 (Table 12). We are currently reviewing options for emergency drought supply options in the West Cumbria area.

Table 12: Detail and total benefit of each supply-side option (previous supply-side options are included to show change to business as usual)

Source	Deployable Output (Ml/d) (estimated in a drought)	Estimated time to implement	Benefit
Castle Carrock reservoir, deadwater storage	6.0	1 month	Carlisle Resource Zone
Stockswell boreholes (Previous drought plan option now available)	8.0	Available under normal operation	Strategic Resource Zone, with local support to the Widnes area
Netherley boreholes (Previous drought plan option now available)	9.0	Available under normal operation	Strategic Resource Zone, with local support to the Widnes area
Pex Hill boreholes (Previous drought plan option now available)	5.8	Available under normal operation	Strategic Resource Zone, with local support to the Widnes area
Water Lane boreholes (Previous drought plan option now available)	6.2	Available under normal operation	Strategic Resource Zone, with local support to the Widnes area

## Outage management

Outages are periods of time where some of our assets are unavailable, or only available at reduced capacity, because we are carrying out essential maintenance or repair work. Outage also includes reservoir drawdowns, where the level in a reservoir is reduced in order to carry out work. We continuously plan for these outages taking place to ensure we have a resilient supply of water for customers. When a drought situation is developing, we will more regularly assess all ongoing and planned outages as part of Enhanced Monitoring and Operations operational actions (Table 8) to determine the appropriate set of actions to take as part of our response to a drought, which may include:

- Postponing upcoming planned outages;
- Accelerating the conclusion of ongoing outages; and
- Mitigating impacts of ongoing outages which cannot be concluded early, by using other sources for example.

As part of our regular liaison with the Environment Agency we will provide a forward look of upcoming major outages in our quarterly Water Resources Liaison reports, so that if necessary, we can discuss our mitigation plan to minimise the impact of outages on our ability to respond to drought should one occur.

### 2.4.5 Drought permits and orders

We may need to use drought permits and orders due to the risk a drought becoming worse and resulting in the loss of supply to customers and the environment. We must apply for these permits and orders early enough to allow enough time for them to be considered by the relevant permitting authority and if granted, to protect the availability of water supplies for customers.

We could potentially need a drought permit or order at any of our abstraction sources across the region, however it is unlikely at most locations. By looking at historical events and modelling future scenarios we have identified the locations where we think there is a reasonable possibility that we may need to apply for a drought permit or order. In extreme circumstances there could be other locations that are required in the future and in this case we would liaise closely with the Environment Agency, Natural England and other relevant stakeholders. These drought permits or orders would then be added to our drought plan.

Table 13 lists the locations we have identified as potentially needing a drought permit, together with details of the action we would apply for and a summary of the potential impact on the environment. For several locations there is more than one possible option for the drought permit conditions sought. This is because what we would need to do depends on the situation at the time. We have prepared environmental assessment reports for each of the drought permit options in the drought plan. These reports include an environmental monitoring plan and mitigation proposals and have been prepared in consultation with the Environment Agency, Natural England and Natural Resources Wales (where appropriate) to ensure they are application ready. The environmental monitoring plans detail baseline, pre/during and post-implementation monitoring required for each drought permit. Baseline monitoring has been undertaken to provide strong baseline datasets against which to assess drought permit impacts. A programme of baseline monitoring has been undertaken and is regularly reviewed and updated where appropriate.

A Strategic Environmental assessment (SEA) and Habitats Regulations Assessment (HRA) of the drought plan have also been undertaken in parallel with plan development. These were published for consultation alongside our draft plan. We have updated these documents in line with comments received (and detailed in our Statement of Response). The updated assessments have been uploaded on to our website alongside this revised draft drought plan.

Not all of the actions would necessarily be taken to their fullest extent, and further drought permits or orders not included in Table 13 may be needed. There is no guarantee that any of the potential drought permits or orders would be granted, and each application we make would need to be assessed by the Environment Agency, Natural England, Natural Resources Wales or Defra/Welsh Government (as appropriate).

At drought level 2 we would consider the need for a drought permit or order and prepare the information we would need to provide to apply. We have experience of applying for permits during past events and have template applications ready should we require a drought permit in an event. We would discuss any plans for drought permits or orders with the relevant environmental regulator (the Environment Agency, Natural England or Natural Resources Wales) and Defra/Welsh Government. The drought permits listed in Table 13 are a suite of options; the permits used during a drought will be determined by the type of drought, time of year and season of implementation. The environmental impact of each permit will also be influenced by the time of year it is implemented.

Table 13: Potential drought permit sites for public water supply resources

Drought permit site	Drought permit conditions	Habitats Regulations Assessment conclusion	Environmental Impact	Low/Medium/High impact
<b>Strategic Resource Zone</b>				
<b>Delph</b>	Reduce compensation flow from 3.7 to 1.0 MI/d	No likely significant effects (alone and in-combination)	Minor impacts with moderate impacts on trout only if implemented in late autumn/winter	Low
<b>Dovestone</b>	Reduce compensation flow from 15.9 to 10.0 MI/d or to 5.0 MI/d	No likely significant effects (alone and in-combination)	Minor impacts with moderate impacts on some fish species in some months	Low/Medium
<b>Fernilee</b>	Reduce maintained flow from 13.6 to 6.8 MI/d	No likely significant effects (alone and in-combination)	Moderate impacts on fish species all year, minor impacts on other receptors	Medium
<b>Jumbles</b>	Reduce compensation flow from 19.9 to 12.0 MI/d or to 6.0 MI/d	No likely significant effects (alone and in-combination)	12MI/d - Minor impacts 6MI/d - Moderate impacts	Low Low/Medium
<b>Longdendale</b>	Reduce compensation flow from 45.5 to 22.5 MI/d or to 15.0 MI/d	No likely significant effects (alone and in-combination)	Moderate impacts on fish/minor impacts on other receptors (both options)	Low/Medium
<b>River Lune LCUS</b>	Reduce hands-off flow from 365 to a minimum of 200 MI/d	No likely significant effects (alone and in-combination)	Minor impacts	Low
<b>Rivington (Brinscall Brook)</b>	Reduce compensation flow from 3.9 to 2.0 MI/d	No likely significant effects (alone and in-combination)	Moderate impacts on fish species all year, minor impacts on other receptors	Low/Medium
<b>Rivington (White Coppice)</b>	Reduce compensation flow from 4.9 to 2.0 MI/d	No likely significant effects (alone and in-combination)	Moderate impacts on fish species all year, minor impacts on other receptors	Low/Medium
<b>Ullswater</b>	Reduce hands-off flow to a minimum of 175 MI/d and relax 12-month rolling abstraction licence limit	No likely significant effects (alone and in-combination)	Negligible	Low (negligible)
<b>Lake Vyrnwy</b>	Reduce compensation flow from 45.0 to 25.0 MI/d	No likely significant effects (alone and in-combination)	Minor impacts	Low



Drought permit site	Drought permit conditions	Habitats Regulations Assessment conclusion	Environmental Impact	Low/Medium/High impact
<b>Windermere</b>	Reduce hands-off flow to a minimum of 95 MI/d and relax 12-month rolling abstraction licence limit	No likely significant effects (alone and in-combination)	Moderate impacts on some life stages of fish (seasonally dependent)/minor impacts on other receptors	Low/Medium
<b>North Eden</b>				
<b>Bowscar boreholes</b>	Increase annual licence limit to enable continuation at the maximum daily abstraction rate	No likely significant effects (alone and in-combination)	Minor	Low
<b>Gamblesby boreholes</b>	Increase annual licence limit to enable continuation at the maximum daily abstraction rate	No likely significant effects (alone and in-combination)	Minor	Low
<b>Tarn Wood boreholes</b>	Increase annual licence limit to enable continuation at the maximum daily abstraction rate	No likely significant effects (alone and in-combination)	Minor	Low

As part of the Environmental Assessment Report (EAR) for each drought permit, the impact on social-economics, tourism, recreation and other abstractors has been assessed. We are confident that the significance of impact from a drought permit on these elements in general are minor (and in some cases beneficial). In the event that a drought permit is proposed, we will discuss the potential risks with specific users (e.g. non-consumption Hydropower schemes and boating companies).

For compensation-only reservoirs, which have no link to public water supply system but remain assets of United Utilities, the drought levels are slightly different as the only output is the compensation flow released to the downstream river to protect the environment. The monitoring of reservoir storage against drought triggers and preparing a drought order application are the responsibility of the Water Company; however it is the Environment Agency which is responsible for applying for the drought order to Defra (this change has been made in line with the latest guidance). Appendix G sets out the drought triggers (drought triggers not levels are used for compensation-only reservoirs) and resilience assessments for the compensation-only reservoirs.

Where the storage in one of our reservoirs is getting close to deadwater, environmental assessments and monitoring will be undertaken to determine the impact the drought is having on fish and habitats. These assessments will also determine any extra actions we need to take to protect the environment.

#### 2.4.6 Extreme drought measures

The tests that we have carried out on our drought levels indicate that with the benefits from using drought permits or orders and the supply-side options set out in this plan, we would not need to use standpipes and rota cuts under historic drought scenarios. Our assessments indicate that if the worst drought on record is repeated, our reservoirs

will not run dry, but they will drop to very low levels. Before this happens, we would have to take action to protect water supplies in case the drought became more severe. So we would need to introduce water-use restrictions and drought permits or orders before low reservoir levels were reached. Appendix K sets out the extreme drought measures we would consider before introducing standpipes and rota cuts, in a worse than historic drought.

In very extreme droughts, where there might be no water supply at customers' taps, under the Civil Contingencies Act (2004) and the Security and Emergency measures Direction (1998) we would work with Local Resilience Forums to implement supply plans that will be agreed with them for the emergency distribution of safe water.

## 2.5 Incident management structure

If there is a drought, we will decide on the most appropriate management structure to deal with the developing situation. Table 14 shows a typical management structure which we may adopt within our company. Within the Drought coordination group the members will lead task teams (for example Network Leakage task team), and report the situation into the incident meetings for decision and sign-off. Depending on the decision this may be made at the Drought coordination group or the Executive Drought management Group. Agreed actions will be introduced in areas where they are considered appropriate. This will depend on the current circumstances.

Table 14: United Utilities drought management structure

Responsibility	Group
<b>Overall responsibility for drought policy and management decisions</b> (including decisions on water use restrictions and applications for drought permits/orders)	United Utilities Water Limited Board
<b>Responsibility for implementing drought management strategy</b> This group will be established at Drought level 1 (meeting once a week)	Executive Drought Management Group, comprising: <ul style="list-style-type: none"> <li>• Director of Water, Wastewater and Digital Services (chair) (from drought level 3 - Chief Executive);</li> <li>• Corporate Affairs Director;</li> <li>• Customer and People Director;</li> <li>• Environment, Planning and Innovation Director (link to United Utilities/Environment Agency Executive Liaison Group);</li> <li>• Operation and Emergency Planning Manager (link to Drought Coordination Group);</li> <li>• Water &amp; Wastewater Network Director;</li> <li>• Water Treatment Director; and</li> <li>• Head of Central Operations.</li> </ul>

Responsibility	Group
<p><b>Day-to-day responsibility for managing and implementing the drought plan</b></p> <p>This group will be established at Drought level 1 (meeting once a week) the frequency of meetings will increase to twice a week at Drought level 2</p>	<p>Drought Coordination Group, comprising leaders from the following business areas:</p> <ul style="list-style-type: none"> <li>• Operation and Emergency Planning Manager (link to Executive Drought Management Group);</li> <li>• Head of Water Strategy and Planning (link to United Utilities/Environment Agency Drought Liaison Group and the Environment Agency Multi-Agency Drought Group);</li> <li>• Head of Environment Regulation and Strategy;</li> <li>• Corporate Affairs;</li> <li>• Customer and People;</li> <li>• Water and Scientific Services;</li> <li>• Water Network Operations; and</li> <li>• Media and Stakeholders.</li> </ul> <p>A Drought Manager will be appointed (in line with our incident management procedure) and will be the Chair of the Drought Coordination Group.</p> <p>Specialist task teams will be established as required.</p>

## 2.6 Agreements with other licenced water suppliers

At the time of writing this plan (August 2021), there are three companies, from which we import water to supply customers within our geographical area through our supply system, these are: Hafren Dyfrdwy; Northumbrian Water Ltd; and Severn Trent Water Ltd. We also export to Dŵr Cymru Welsh Water and Leep Water Networks Ltd and Severn Trent Water Ltd.

A summary of all imports and exports is provided in Table 15. Our drought plan consultation process has included these licensed suppliers operating in our area, with whom we share imports/exports.

Table 15 Summary of import and export arrangements with other companies.

Import/Export	Water Undertaker	Resource zone	Amount (MI/d)	Information
Imports	Hafren Dyfrdwy	Strategic	0.03	Crewe by Farndon
	Northumbrian Water Ltd	North Eden	1.3	Supply from Burnhope reservoir
	Severn Trent Water Ltd	Strategic	0.07	Mow Cop
	Severn Trent Water Ltd	Strategic	0.06	Oven Hill Road, High Peak
Exports	Dŵr Cymru Welsh Water	Strategic	28	Raw water transfer from River Dee at Heronbridge to Dŵr Cymru Welsh Water
	Hafren Dyfrdwy	Strategic	0.04	Bowens Hall Farm
	Leep Water Networks Ltd	Strategic	4.56	Inset Appointee for Media City, Liverpool International Business Park and No.1 Old Trafford.
	Northumbrian Water Ltd	Carlisle	0.3	Reaygarth
	Severn Trent Water Ltd	Strategic	0.678	Congleton Edge Road
	Severn Trent Water Ltd	Strategic	16	Llanforda (emergency connection, used by exception for contingency purposes)

Within our area, Leep Water Networks Ltd operates as an Inset Appointee for:

- Media City in Salford, Greater Manchester;
- Liverpool International Business Park; and
- No 1. Old Trafford, Trafford Wharf in Stretford, Manchester.

During times of drought and water use restrictions, Leep Water Networks Ltd have agreed to mirror the same restrictions that we implement<sup>6</sup>.

We also have an emergency only connection with Yorkshire Water.

Shared water sources are:

- The River Dee;
- Lake Vyrnwy; and
- Burnhope Reservoir.

See Appendix K (Extreme drought measures) for our commitment to explore further supply options with other companies.

### 2.6.1 Shared water source – River Dee

We abstract water from the River Dee at various locations to supply both potable and non-potable customers. In addition to us, other abstractors from the River Dee include Dŵr Cymru Welsh Water, Severn Trent Water, Hafren Dyfrdwy and the Canal and River Trust. The River Dee is managed by Natural Resources Wales through a regulation scheme. Our abstractions are governed by the River Dee General Directions (Natural Resources Wales, 2020) which set out rules for abstraction during drought conditions and are approved by the statutory Dee Consultative Committee. If storage in the River Dee regulation reservoirs falls to the drought action trigger level, a meeting of the Committee will take place to discuss the introduction of drought alleviation measures as enshrined in the Dee General Directions. To conserve water supplies and ensure efficiency of operation, we provide a weekly abstraction forecast to Natural Resources Wales to assist in calculating the required releases from the Dee system reservoirs.

### 2.6.2 Shared water source – Lake Vyrnwy

Lake Vyrnwy is owned by Severn Trent Water. However, we have an abstraction licence allowing us to abstract water from the reservoir to supply customers in Merseyside and parts of Cheshire. Lake Vyrnwy is also used to regulate the River Severn, from which other water companies abstract including Severn Trent Water, South Staffordshire Water and Bristol Water. The Environment Agency and Natural Resources Wales, working with relevant water companies and stakeholders, manage the River Severn regulation system. The Environment Agency is responsible for applying for a River Severn drought order to reduce the prescribed flow at Bewdley to prolong storage in Llyn Clywedog Reservoir, enabling regulation to continue supporting the environment and public water supply needs for as long as possible during a severe drought. The Environment Agency and Natural Resources Wales reviewed the process for such applications in 2013, in consultation with all relevant water companies, stakeholders and the public. This ensures that water company drought plans and the Environment Agency's plans are aligned. During drought conditions, we will liaise with the Environment Agency to discuss potential management actions for the River Severn system.

We have the provision to provide Severn Trent Water with up to 16 Ml/d of treated water sourced from Lake Vyrnwy, for emergency use only up to a maximum period of 28 days in any instance.

<sup>6</sup> See [https://www.leeputilities.co.uk/s/Leep\\_Water\\_Final\\_Drought-Plan-2018\\_100620.pdf](https://www.leeputilities.co.uk/s/Leep_Water_Final_Drought-Plan-2018_100620.pdf)

### 2.6.3 Shared water source – Burnhope Reservoir

---

We have a bulk supply agreement with Northumbrian Water who supply treated water to the Alston area of Cumbria (North Eden Resource Zone) from Burnhope Reservoir. The agreement is for Northumbrian Water to provide a bulk supply of non-fluoridated, potable water up to a maximum of 1.3 Ml/d. The maximum import volume provides sufficient headroom to meet demand in drought conditions. Discussions with Northumbrian Water have confirmed that the full import volume is reliably available under drought conditions.

### 2.6.4 Other connections

---

In addition to the shared water sources of the River Dee, Lake Vyrnwy and Burnhope Reservoir, we also have a number of inter-company connections with Hafren Dyfrdwy, Severn Trent and Yorkshire Water, covered by small supply agreements. These imports/exports are a mixture of continuous and emergency only supplies to small areas. Under these agreements, customers would be subject to water use restrictions imposed by the company who they pay their bill to, rather than the company that physically supplies their water.

In addition to the shared water source of the River Dee, United Utilities and the Canal and Rivers Trust have a shared interest in other water sources, such as Hollingworth Lake and Chelburn reservoir. These are owned by United Utilities but our compensation flow releases provide inflows to the canal network.



# 3 After a drought

A range of indicators will be used to identify when a drought has ended. Those indicators include the following:

- The level of water at key reservoirs compared against the drought levels
- Relative water levels across the resource zone
- Current demand compared to normal demand
- Rainfall and weather forecasts for the next 7 to 30 days
- Previous rainfall and an assessment of whether the amount of moisture in the soil has returned to normal for the time of year
- The status of groundwater sources and levels at observation boreholes
- The availability of pumping from lakes and rivers to help reservoir levels to recover

The decision to withdraw a drought permit/order application (prior to its determination by the Environment Agency/Defra) or the early termination of a drought permit/order that is in force will be taken on a case-by-case basis taking account of the above indicators.

Our process for relaxing or ending drought actions will be based on continual assessments. We will discuss our proposals with the Environment Agency and Natural Resources Wales (as appropriate).

We will continue to communicate with customers, the Environment Agency, Natural Resources Wales, Natural England, Ofwat, the Consumer Council for Water and other interested parties during the period of recovery after a drought to explain our actions and to thank customers for their help. The way in which we will communicate is set out in Section 6 of Appendix B.

## 3.1 Lessons learnt

After a drought, a 'lessons learnt' report will be produced within six months of conditions returning to normal. We will engage with the Environment Agency, Natural England, Defra and Natural Resources Wales to review the drought, our drought levels, communications, environmental impacts, the effectiveness of drought options that were adopted, and alternative strategies that could be adopted in future droughts. We may need input from specific stakeholders (for example, other water companies, if the drought affected other regions). As each drought has different characteristics, such as the area affected and the water sources at risk, different lessons are learnt from each one. These joint lessons learnt can be used to identify improvements that can be made in the future. Where appropriate, the lessons learnt from previous droughts have been incorporated into this drought plan; Appendix A explains how we used the lessons learnt from the 2018 dry weather event.

The Environment Agency held a drought exercise in March 2017, attended by our Water Resources Manager, to provide a water company perspective. We held our first company drought exercise on 22 March 2016 at which the Environment Agency and Natural Resources Wales were also present. We commit to undertaking a drought exercise within 12 months of publishing our Final Drought Plan, to test the new drought levels and to raise awareness of the Drought Plan and processes across the business. If a drought occurs and as such tests our drought plan discussions will take place with the Environment Agency to decide whether a drought exercise is still required.