BRISTOL WATER

Bristol Water Drought Plan 2022

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Document Control Sheet

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Executive Summary

This Drought Plan explains Bristol Water's operational approach to the management of water resources during periods of drought. It has been produced in consultation with a wide range of external stakeholders. It is an operational plan that set out what actions we will take before, during and after a drought to maintain a secure supply of water to our customers and protect the environment if a drought were to occur under present circumstances and with existing infrastructure. The Plan includes information on the following:

- How Bristol Water defines a drought - the thresholds the company will use to define whether a drought has begun, the severity of the drought event, and when the drought can be considered to have ended.
- The operational management structure to be used during drought events.
- Measures the company will take to manage demand for water during a drought.
- Temporary measures the company may take to obtain additional water supplies and the environmental investigations associated with these options.
- Stakeholder communication and consultation the company will undertake during a drought, including working with neighbouring water companies and regional groups.
- How we will learn from any drought events.

Our response to drought set out in this drought plan reflects operation under our current company levels of service as set out below:

Bristol Water Level of Service

Drought Action	Bristol Water Level of service	EA level 1 to 4 definition
Temporary use bans (TUBS)	1 in 15 years on average	Level 2 restrictions (Drought Plan)
Drought Order – Non-essential use ban	1 in 33 years on average	Level 3 restrictions (Drought Plan)
Emergency drought order – partial supply and rota-cuts	1 in 200 years	Level 4 restrictions (Incident response)

The Plan is designed to meet the needs of customers and to protect the environment. It follows a range of guidance and legislation, including the Environment Agency's Drought Plan Guideline (Dec 2020) and the requirements of the Water Industry Act 1991 (as amended by the Water Act 2003). The Plan is consistent with the company levels of service set out in Bristol Water's Water Resources Management Plan (2019) (WRMP19), a strategic plan which sets out the company's 25-year strategy for the management of water resources.

About Bristol Water

Bristol Water provides drinking water supply to a population of almost 1.23 million[1] people across an area of approximately 2500 square kilometres, centred on Bristol and extending from Glastonbury to Tetbury. The company provides around 270 to 280 million litres of drinking water on average each day, with some minor non-potable water use by business customers.

Most of the water supplied by the company comes from surface water sources, with a small proportion (about 15%) coming from underground sources such as wells, springs and boreholes. We operate four major reservoirs - Chew Valley Lake, Blagdon Lake, Cheddar and Barrow, with additional direct surface water abstraction from rivers and canals. Reservoir and river sources each supply between 35% and 50% of the company's total water supply.

Reservoir storage is used in order to ensure that sufficient water is available during the drier summer months and peak demand periods, so a dry winter period that inhibits reservoir refill can lead to an increased vulnerability to drought.

Drought vulnerability

Bristol Water has worked for many years to create a water supply system that is resilient to drought, water pollution and other operational issues. Works undertaken include reinforcement and interconnection within the company's potable mains network, flood protection, and improved water treatment systems.

As part of the development of our WRMP19 we completed work to understand the drought vulnerability of our supply system to historic droughts and droughts more severe than those experienced in the historic record. This work was used to generate a 1-in-200 year drought flow sequence to assess the water resource that would be available to Bristol Water under this level of drought severity. We have used the information from our drought vulnerability assessment to model our drought triggers and actions, and to test our triggers against the 1-in-200 year design drought used in out WRMP19. We have also tested our drought triggers against a plausible more extreme drought, taken from our drought library to reflect between a 1-in-500 and 1-in-1000 year level of severity. The modelling carried out suggests that at current levels of demand, by implementing the actions set out in this drought plan, which go beyond the baseline assumptions in the WRMP assessment for long term planning, we would be able to avoid the need for Level 4 restrictions, associated with emergency drought orders, such as standpipes and rota cuts.

This drought plan sets out the measures we can take to manage drought at present, using all existing resources available to us. Our WRMP19 considers whether our current system and

[1] As reported in the Bristol Water WRMP Annual Review submission (July 2020)

measures are resilient in the longer term and sets out the additional measures we would need to take if they are not deemed sufficient, to address any demand shortfalls.

Changes and improvements since the last Drought Plan

Since the publication of our last drought plan in 2018, several changes and improvements have been made to our drought plan. These reflect out improved understanding of the effect of more severe droughts on the Bristol Water system and take account of the lessons learned from the hot dry periods experienced in summer 2018 and spring 2020.

Our ongoing programme of environmental monitoring and assessment to support the drought permit options has resulted in improved environmental information to assess the likely environmental effects of our drought permit options and to identify appropriate mitigation measures. We have also reviewed our licences and identified three additional drought permit options, which have been included in the drought plan for consultation.

We have identified actions that could be implemented in an extreme drought, to delay or remove the need for Level 4 severe restrictions (such as emergency drought orders for standpipes and rota-cuts). Finally, with the development of regional planning, we have included how we would work together with other water companies across the regional groups to improve drought management across the region.

How Bristol Water defines a drought

Resource availability is monitored continuously by Bristol Water and a large data set is available that provides the company with good insight into the trends in available water. Factors considered in resource management include rainfall, reservoir storage volumes, groundwater levels, river flows and customer demand for water.

The most significant of the factors considered in drought management is the availability of stored water, where reservoir storage curves are used as the primary criteria against which drought management is planned. Because Bristol Water's supply system is highly interconnected, the reservoirs used by the company are considered for the purposes of drought planning as a single storage system with a capacity of 38,515 million litres; and reservoir levels are managed accordingly with control curves that vary seasonally, ranging from a "normal operation" approach where ample water is available and the primary operational driver is cost optimisation, to "severe drought" where Level 4 restrictions would be implemented (emergency drought orders) and we would be operating under our incident response procedures.

Summary of the actions Bristol Water will take in a drought

A full breakdown of the actions we will take in order to manage a drought event is included in this Drought Plan.

These actions will begin in all drought circumstances with an increased management focus on water resources, and then as a drought progresses this will extend to actions taken to reduce demand. These actions will range from public communication and engagement events, water efficiency programmes and education; to temporary use bans on garden watering, or more stringent restrictions in the event of prolonged drought. Actions to increase available supply will range from temporary variations to bulk supply arrangements, to drought permits to vary our abstraction licence conditions.

Full details of these actions can be found in the main body of this report.

Contents

1 Introduction

1.1 Overview

This report is Bristol Water's Drought Plan, which has been prepared as per the Environment Agency's Water Company Drought Plan guideline (September 2020). Water companies were first required to submit statutory drought plans in 2006. However, Bristol Water has been producing them since 2000, and this drought plan builds upon our previous drought plans.

The Drought Plan is an operational tactical manual detailing how we intend to manage a drought, what trigger levels can be used to identify when action is required, and what measures are available to support supplies when levels of service are compromised. The Drought Plan sets out how the effects of a drought and associated drought actions will be communicated to our customers, and also takes account of the need to undertake environmental monitoring at any sites which could potentially be affected by implementation of our drought actions.

1.1.1 Changes and improvements since the last plan

A number of changes and improvements have been made to our drought plan since it was last published in June 2018. These changes have been made to reflect our improved understanding of the effects of more severe droughts on the Bristol Water system, and take account of lessons learned for the hot dry periods experienced in the summer of 2018 and spring 2020. In addition, we have also implemented an ongoing programme of environmental monitoring and assessment to support our drought permit options.

Changes made to the drought plan include:

- Using the outputs of the WRMP drought vulnerability assessment work to inform our understanding of the drought vulnerability of the Bristol Water supply system in the context of more severe droughts (1-in-200 year and 1-in-500 year droughts) and model our response to these drought scenarios.
- Improvements to the environmental information used to assess the likely environmental effects of our drought permit options and identify appropriate mitigation measures. This has included an ongoing programme of monitoring and assessment work.
- Review of our licences and identification of three additional drought permit options to be included within the drought plan.
- Reviewing the drought options available in the context of identifying actions that could be implemented in the event of extreme drought, to delay or remove the need for Level 4, severe restrictions (such as emergency drought orders for standpipes and rota-cuts).
- Categorising our drought plan actions in the context of the Level 1 to 4 definitions set out in the Environment Agency's drought plan guideline.

- Links with the West Country Water Resource Group for Regional Planning and the opportunities for coordination of drought management in a regional context including the use of 'agile communications'.

1.1.2 Regulatory Framework

Water undertakers in England and Wales are required to prepare and maintain Drought Plans under Section 39B and 39C of the Water Industry Act 1991, as amended by the Water Act 2003. When producing this drought plan, reference has been made to the following guidance and legislation;

- Conservation of Habitats and Species Regulations 2010
- Drought permits and drought orders supplementary guidance 2020 (Environment Agency & Defra)
- Environmental Assessment of Plans and Programmes Regulations 2004
- Environmental assessment for water company drought planning supplementary guidance – July 2020 (Environment Agency)
- Flood and Water Management Act 2010 where s. 36 amends the Water Industry Act 1991 by substituting a new s.76
- The Drought Direction 2011
- The Drought Plan (England) Direction 2020
- The Drought Plan Regulations 2005
- Water Company Drought Plan guideline – December 2020 (Environment Agency & Defra).
- Water Act 2003 where s.63 inserts new sections 39B & 39C into the Water Industry Act 1991 and s.62 inserts new sections 37B-D into the Water Industry Act 1991
- Water Act 2014 where s. 28(4) inserts an amendment to s. 39B into the Water Industry Act 1991, and s. 28(5) inserts a new section 39D into the Water Industry Act 1991
- Water Industry Act 1991
- Water Use (Temporary Bans) Order 2010
- Wildlife and Countryside Act 1981 as amended by the Countryside and Rights of Way Act 2000, Section 28G

This drought plan is consistent with the assumptions and company levels of service set out in our Water Resources Management Plan (2019) (WRMP19). The WRMP19 is a strategic plan which sets out our 25-year strategy for ensuring that we have enough water resources to meet forecast demand, identifying any requirements for additional supply demand solutions should there be a risk of demand exceeding our supply capability over the planning period. The WRMP is updated every 5 years. Our next WRMP update will be available for public consultation in 2022, with final publication before the end of 2023. If there are material changes to our assumptions and company levels of service as a result of the WRMP update, we will review and update our drought plan to reflect this.

In March 2020, the Environment Agency published 'Meeting our future water needs: a national framework for water resources'. This document explores England's long-term water needs, setting out the scale of action needed to ensure resilient supplies and an improved water environment. This includes the need to improve the nations resilience to drought, but to use supply side drought orders and permits less frequently in the future, especially in sensitive areas. We are working within the West Country Region via the West Country Water Resource Group (WCWR Group) to develop a regional plan that improves drought resilience across the region but also looks at opportunities for improved environmental ambition. We have worked with the WCWR Group in updating our drought plan to include better alignment of assumptions, and the development of joint approaches to customer communications during a drought.

1.1.3 Consultation Process

Pre-consultation & preliminary discussions

The *Water company drought plan guideline* (2020) sets out the requirements for carrying out pre-consultation discussions with the appropriate regulators and local stakeholders.

Bristol Water recognises the value of early communication with the many stakeholders potentially affected by and involved in the drought management process. We therefore carried out a pre-consultation process and preliminary discussions with both statutory consultees and other interested parties.

Who we consulted:

We consulted a range of stakeholders as part of the pre-consultation process before preparing the draft drought plan, including statutory consultees, non-statutory consultees that may have an interest in the drought plan and/or could be affected by actions within the plan, and neighbouring water companies.

The following organisations and companies were contacted in August 2020, setting out what the focus of our draft drought plan update will be and requesting any recommendations or considerations that they would like us to take into account in the review process:

- Avon Wildlife Trust
- Bath & North East Somerset Council
- Bristol City Council
- British Nuclear Group
- Bristol Water Challenge Panel (BWCP)
- Bristol Water Non-Household Retail Customers
- Canal & River Trust
- Consumer Council for Water
- North Somerset Council
- Ofwat
- Seabank Power Ltd
- Salmon & Trout Conservation UK
- Sedgemoor district Council
- Severn Trent Water
- Somerset County Council
- Somerset Wildlife Trust

- Defra
- Drinking Water Inspectorate
- Environment Agency
- Horticultural Trades Association
- Independent Water Networks
- Mendip District Council
- National Farmers Union
- Natural England
- South Gloucestershire Council
- South West Water
- Water Resources South East
- Water Resources West
- Welsh Government
- West Country Water Resources
- Wessex Water

During the pre-consultation period, we also had a pre-consultation workshop with the Environment Agency on the 8th October 2020, where we reviewed the work completed since the last drought plan and the existing and proposed drought options within the context of the latest drought plan guideline. We also held a pre-consultation meeting with the Canal & River Trust on 13th August 2020 and provided a briefing to the Bristol Water Challenge Panel during their September 2020 meeting. As a core member of the West Country Water Resource Group for regional water resource planning we have also held regular discussions with the other water companies and Environment Agency group members at the WCWRG Steering Group meetings, regarding regional alignment of drought plans and the opportunities this presents for the West Country region.

Feedback received and how this has influenced the Drought Plan:

Responses were received from seven consultees: Environment Agency, Natural England, CCW, Bristol Water Challenge Panel, Wessex Water, Water2Business and National Farmers Union. The table in Appendix A summarises the comments received and where we have addressed them within the Drought Plan.

Draft drought plan public consultation

The statutory process requires us to publish our draft drought plan for public consultation. This process provides customers and stakeholders an opportunity to consider the proposals we have set out in our draft drought plan in terms of our operational response to drought under our current level of service, and how this may affect customers, and provide us with any feedback and comments.

We published our draft Drought Plan (along with its Appendices, a draft Strategic Environmental Assessment (SEA), a draft Habitats Regulations Assessment (HRA), and a Non-Technical Summary) for an 5 week consultation period from 8th June to 13th July 2021.

As part of this public consultation process we:

- Published our draft Drought Plan and all supporting documents on our website.
- Wrote to over 70 consultees – including regulators, other water companies, MPs, Councils and non-household retailers to let them know that the consultation had commenced.

- Implemented a dedicated online feedback questionnaire to support the drought plan consultation and encourage direct feedback from customers.
- Promoted the online questionnaire via our customer online panel, encouraging them to provide responses.
- Promoted our online questionnaire and the consultation via our company Facebook, Twitter and LinkedIn social media accounts.

A list of the respondents who provided representations on the draft drought plan (including the accompanying Strategic Environmental Assessment, Water Framework Directive Assessment and Habitats Regulations Assessments report) is provided in the table below. Through our customer engagement online questionnaire, we received 182 individual responses.

Name	Stakeholder Type
Bristol Water Challenge Panel	Stakeholders / Customers
Canal & River Trust	Stakeholder
Consumer Council for Water (CCW)	Customers
Environment Agency	Regulator/Statutory body
Historic England	Regulator/Statutory body
Natural England	Regulator/Statutory body
Draft drought plan online questionnaire (182 individual responses)	Customers

The Drought Plan (England) Direction 2020 requires us to publish a statement of response to the representations received as a result of the public consultation within 15 weeks of the publication date of the draft drought plan. We therefore prepared and published our Statement of Response on 14th September 2021. The Statement of Response provides a summary of the responses received, sets out our view on them, and identified where changes have been made to the drought plan. All responses received verbatim, and our responses to these are tabulated and appended to the Statement of Response report for reference.

We value the feedback we have received from our regulators, stakeholders and customers and would like to thank them for their input and contribution to the consultation process.

This final Drought Plan sets out the changes we have made as a result of the consultation process and reflects our statement of response.

2 Background Information

2.1 Supply area and water resource zones

Bristol Water's supply area covers 2,400 square kilometres (1,000 square miles) and includes a population of almost 1.23 million[2] people. Our supply area ranges from Thornbury and Tetbury in the north to Street and Glastonbury in the south, and from Weston-Super-Mare in the west to Frome in the east.

Water resource planning is undertaken at water resource zone (WRZ) level. A WRZ is defined as the largest possible area in which all resources, including external transfers, can be shared and hence the zone is which all customers experience the same risk of supply failure from a resource shortfall. Due to the integrated nature of Bristol Water's sources, we plan on the basis of operating the company area as a single WRZ. This means that all water resources within the company area are capable of being shared within the zone. Bristol Water uses the same WRZ for operational management, water resource planning and drought planning.

Our supply area and the key features of our WRZ are illustrated in the map in Figure 1.

2.2 Baseline water resource situation

Our baseline water resource situation is set out in our Water Resources Management Plan 2019 (WRMP19).

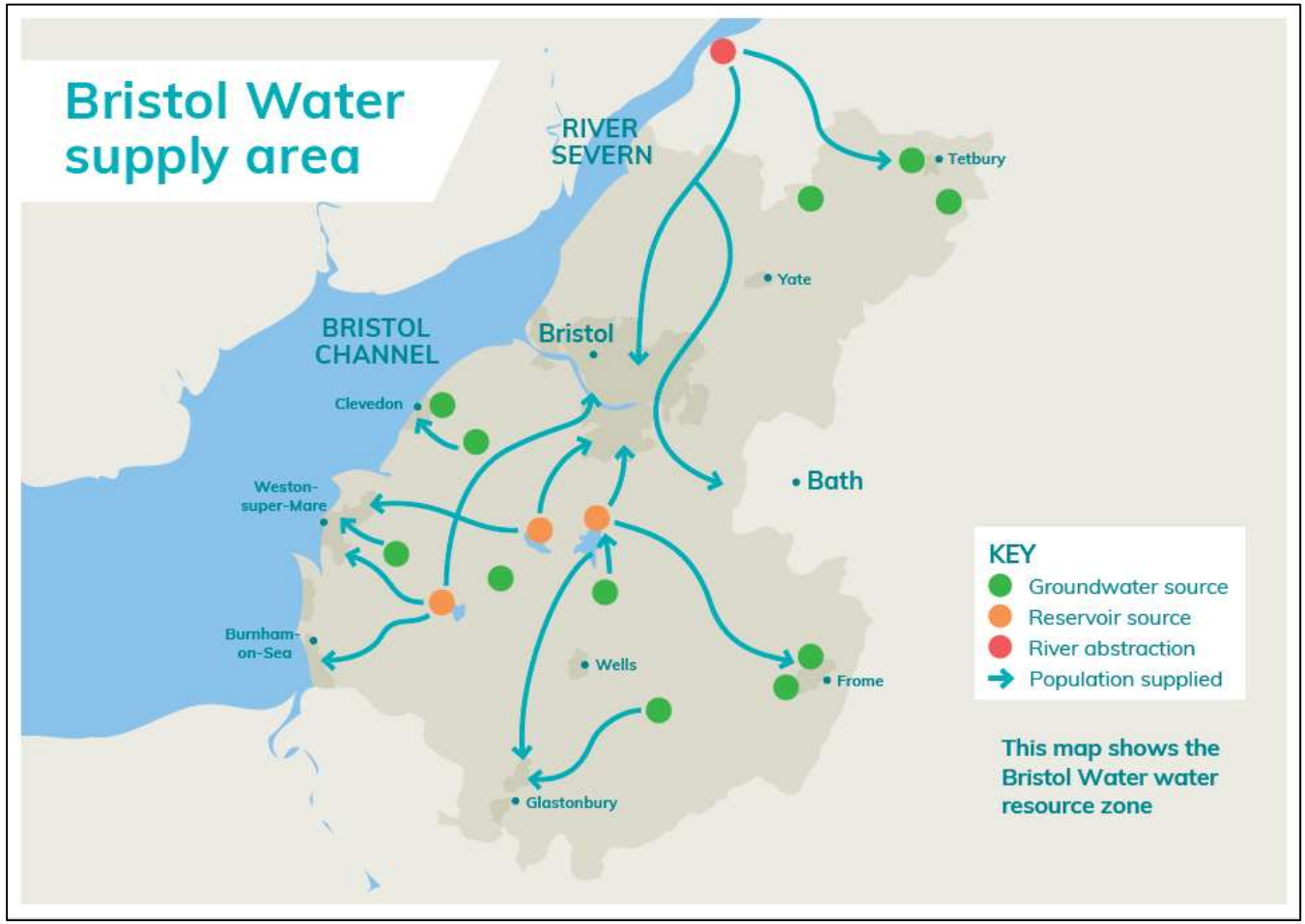
Only around half of the water supplied within the Bristol Water supply area is sourced from within it, with the rest being transferred into the zone from outside the area. This water is sourced from the Gloucester & Sharpness canal to supply our largest northern treatment works. This source accounts for approximately 46% of our licensed resource. The Gloucester & Sharpness canal is owned and operated by the Canal & River Trust and is supplied by the River Severn and other local rivers, the Cam and the Frome. We have a contract with the Canal & River Trust to supply us with water from the Gloucester & Sharpness Canal. In dry periods, use of this source is maximised to conserve the water stored in our reservoirs.

The intrinsic water resources within the WRZ include our Mendip Reservoirs and associated surface water abstractions, which account for approximately 42% of our available licensed resource.

The remaining water sourced from within the water resource zone is derived from groundwater and accounts for approximately 12% of our available licensed resource. These sources are operated at their optimum output to meet the base-load demand for water.

[2] As reported in the Bristol Water WRMP Annual Review submission (July 2020)

Figure 1: Bristol Water, water resource zone and associated infrastructure



2.3 Levels of service & drought vulnerability

2.3.1 Levels of service

Expectations about the frequency with which restrictions are implemented are known as 'levels of service'. We are required by our regulators to both specify and report our levels of service, or frequency at which customers can expect to experience restrictions on water use and what types of restrictions these would be.

During extended period of dry weather, it may be necessary to encourage increased customer water efficiency and to restrict customer demand, to ensure that water supplies are maintained. Initial demand management actions therefore include encouraging customer restraint on water use through media campaigns.

As dry weather continues into drought conditions and the risk to water supply increases, more formal water use restrictions may be required such as temporary use bans (TUBs). In extreme drought conditions, drought orders may be needed to further restrict water use for commercial purposes.

It is not feasible to plan for a level of service that would guarantee there would never be any customer demand restrictions because this would require significant investment in additional water resource assets, which would be used very infrequently, and result in unacceptably high water bills for customers. Our current levels of service are provided in our WRMP 2019 and are set out below in Table 1. As part of our WRMP19 development we were required to demonstrate resilience to a 1 in 200-year drought without the need for emergency drought order restrictions (Level 4 restrictions under the EA definition). As we develop the new regional plans and the WRMP24, we are being asked by regulators and government to move towards a 1-in-500 year level of resilience by 2039 at the latest. The regional plan and our WRMP24 will set out the pathway we are taking to achieve this. Any increased level of resilience associated with this new requirement will be reflected in our next review of our drought plan.

Table 1: Bristol Water levels of service and frequency of restrictions

Drought Action	Bristol Water Level of service	EA level 1 to 4 definition
Temporary use bans (TUBS)	1 in 15 years on average	Level 2 restrictions (Drought Plan)
Drought Order – Non-essential use ban	1 in 33 years on average	Level 3 restrictions (Drought Plan)
Emergency drought order – partial supply and rota-cuts	1 in 200 years	Level 4 restrictions (Incident response)

2.3.2 Drought vulnerability and testing our drought plan.

The Environment Agency updated guidance, *Water Company Drought Plan guideline (Dec 2020)* requires the drought plan to be supported by an understanding of the drought vulnerability of our supply system using the UKWIR *Drought Vulnerability Framework (2017)*. We completed this work to support our WRMP19 and used it to generate a 1-in-200 year drought flow sequence to calculate the Bristol Water system yield associated with the 1-in-200 year drought. Details of this work are provided in our final WRMP19[3] (section 6.2.3). We have used the information from our drought vulnerability assessment to assess our drought triggers and actions, and to test our triggers against the '1-in-200 year design drought' used in our WRMP19 baseline planning assumptions. We have also tested our drought triggers against a plausible more extreme drought, taken from our drought library to reflect droughts between 1-in-500 and 1-in-1000 year level of severity. The results of this assessment are presented in Appendix B: Testing the drought plan.

[3] https://f.hubspotusercontent30.net/hubfs/7850638/Site%20Assets/Offline%20docs/Bristol-Water-Final-WRMP-2019-August-2019-REDACTED.pdf

3 Drought indicators and triggers

We monitor the water resource situation throughout the year and across our operating area as part of our day to day operations. As well as providing the resource information required to manage our operations, this monitoring also ensures that we are aware of the onset of drought and provides the opportunity for timely action. We monitor the status of water resources in terms of key indicators, such as rainfall, reservoir storage, groundwater levels etc. These indicators not only provide a measure of relative 'dryness' but also the amount of water that is available for supply. This is based upon volumes of water in storage and the state of the river catchments, measured via a network of river gauging stations (mostly owned by the Environment Agency) and rain gauges. A further indicator and consequence of prolonged dry weather is a sustained level of high demand.

As an indicator trigger level is approached (as outlined in section 3.2) we give consideration to implementing appropriate drought measures (section 4) once the triggers are breached.

3.1 Resource monitoring and drought indicators

There are a number of indicators that a drought is developing. Drought indicators that historically have been of the greatest value in Bristol Water's WRZ are rainfall, reservoir storage, groundwater levels, river flows, weather forecasts and demand. These are the indicators that are used within this drought plan to identify and measure the onset of drought in our operating area.

The regional water situation is monitored on a daily basis. Reports on the situation are circulated widely within Bristol Water and weekly reports are shared with the Environment Agency. Routine monitoring is also carried out by the Environment Agency, and any relevant data and information shared with Bristol Water. The Environment Agency water situation reports and associated data give an indication of whether an environmental drought is likely and this data is also used to monitor the onset of a water resource drought. The results of the routine monitoring are used to track water resource availability throughout the year, and this position is monitored against specific drought triggers (Section 3.2).

3.1.1 Rainfall

Rainfall is the primary indicator of drought severity, and one of the earliest indicators of the possible onset of drought. It has a direct effect on the other hydrological parameters (river flows, soil moisture deficit and groundwater recharge) and therefore affects the quantities of water available for abstraction.

Rainfall is measured at rain gauges throughout the UK, and is independently recorded by Bristol Water at the following sites:

Table 2: Bristol Water rain gauges

Rain gauge location	Period of record	
	Storage gauge	Tipping bucket gauge
Barrow	1960 – 2020	2014 – 2021
Chew Stoke PS	1984 – 2020	1996 – 2021
Litton	1909 – 2020	2014 – 2021
Pucklechurch	2007 – 2020	2002 – 2021
Purton	1996 – 2020	2014 – 2021
P25R	1985 – 2020	2014 – 2021

As of 2020 all our rain gauges are now automated, using tipping bucket gauges. The data from these sites is transferred directly to our telemetry network as a daily total. Under normal conditions the data is reviewed on a weekly basis in the context of the long-term average rainfall record. In a drought the rainfall will be closely monitored.

We also receive the daily total rainfall data from Environment Agency sites across our supply area. These sites are listed in table 3. Under normal conditions this data is received on a monthly basis. However, during a drought we may request it more frequently. This data would be used to validate the Bristol Water rain gauge data and input into any regional assessment work such as demonstrating an exceptional shortage of rain (ESoR) case to support drought permit application.

Table 3: Environment Agency rainfall data sites

Environment Agency rainfall monitoring sites	
Badminton	Gold Corner
Bath Claverton	Grove Farm
Bruton Dam	Hardenhuish
Chew Magna Reservoir	Keynsham
Clewer	Kingswood
Clevedon	Paulton
Clifton Oakfield Road	Priddy
Cromhall	P25R
Doulting	Somerton
Downhead	Stoke Bottom
Frampton Cotterell	Tetbury
Frome STW	Walters Farm
Great Somerford	Wick St Lawrence

Monthly rainfall is also provided by the Environment Agency within their 'Monthly Water Situation Reports' for both the Wessex Area and the Midlands Area. The Wessex Area covers the catchments affecting our Mendip Reservoir sources, and the Midlands Area covers the catchments affecting our supply from the River Severn via the Gloucester & Sharpness canal. Monthly rainfall totals are reported and compared to the 1961 to 1990 long term average for each hydrological area. Rainfall is categorised on a descriptive scale from *Exceptionally low* to *Normal* and up to *Exceptionally high*. This provides an indication the rainfall position in the context of the historic record for the current month and up to the last 12 months. We use this categorisation as an indication of the extent and duration of any rainfall deficit. If rainfall is categorised as *Below normal* or lower for a number of months we will start to see an impact on the inflows to our reservoirs. This would be an early warning that there may be a risk of a water resource drought, and we would use this information to inform our modelling forecast scenarios to assess the ongoing water resource position.

In addition, the Environment Agency also produces a weekly rainfall and river flow summary on a national level. This covers the whole of England, reporting rainfall for the south-west, and river flows for the Bristol Avon. This information supplements the site-specific rainfall data recorded at Bristol Water's rain gauges.

3.1.2 River flow

The Environment Agency monitors river flows across England via a network of river gauging stations and reports monthly data in their 'Monthly Water Situation Reports'. As well as monthly mean flow, data is also presented as a percentage of long-term average for the reporting month and given a classification on a scale from Exceptionally Low to Exceptionally High. Reviewing this data enables us to quickly identify if river flows are receding in response to low rainfall and the onset of potential drought conditions.

If the river flows in the Environment Agency monthly report indicate the potential for drought conditions (reporting flows as 'below normal' or 'notably low'), we would put in place more frequent data requests to enable us to closely monitor the conditions within the river catchments we have an interest in. Some gauging stations now have 'live data' availability on the CEH National River Flow Archive website (https://nrfa.ceh.ac.uk/data/search). For those gauging stations where live data is not available, the frequency of the data requests would be agreed with the Environment Agency at the time and would reflect the needs of the potential drought situation.

Table 4 lists the gauging stations that we use to monitor the response of the river catchments:

Table 4: River gauging stations used by Bristol Water.

Gauging station name	Gauging station number	River	Associated Bristol Water source	Period of record
Bewdley	54001	Severn	Gloucester & Sharpness canal at Purton	1921 to present day (live data available)
Compton Dando	53004	Chew	Chew Valley Lake	1958 – present day
Deerhurst	54110	Severn	Gloucester & Sharpness canal at Purton	1995 – present day (live data available)
Iwood	52017	Congresbury Yeo	Blagdon Reservoir	1973 – present day
Wookey	52001	Axe	River Axe & Cheddar Reservoir	1957 – present day

3.1.3 Groundwater

Most of our groundwater sources exploit the water resource from the Jurassic Inferior Oolite aquifers which are confined by lower permeability clays (Fuller's Earth). These aquifers have high transmissivities and low storativity. This means that the water level in the aquifer increases reasonably quickly in response to rainfall but can equally fall with the long-term absence of rainfall. These groundwater abstraction sites are in the Mendip Hills and the Cotswold Hills where regional groundwater levels are monitored to identify and forecast the risk of drought.

Two of our sources abstract groundwater from the Dolomitic Conglomerate. This aquifer is confined by mudstone at our abstraction points however, the confining layer of mudstones is laterally heterogenous, meaning it is regionally unconfined. Where this aquifer is hydraulically connected to watercourses, we monitor river levels to ensure our abstraction does not impact river flows. Additionally, under normal operation we gradually limit our abstraction when groundwater levels fall below a critical level.

We monitor the water levels at our groundwater sources via our telemetry network. Levels are monitored every 15 minutes. The location of these groundwater sources is indicated on the map in Figure 1.

Bristol Water also abstract from springs as they emerge from the cave system at Cheddar Gorge and store this water in Cheddar Reservoir. This water comes from the karstic aquifer system within the Carboniferous limestone in the Mendips. We also abstract from other spring sets across the Mendips as they arise at Chewton Mendip and Banwell.

The Environment Agency provides groundwater levels for a number of indicator sites for the major aquifers. The groundwater levels are ranked in the context of the historic data set for

the specific site. These are reported in the Environment Agency's 'Monthly Water Situation Reports'. Groundwater levels are categorised on a descriptive scale from *Exceptionally low* to *Normal* and up to *Exceptionally high*. This provides an indication the groundwater position in the context of the historic record for the current month and up to the last 12 months. We use this categorisation as an indication of the regional groundwater position. If groundwater levels are categorised as *Below normal* or lower for a number of months, we may start to see an impact at our sites. Reviewing this data enables us to identify if groundwater levels are receding in the wider aquifers in response to low rainfall and the onset of potential drought conditions.

3.1.4 Reservoir storage

Bristol Water has four major reservoirs, Chew Valley Lake, Blagdon, Cheddar and Barrow, which are supplied from river basins in the Mendip Hills. Reservoir storage information is a critical element of monitoring the resources in the Bristol Water system and forms the basis of the drought control curves and triggers referred to in Section 3.2.

Reservoir storage in the Bristol Water system is monitored through the telemetry system and reported on a daily basis within the Company. This information is circulated on a weekly basis to the Environment Agency.

Due to the integrated nature of the Bristol Water, water resource zone, our reservoirs are managed on a combined basis via a set of combined reservoir operating control lines that indicate when storage levels are below normal for the time of year. These are used each year to optimise the use of stored water across our resource zone and to balance reservoir storage. Under normal water resource conditions and reservoir operation, the amount of water in storage in our reservoirs declines during the summer months and recovers again over the winter period.

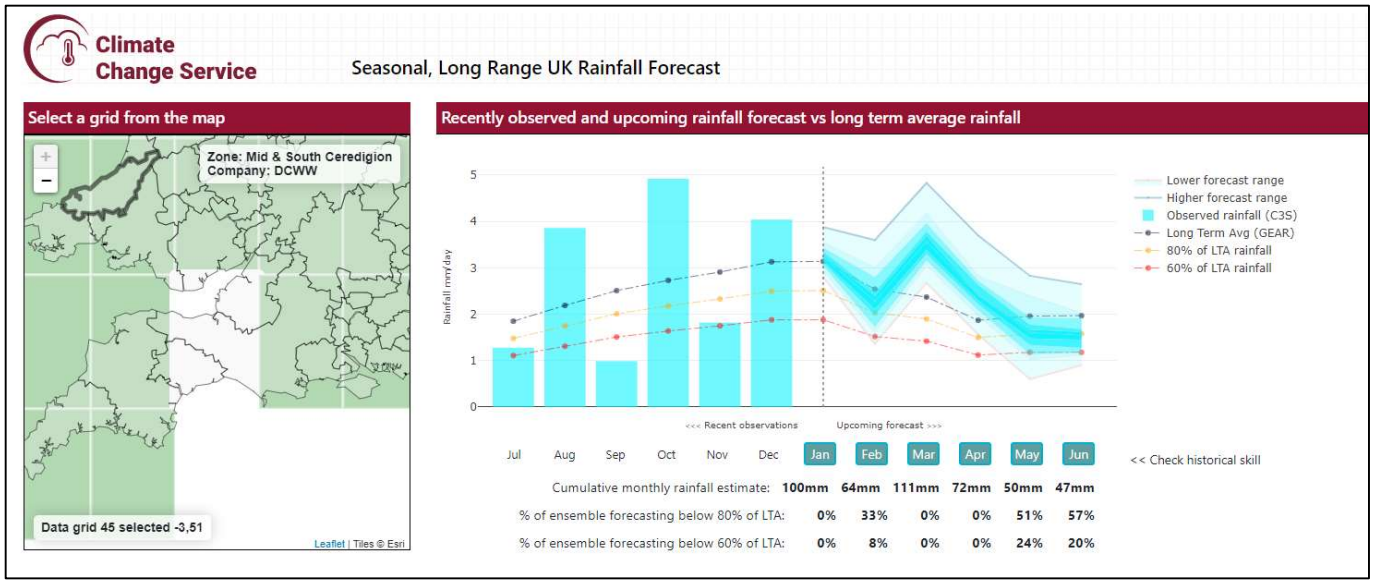
3.1.5 Weather forecasts

Weather forecasts provide an indication of the weather conditions likely to be experienced and can be used to inform decision making on the management of water resources over the short term. We regularly review the weather forecast as part of our normal operations. In the event of the onset of drought conditions the frequency of weather forecast reviews will be increased, with a range of both short- and long-range weather forecasts being utilised.

Drought impact on water resources forecasting tool:
During 2019 and 2020 we supported HR Wallingford in a piece of research to develop a new web-based tool for assessing the impacts of drought conditions on water resources. The forecasting tool is based on Copernicus Climate Change Service (C3S) seasonal forecast data. The tool allows users to view and analyse the C3S rainfall forecasts and gives users the opportunity to explore how accurately these forecasts can predict potential upcoming droughts based on historical performance. Bristol Water was among a few UK water

companies who supported this project with our drought planning and management experience, relating to how this information could be used to support drought management. During a dry weather we would use this tool to support our forecasting assumptions.

More information about the tool is available on the web site: https://climate.copernicus.eu/drought-impact-water-resources-forecasting-tool. A screenshot of the tool is provided below:



3.1.6 Environmental stress

It is often the case that the effects of prolonged dry weather and drought result in environmental stress before the public water supply is significantly affected. This was the case in 2017/18 when prolonged dry weather resulted in low flows, fish kills and other environmental incidents. In 2011/12 the Wessex area also experienced below average rainfall and low groundwater levels resulting in the threat of environmental effects. The Environment Agency's drought plans[4] set out how they monitor the environment via the National Drought network to inform National drought impact reporting. We will work with and support the Environment Agency in monitoring the environmental stress on our sites in terms of the hydrological indicators (groundwater, rainfall, temperature) and environmental indicators (effects on aquatic plants, algal blooms, fish incidents). Where appropriate we will work with the Environment Agency to identify opportunities to support the environment if it becomes under stress and there is not a water supply drought. This could include, but not be limited to, communication messaging to customers to raise awareness of the situation, targeted operational actions to relieve environmental stress.

[4] Environment Agency (May 2020): Wessex Drought Action Plan Final plan 2020 v1

During prolonged dry weather and drought that effects public water supply, we will work to minimise the stress on the environment by prioritising demand saving actions first and implementing the least environmentally damaging drought options first. Details of this are set out in section 4.

3.1.7 Abstraction and demand

During dry weather conditions, customer demand increases. As demand increases, so does the pressure on our water resources. Abstraction and demand can therefore be used to indicate when our resources are being stretched.

In accordance with our abstraction licence conditions, Bristol Water records the volume of water abstracted from each of our sources. In addition, we also continuously monitor the demand from our water treatment works and report this data on a daily basis using our telemetry network. This information is assessed on a weekly basis and reported within the company on our 'Demand Dashboard'. This includes a breakdown of the water supplied from each of our treatment works and a forecast of the anticipated distribution input over the coming 3 days. During a drought, the frequency of this analysis and forecasting would be increased to daily reporting. The three-day forecast provides a robust short term operational forecast to manage our network to.

The Bristol Water system is not peak demand constrained due to the conjunctive use nature of the system and the storage available within the water resource zone and the network. This has been confirmed through the response to the recent heatwaves experiences in the summer of 2018 and the spring of 2020.

In 2019 we started to use a network optimisation tool, IPSOS, to support the daily operation of our network. IPSOS uses short term 24 hour forecasting from the network supply position at the beginning of each day, to plan how the water will be delivered in the most optimum way to customers. IPSOS responds to peak demand by identifying when demand is moving out of normal range to operators and the supply programme is adjusted accordingly. Our integrated network allows us to respond quickly to sudden increases in demand caused by events such as heatwaves.

3.2 Drought triggers

Drought management decisions should always be based on sound planning and judgement and it is important to establish when action should be taken during a drought to protect supply to customers. During a drought, the water availability and demand will be reviewed on a regular basis. Bristol Water has developed drought triggers to identify when we should consider implementing specific drought actions to reduce demand and, if necessary, obtain additional water supply. These triggers are used as one of the decision-making tools to inform the overall drought management framework in terms of deciding whether to implement drought actions. In a drought situation, professional judgement, drought scenario

modelling and available data and information in the form of the drought indicators described in section 3.1, will also be used to inform the drought management decision making process.

Drought triggers have been developed to identify when the water resource situation is moving into a drought. Increasing levels of drought severity have been defined, aligned with the Environment Agency's 'drought stages' set out in the Wessex Area Drought Action Plan (May 2020), to ensure that the drought actions are proportionate to the level of drought risk being experienced. In addition, where appropriate the drought actions have been categorised using the Environment Agency defined Level 1 to 4 definitions. Our drought triggers are based on 6 drought management zones (DMZ) as set out in Table 5.

Table 5: Drought management zones

Bristol Water DMZ	EA Drought Stage		EA Level 1–4 category	Actions (see section 4 for further details)	Associated level of service (if applicable)
	Status worsening	Status improving			
1	Normal	Normal		Normal operation	
2	Normal	Normal		Normal operation but implement dry weather system management	
3	Prolonged dry weather	Recovering drought	Level 1	Drought actions: – appeal for restraint, – enhanced demand management, – enhanced leakage management –reduce bulk supplies to third parties	
4	Drought	Drought	Level 2	Drought actions: – temporary use bans – R24R to R24Ra (Well Head) supply side option (existing licence)	1 in 15 years on average
5	Drought	Drought	Level 3	Drought actions: – non-essential use bans – supply side drought permits	1 in 33 years on average
6	Severe drought	Severe drought	Level 4	Emergency drought orders	1 in 200 years on average

The alignment of the drought management zones set out in table 5 to the EA drought stages, provides an indication of how these zones would be used to provide an indicator of the end

of the drought as well as the start. A drought would start when we entered drought management zone 4 and implemented EA level 2 restrictions (TUBs). Prior to this it is prolonged dry weather management. It is likely that drought recovery would be taking place when the reservoirs started to refill and move into drought management zone 3, and a drought would end when we returned to normal operation in drought management zone 2. Further details of the drought recovery process are provided in section 8.

3.2.1 Reservoir triggers

Due to the integrated nature of the Bristol Water system, the combined volume of water stored within our reservoirs informs the management decisions relating to the use of water resources across the water resource zone as a whole. Reservoir triggers have been developed in the form of drought control curves for the combined storage of our 4 major reservoirs: Chew Valley Lake, Blagdon, Cheddar and Barrow. These define the drought zones within which specific drought actions may be implemented. The combined reservoir control curves are indicated in Figure 2. The shape of the curves reflects the expected drawdown of the reservoirs during the drier summer months when natural inflow into the reservoirs is less than the volume being abstracted to meet customer demand. Refill commences in the autumn when natural inflow to the reservoirs exceeds the volume being abstracted to meet customer demand.

The combined storage approach reflects how the Bristol Water system is managed in practice. The system is a highly integrated conjunctive use system which means that we operate as one water resource zone and have the flexibility to move water around the network to where it is needed. The whole water resource zone is therefore at the same level of risk in terms of restrictions on water use, if a drought occurs.

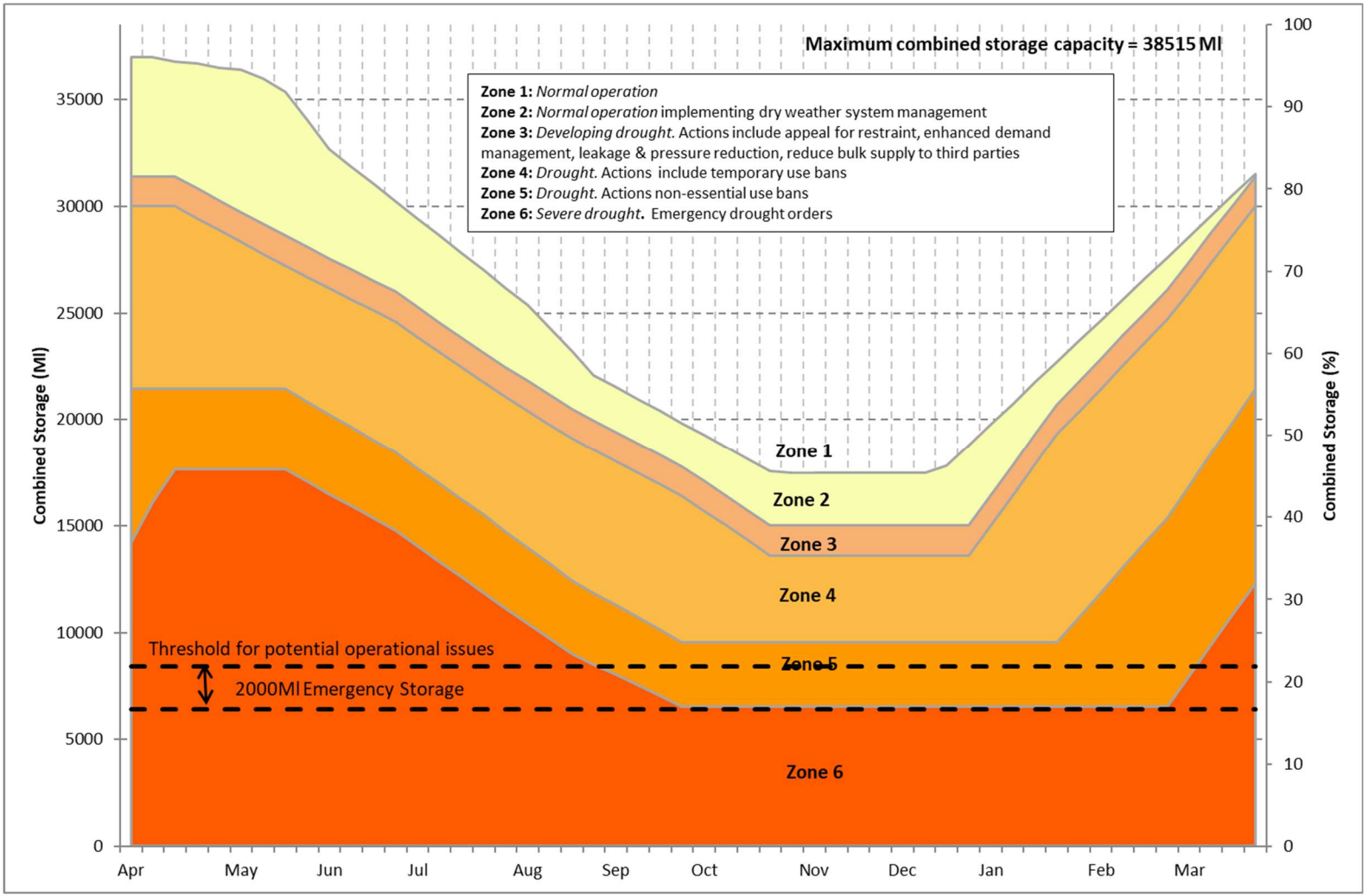
The areas between the control curves define the discrete zones which indicate which of the drought measures should be considered for implementation. These zones have been aligned with the Environment Agency's 'drought stages' and are summarised in Table 4. If combined reservoir storage remains within zone 1, then we are not considered to be within a drought situation and our system will be operated as normal, optimising resources across the water resource zone in order to minimise cost. If reservoir storage drops into zone 2, then our 'dry weather' system management processes would be implemented (if they have not been already), optimising our system on a resource basis. This is still within the realms of normal operation, as dry weather is to be expected as part of annual variability.

The remaining zones, 3, 4, 5, and 6 are for the progressive implementation of drought actions, with the severity of the actions increasing as the combined reservoir storage declines. The details of our proposed drought actions are set out in section 4.

Scenario testing has been used to test these reservoir control curves and drought triggers to demonstrate their validity and how they would be used under a range of droughts. Details of this analysis are presented and discussed in Appendix B.

As part of the development of our 2024 Water Resource Management Plan, we will be reviewing our reservoir control curves in the context of a wider hydrology and modelling review. This review will not be completed in time to inform the final Drought Plan, but we are committed to providing any necessary updates to the drought plan once the review is compete.

Figure 2: Combined reservoir control curves and drought zones



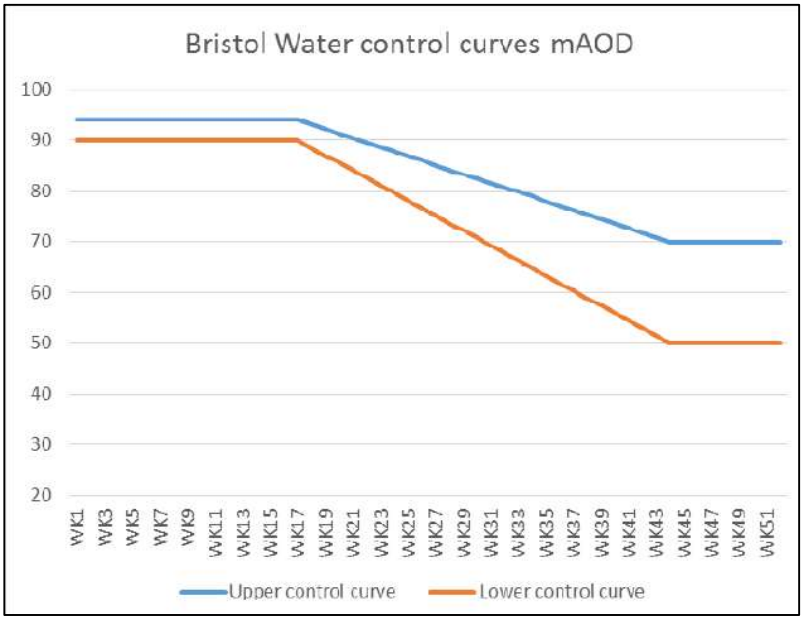
3.2.2 Groundwater triggers

Our groundwater sources provide just 15% of our licenced resource and are therefore not the primary focus of the operational triggers used to manage the Bristol Water system. However, we do have some triggers for abstraction reduction on our P25R and Long Newton sources in order to enable Wessex Water to provide environmental 'stream support' during low flow condition.

In 2019 three of our groundwater abstraction licences were varied to support the low river flow issues caused by Wessex Water's abstractions in the Malmesbury area. During dry weather, these Wessex Water abstractions can cause very low or even zero flows in the local river. Our licence changes help to mitigate this impact through the use of a set of triggers, below which we must reduce our abstraction volumes at our P25R and Long Newton sources, in order that Wessex Water can pump water directly into the river affected by their abstraction for 'stream support'. In addition, we have agreed a further reduction in our abstraction when groundwater levels in the area are very low, and this further reduction in abstraction is supported by a small transfer of up to 1.5Ml/d from Wessex to Bristol Water. This abstraction reduction at the lower levels is linked to our AIM (abstraction incentive mechanism) commitment to reduce abstraction from environmentally sensitive water sources when river flows are low.

The triggers for these abstraction reductions are set out in the licence conditions and consist of upper trigger level (to constrain the abstraction) and a lower control level (to constrain the abstraction further and limit groundwater level recession) at the Didmarton observation borehole for specified times of the year. A graphical representation of these trigger levels is provided in figure 3.

Figure 3: Didmarton observation borehole control curves.



3.2.3 River Severn drought order triggers

The Environment Agency is the responsible authority which regulates the flow in the River Severn and has a legal responsibility to maintain the flow as measured at Bewdley gauging station near Kidderminster, to an agreed level. The river flows are supported by releasing water from the upstream reservoirs Clywedog and Vyrnwy and from the Shropshire Groundwater Scheme (SGS).

Clywedog Reservoir is the main source of supply for river regulation and its control curves are used as the indicators for drought actions, including the application for a River Severn Drought Order. Details of the River Severn Drought Order control curves are set out in the Environment Agency's *River Severn Drought Order Environmental Report* (Working Draft – Dec 2013).

The Clywedog Reservoir control curves define the discrete storage zones which indicate when the River Severn Drought Order is likely to be implemented. These zones and the associated actions that may affect Bristol Water's supply from the Gloucester & Sharpness canal are set out in Table 6. Historically a River Severn Drought Order has been applied for and operated in 1976, 1984 and 1989[5]. It is therefore over 30 years since a River Severn Drought Order has been required. The Environment Agency estimate that the return period for the implementation of the River Severn Drought Order is 1-in-50 years. If a River Severn Drought Order were required in a future drought, we would work closely with the regulators and other abstractors on the River Severn via the River Severn Working Group and the River Severn Drought Management Group (when it was formed) to understand the likely effect of a drought order on our operations relevant to the specific drought conditions at the time.

As part of the WRMP19 deployable output assessment we carried out an assessment of the drought resilience of the Gloucester & Sharpness canal supply under a 1 in 200 year drought event. This work concluded that it was highly likely that the estimated deployable output for the canal source would be available during a 1 in 200 year drought event[6]. This is consistent with the Environment Agency's assessment of the return period for the 1976 drought event in the River Severn Drought Order Environmental Report which indicated that the return period of the 1976 drought in the Lower Severn at the end of August was up to a 1 in 100 year event over 9 months, and up to a 1 in 200 year event over 11 months[7].

As part of the development of our WRMP24, we have a project underway to review and update our inflow data and information. This includes working with the Canal & River Trust to better understand and model the water availability in the Gloucester & Sharpness Canal. This work will be completed to inform our WRMP24 assessments which require resilience to a 1 in 500 year drought.

[5] Environment Agency (Dec 2013): *River Severn Drought Order Environmental Report – Appendices* (Working Draft) v7. Appendix B: Historic Droughts; River Severn Drought Order operation 1976, 1984 and 1989.
[6] Bristol Water (August 2019): Final Water Resources Management Plan 2019 - p53
[7] Environment Agency (Nov 2020): *River Severn Drought Order Environmental Report (Working Draft)* p50

Table 6: River Severn Drought Order storage zones[8]

Clywedog Reservoir Storage zone description	Actions involving/affecting Bristol Water
Normal operation	None
Drought alert	Environment Agency forms the River Severn Drought Management Group and Bristol Water is represented on it
Apply for drought order (Environment Agency application)	Bristol Water will review the likely impacts of the application being made and make a formal representation on the specific effects the drought order is likely to have on our operations. We will work closely with the Canal & River Trust during this process.
Drought order in force	Canal & River Trust abstraction reductions enforced at Gloucester & Sharpness canal limiting abstraction that can be taken for the canal at Gloucester Dock to 300Mld[9] when the flow in the River Severn at Deerhurst drops below 1200Ml/d.[10]

[8] Source - Environment Agency (Nov 2020): *River Severn Drought Order Environmental Report (Working Draft)*.
[9] The Canal & River Trust (CRT) made representation to the Environment Agency during the 2013/14 consultation on the River Severn Drought Order, raising concerns that a 300Ml/d restriction may have implications for the effective operation of the canal, including the statutory duty to maintain navigation, the open port duty at Sharpness Dock and the public water supply at Purton. CRT may make further representation if/when the EA instigate the Drought Order on the specific impact of the order on their operations.
[10] The abstraction at Gloucester was licence exempt under s.26 of the Water Resource Act 1991. The Canal & River Trust are in the process of applying to the Environment Agency for an abstraction licence for this source under the new authorisations process for previously exempt licences. It is anticipated that this licence will be issued before the end of December 2022. Once this is issued then the Canal & River Trust will be required to submit annual abstraction returns for this source.

4 Drought Management Actions

4.1 Overview

This section describes the drought measures/actions that Bristol Water would use to ensure that water supply is maintained in the event of a drought. Under normal conditions we monitor the water resource situation to inform our everyday operations and manage our water sources appropriately. If conditions start to become dry, we manage our operations to reflect this and initiate our 'dry weather' operations processes. Actions associated with this include, but are not limited to, the operation of the River Axe abstraction and re-zoning distribution areas to minimise use of the Mendip reservoirs. These are considered to be part of the everyday management of our water resources and are therefore outside the scope of the drought plan. It should be noted however, that when a drought does occur, we will have already been monitoring the situation as part of our overall operational strategy planning.

As a drought develops, the decision will be made to form the Drought Management Group (see Section 7). Drought measures will be implemented in an appropriate order as determined by the Drought Management Group and ratified by the Management Team and Board as appropriate.

Section 3 has set out the way in which we identify and define the stages of drought in terms of the hydrological conditions and the resource availability within our reservoirs. Implementation of the drought measures will be influenced by the ambient hydrological conditions and our resource position against the trigger levels. However, every drought is different, and the actions taken during a drought should be proportionate to the severity of a specific drought event. Bristol Water will therefore manage each drought with respect to the circumstances that emerge as the drought develops and will always try to adopt the options with the least environmental effects first. This means that options that focus on demand management, such as water efficiency, media campaigns and enhanced leakage management will be implemented prior to using supply side measures that may require drought permits or orders. This section describes the order in which we will implement the drought actions associated with each drought management zone.

As part of the update of our drought plan, we have carried out a detailed review of our options from both an operational and regulatory perspective. This has included:

- Internal workshops and meetings with our operational and communications staff to review the feasibility of the existing options and identify any additional options.
- A pre-consultation workshop with the Environment Agency to review our existing options and identify any additional options, with a specific focus on the requirement to include options for implementing in the event of an extreme drought.

As a result of this review we have added three supply side options to the drought plan as proposed drought permits at three of our licenced sources. The potential environmental

effects of these options have been assessed through the SEA, HRA and WFD assessment processes and further details of the environmental assessments associated with all of our drought permit options are provided in section 5.

A summary of the demand and supply side options available to us and the order in which they would be likely to be implemented in the context of the drought management zones and the Environment Agency drought action 'categories' (Level 1 to 4) are set out in Table 7.

For each of the supply side drought options considered a drought options environmental assessment and monitoring table has been completed. These are available in Appendix C.

Table 7: Drought actions available and their order of implementation.

Drought management zone	Drought description	EA drought action category	Demand side action	Supply side/ operational action	Stakeholder liaison/ communications
1	Normal		Weekly monitoring of rainfall, reservoir and demand levels Normal programme of leakage maintenance and water efficiency work	System operation optimised on both cost and maintaining resources within zone 1	
2	Normal		Enhanced publicity and awareness of water efficiency messaging through media campaigns as per the communications plan, including requests for voluntary restraint Greater prominence of messaging within website. Social media geo-targeted adverts on water efficiency. Water efficiency promotions	Increased monitoring and management of sources Review planned outage program of work to minimise reductions in supply capability from outage Minimise use of reservoir water and ensure balancing of reservoir drawdown River Axe abstractions/transfers (within licence conditions) Maximise River Severn Maximise groundwater abstractions Minimise reservoir compensation releases within licence conditions.	Advise key stakeholders of situation (Environment Agency, Consumer Council for Water, Regional Groups (WCWRG and WRW))
3	Prolonged Dry Weather	Level 1	Full scale publicity and media campaign to appeal for restraint and raise	Review availability of any mothballed/emergency sources	Implement increased Environment Agency liaison

Drought management zone	Drought description	EA drought action category	Demand side action	Supply side/ operational action	Stakeholder liaison/ communications
3	Prolonged Dry Weather	Level 1	awareness of the prolonged dry weather and potential drought situation. Increasing internal resources on leakage find and fix activities. Reduce the time taken to repair both visible leaks once reported and non-reported leaks once we are aware of them. Reduce pressure across as many network zones as feasible to preserve water and minimise loss from leaks. Implement enhanced customer communication campaigns to increase awareness and reporting of leaks. Promote the company "DigDat" service to encourage customers to report leaks Maximise "Leakstop" campaign publicity to encourage reporting of leaks on supply pipes Pre-planning and consultation on the implementation of Temporary Use Bans (TUBs) Pre-planning for the implementation of Non Essential Use Bans (NEUBs)	and plan any mobilisation requirements Reduce bulk supplies to third parties where possible Minimise compensation releases within licence requirements Optimise treatment works to reduce/minimise losses Manage water treatment works to cope with reduced water quality Review planned outage program of work to minimise reductions in supply capability from outage	in line with Management and Communication plan If forecasts suggest the need for drought permit applications within 6 weeks, notify key stakeholders of intention to apply for permits and commence pre-application process.

Drought management zone	Drought description	EA drought action category	Demand side action	Supply side/ operational action	Stakeholder liaison/ communications
4	Drought	Level 2	Continuation of preceding actions Introduction of TUBs Full media campaign with direct appeals for TUBs compliance as per the communications plan Apply for drought orders for NEUB Pre-planning of extreme drought management actions	Implement environmental monitoring in line with Monitoring Plan Bring emergency/mothballed supply side options online where practicable (constrained by scheme lead times and maintenance of wholesome water quality) Postpone planned maintenance where possible to reduce planned outage Prepare drought permit applications for supply side drought actions Submit drought permits with a lead time to enable them to be implemented when drought management zone 5 is reached.	Briefing and working with stakeholder groups If forecasts suggest the need for drought permit applications within 6 weeks, notify key stakeholders of intention to apply for permits and commence pre-application process.
5	Drought	Level 3	Continuation of preceding actions Full media campaign continues with updates messaging to reflect the ongoing severity of the situation as per the communications plan Introduction of NEUBs	Continue environmental monitoring in line with Monitoring Plan Once demand management options are in place, implement supply side options that require drought permits	Briefing of Environment Agency, Consumer Council for Water, Defra and stakeholder groups

Drought management zone	Drought description	EA drought action category	Demand side action	Supply side/ operational action	Stakeholder liaison/ communications
5	Drought	Level 3	Implement extreme drought management actions to prevent entering drought management zone 6 (Level 4 action category)		
6	Severe drought	Level 4	This level of drought is outside the scope of the drought plan and would be managed via our incident response process. Implementation of emergency drought orders (standpipes/ rota cuts)	Continue environmental monitoring in line with Monitoring Plan Bring in extreme drought sources of supply on line with customer notices in place if there is a risk of water quality issues Managing draw off from reservoirs at low volume	Planning supply security for vulnerable customers Increased frequency of briefing of Environment Agency, Consumer Council for Water, Defra and stakeholder groups

4.2 Demand management actions

4.2.1 Water efficiency campaign and appeals for restraint.

Action Summary:

Trigger for implementation	DMZ3 – Prolonged dry weather – Level 1
Estimated impact on peak demand	Approximately 1% on average household demand
Area affected	Whole supply area / whole resource zone
Time to implementation	Immediate via social media channels 1 week preparation for implementing other types of campaigns.
Duration of action	Throughout dry weather and ramping up campaign and messaging as drought progresses to reflect changing situation
Permissions required	None.
Risks	Uncertainty over customer response and demand savings that will be realised.

Details:

Under normal water resource conditions we implement our on-going water efficiency campaign. This activity is designed to encourage our customers to use water wisely and our '*savewatersavemoney*'[11] promotion encourages customers to cut both their water and their energy bills by being more water efficient. Through this campaign we offer a number of free water saving devices to our customers as well as the promotion of other water saving products.

During a period of prolonged dry weather and declining water resources, the profile of the water efficiency campaign would be increased. This would be done ahead of implementing any other drought management actions and would include both household and non-household (i.e. retailers) customers. Our communication plan is based around the flexible and adaptive approach of 'agile communications' using varied and innovative communication channels to help customers reduce water use during dry weather and drought. We would also be working with other water companies and regulators in the region via the West Country Water Resources Group, to maximise the messaging opportunities across the region.

The details of this option are set out in our Communications Plan presented in section 6. Quantifying the likely additional demand reductions that would be associated with such a campaign is difficult. During the heatwaves experienced in 2018 and 2020 social media was used to deliver water efficiency messaging to customers, but because the water resource position was under 'normal operation' and we were not forecasting any supply issues, a full

[11] https://www.savewatersavemoney.co.uk/bristol/free-water-saving-products

media campaign was not launched by Bristol Water. We have therefore based our assumptions on a reduction of approximately 1% of average household water demand. This may increase as the water resource situation deteriorates, and the media campaign becomes more high profile.

4.2.2 Enhanced leakage management

Action Summary:

Trigger for implementation	DMZ3 – Prolonged dry weather – Level 1
Estimated impact on peak demand	Approximately 2Ml/d
Area affected	Whole supply area / whole resource zone
Time to implementation	Resourcing may need to be increased, so gradual increased activity over 2 or 3 weeks.
Duration of action	Throughout dry weather and ongoing drought situation.
Permissions required	None
Risks	BW already operate at a very low level of leakage so uncertainty over additional volumes that can be achieved.

Details:

Bristol Water continues to deliver industry leading levels of leakage reductions. Our excellent leakage performance can be attributed to significant effort to reduce leakage on our distribution network with more leakage inspectors deployed, supported with additional technology, whilst working closely with our customer to minimise leakage. Our leakage management strategy is therefore well established. During a drought situation we will review our leakage activities and any scope for additional savings or improvements. This will include:

- Increasing resources on find and fix activities (either internal resource or with contractor support).
- Reducing the time taken to repair both visible leaks once reported and non-reported leaks once we are aware of them.
- Reduce pressure across as many network zones as feasible to preserve water and minimise loss from leaks.
- Implement enhanced customer communication campaigns to increase awareness and reporting of leaks.

These activities would be implemented on entering drought management zone 3 (prolonged dry weather/Level 1) and be maintained throughout the drought situation. Table 7 shows where the implementation of leakage activities sits within our overall drought actions.

We will focus on our messaging to customer during a drought to emphasise our leakage activities and ask them to support us in these by promoting the company 'DigDat' service to encourage customers to report leaks. We would also maximise our publicity for 'Leakstop'

service to reduce customer supply pipe leakage by offering a subsidy to help with the repair of leaking customer supply pipes.

4.2.3 Temporary Water Use Restrictions (TUBS)

Action Summary:

Trigger for implementation	DMZ4 – Drought – Level 2 Application will be made if forecasts indicating going into DMZ4 within 3 weeks.
Estimated impact on peak demand	Up to 9.5% of peak summer household demand (April to September inclusive).
Area affected	Whole supply area / whole resource zone
Time to implementation	Estimated 2 weeks public consultation on the TUBs restriction proposals, but this would be tailored to the specific type of drought and time of year the TUB is being implemented. Up to a minimum of 3 weeks from decision to impose a TUB and being able to implement it.
Duration of action	Implemented in DMZ4 and continued throughout DMZ5
Permissions required	None required, but liaison with Environment Agency, CCW, Defra and the West Country Water Resource Group will be carried out.
Risks	Effectiveness of the TUBs restriction is uncertain. The resources required to effectively monitor and enforce the restriction. Public relations as a result of imposing a restriction on customers.

Details:

The Flood and Water Management Act (2010) gave powers to water companies to implement a wider range of temporary water use restrictions during a drought, without the need for a drought order. The Water Use (Temporary Bans) Order 2010 and the Drought Direction 2011 supplement the Flood and Water Management Act and set out the categories of water use that companies can restrict with and without a Drought Order.

Bristol Water's proposals for implementing temporary use bans (TUBs) are aligned with the industry Code of Practice and Guidance on Water Use Restrictions (UKWIR 2013). We will implement the restrictions in one stage when we enter drought management zone 4 (Level 2). The activities that will be restricted are set out below:

- Cleaning a private leisure boat using a hosepipe
- Cleaning a private motor vehicle using a hosepipe
- Filling or maintaining and ornamental fountain
- Cleaning walls, or windows, of domestic premises using a hosepipe

- Cleaning paths or patios using a hosepipe
- Cleaning other artificial outdoor surfaces using a hosepipe
- Drawing water using a hosepipe, for domestic recreational use
- Filling or maintaining a domestic swimming or paddling pool
- Watering a garden using a hosepipe
- Watering plants on domestic or non-commercial premises using a hosepipe
- Filling or maintaining a domestic pond using a hosepipe

Bristol Water has signed up to the Code of Practice and Guidance for Water Companies on Water Use Restrictions (UKWIR 2013) and we will therefore honour both the Statutory Exceptions[12] and the Discretionary Universal Exceptions[13] set out in the code. Customers do not need to make a formal representation to obtain permission for these exceptions. A full list of the exceptions is provided in Appendix E.

Bristol Water would implement the temporary use ban over our whole supply area at the same time. We would work with our neighbouring water companies via the West Country Water Resource Group to align our approaches to TUBS implementation if 'Level 2' restrictions were forecast for each company. Further details of this alignment approach are set out in the communications plan in section 6.

The demand saving associated with imposing restrictions on customer use is difficult to quantify. The legislation has only really been implemented once since it has come into effect, during the 2011/12 drought in southern and eastern England[14]. However, in this case, the period of heavy rainfall that occurred shortly after the TUBs came into effect has made it difficult to clearly determine the effect of the restrictions on demand (Environment Agency, December 2013). During the prolonged dry weather experienced in 2018 and 2019 a number of water companies started the process of putting TUBs in place, but they were not implemented due to heavy rainfall. Our assumptions for the likely demand savings to be made from the implementation of TUBs restrictions have therefore been based on the analysis of data collected during the 2003 drought (UKWIR, 2007), and the estimated savings set out in the industry Code of Practice and Guidance on Water Use Restrictions (2013). We estimate that our TUBs restrictions would save up to 9.5% of peak summer household demand.

Consultation prior to implementation of TUBs

We will follow the requirements set out in the legislation (Water Industry Act 1991 Section 76B (2) & (3) as amended by Section 36 of the Flood & Water Management Act) relating to the public consultation process on the implementation of temporary use bans.

[12] Statutory Exceptions – Activities/water uses specified in the legislation which are exempt from water use restrictions and for which customers do not need to make representation to obtain permission (UKWIR 2013).
[13] Discretionary Universal Exceptions – Activities/water uses not covered by a statutory exception but for which signatories to the Drought CoP have agreed to grant an exception for which customers do not need to make representation to obtain permission (UKWIR, 2013).
[14] TUBs were implemented in Spring 2012 by Thames Water, Southern Water. South East Water, Anglian Water, Sutton and East Surrey Water, Veolia Central and Veolia South East.

We will give formal notice in 2 local newspapers and on our website of our intention to implement the TUB and provide the details of the restrictions we are proposing to apply. We will also use social media to raise awareness of the consultation. To promote consistency across the industry, we will use the example notifications for water use restrictions under a temporary use ban provided in Appendix C of the UKWIR (2013) *Code of Practice and Guidance*. Ongoing communications with customers will be used to inform them when the restrictions have come into effect.

We will allow a 14-day consultation period, within which customers would be able to make representations (including for Discretionary Concessional Exceptions[15]). We will also consult with our Bristol Water Challenge Panel to raise awareness and get feedback on the application of TUBS restrictions.

Both prior to implementation of TUBS and as part of the consultation process we will liaise with our neighbouring water companies via the WCWR Group to ensure there is appropriate consistency of messaging and approach to avoid confusion for customers. Further details of our approach to working with neighbouring water companies in the West Country Region is provided in section 6.

The Water Resources Manager will be responsible for collating any representations received and presenting these to the Drought Management Group for review and consideration. We will consider all fully evidenced representations that indicate a particular water use ban would result in substantial and lasting damage to particular categories of business or result in physical harm or damage to health. In such cases we may be willing to modify the restriction to avoid or limit damage.

4.2.4 Drought Order – Non-essential use bans (NEUBs)

Action Summary:

Trigger for implementation	DMZ5 – Drought – Level 3 Application process will commence when TUBs restrictions are implemented (DMZ4 – Drought – Level 2).
Estimated impact on peak demand	Up to 2% of non-household demand across the year.
Area affected	Whole supply area / whole resource zone
Time to implementation	2 to 3 months – time for drought order application and determination, communication with public, time to place adverts in newspapers and send prohibition notices.
Duration of action	Maximum duration 6 months before extension required.

[15] Discretionary Concessional Exceptions – Activities/water uses not covered by a statutory exceptions, but for which an individual water company offers an exception for which customers must first make representation to obtain permission (UKWIR, 2013).

Permissions required	Drought Order from Defra. Public hearing may be required.
Risks	Negative impact on affected businesses. Uncertainty around effectiveness of drought order. Defra may not issue the drought order. Public relations as a result of imposing the restrictions.

Details:

If a drought situation continues to deteriorate, we will need to apply for a Drought Order to further restrict water use through the implementation of non-essential use bans (NEUBs) under the Drought Direction 2011. To introduce this level of restriction we are required to apply to the Secretary of State at the Department of the Environment, Food and Rural Affairs (Defra) for these powers.

In a similar manner to the implementation of TUBs, we will implement the restrictions in one stage. This will be when we enter drought management zone 5 (Level 3).

We anticipate that some of the categories of restrictions could potentially result in a business being affected financially if operation had to be suspended. These restrictions would only be applied if we were experiencing a prolonged drought situation. The restrictions to be implemented are set out below:

- Watering outdoor plants on commercial premises
- Filling or maintaining a non-domestic swimming or paddling pool
- Filling or maintaining a pond
- Operating cisterns (in unoccupied premises)
- Cleaning industrial plant (except where required for health and hygiene)
- Suppressing dust (except where controlled by HSE regulations)
- Operating a mechanical vehicle-washer
- Cleaning a window of a non-domestic building
- Cleaning any vehicle, boat, aircraft or railway rolling stock
- Cleaning non-domestic premises

Bristol Water has signed up to the Code of Practice and Guidance for Water Companies on Water Use Restrictions (UKWIR 2013) and we will therefore honour the Statutory Exceptions[16] as per the Drought Direction 2011 and set out in the code for a NEUB drought order. A full list of the exceptions is provided in Appendix E.

Bristol Water would implement the NEUB over our whole supply area at the same time.

[16] Statutory Exceptions – Activities/water uses specified in the legislation which are exempt from water use restrictions and for which customers do not need to make representation to obtain permission (UKWIR 2013).

It is very difficult to estimate the effect of this type of water use restriction on customer demand as very little data is available. The demand saving associated with imposing NEUB restrictions has been assessed using the UKWIR/EA methodology set out in the 2002 report *Evaluating the impact of demand restrictions*. We estimate that the NEUB restriction would save up to 2% of non-household demand. This would be applicable across the year, as non-household consumption shows little seasonal variation.

It is likely to take between 2 and 3 months to implement this option, to allow time for the drought order application and determination, including the publication of a notice of the Drought Order application in the press. The application process will be commenced at the same time as the TUBs restrictions are implemented (drought management zone 4) in order to ensure enough lead time before the restrictions are required.

The drought order can only be granted for a maximum of 6 months and extended for up to another 6 months via a further application to the Secretary of State.

4.2.5 Emergency Drought Orders

Action Summary:

Trigger for implementation	DMZ6 – Severe Drought – Level 4
Estimated impact on peak demand	Unknown
Area affected	Whole supply area / whole resource zone
Time to implementation	12 weeks (3 months) 10 weeks preparation time, public consultation, possible public hearing and determination by Secretary of State. 2 weeks implementation time on the ground.
Duration of action	N/A
Permissions required	Emergency Drought Order issued by the Secretary of State. Public hearing may be required.
Risks	Uncertainty of effectiveness of emergency drought order Uncertainty of practical implementation of the drought order.

Details:

If the drought situation became significantly worse than the severe drought events that we have planned for we may not be able to maintain an uninterrupted supply of water for an extended duration. In this circumstance we would be moving to our incident response procedures and implementing an Emergency Drought Order, where intermittent supply cuts or supply via standpipes may be required.

4.2.6 Compensation

People who suffer loss or damage as a result of a drought order are entitled to compensation. Claims must be made within six months of the date of expiry of the order. The rules are set out in Schedule 9 of the Water Resources Act (WRA) 1991. Those who may claim are the owners of the source and all other persons interested in the source or adversely affected by the taking of water. The claimant must serve notice on the drought order applicant stating the grounds of the claim and the amount claimed. We do not have any supply side drought orders proposed in this drought plan, so it is not anticipated that compensation of this nature will be required.

We are not required to pay compensation to customers if the circumstances are so exceptional that, in Ofwat's view, it would be unreasonable to expect the interruption to supply to be avoided and under the WRA 1991, customers are not entitled to compensation in respect of loss or damage sustained as a result of the implementation of Drought Permits/Orders.

Further information on the guaranteed standards scheme (GSS) payments is available from the Ofwat website: https://www.ofwat.gov.uk/wp-content/uploads/2017/03/The-guaranteed-standards-scheme-GSS-summary-of-standards-and-conditions.pdf

4.3 Supply-side Actions

Under normal operating conditions we optimise our water resources to minimise the cost, operational risk and our carbon footprint, and to maintain our water resource position in the 'normal' operating zone. During drier conditions focus changes to our dry weather operating policy where we minimise the use of our reservoir water and maximise the use of our river sources from the Severn and the Axe.

Should drought conditions develop, and our water supplies become depleted, we will look to increase the volume of water available to us via a number of supply-side actions. These actions will supplement the demand management actions set out in section 4.2. Each drought is different, and we will aim to take a flexible approach to the timing and use of the supply-side actions in order to be able to respond appropriately to the specific drought conditions being experienced. In principle we will prioritise our actions to implement those with the least environmental impact (and for which we have a high confidence in that assessment) first. Details of the environmental assessment work to support our drought actions are set out in section 5. We will utilise all our licensed sources within their abstraction licence conditions before submitting drought permit applications to remove additional water from the environment.

As part of the drought plan update process, we have reviewed our supply side actions and identified three further drought permits that could be introduced during a drought. The details

of these actions are included below, and we have included them in our Strategic Environmental Assessment work and the Environmental Assessment in section 5.

4.3.1 Support for non-public water supply failure

Across the West Country Region there are people, business and farms that rely on their own water sources for essential use such as drinking and watering livestock. During a drought these sources may be affected and could even fail. There is limited information available about the number of non-public water supply abstractors across the region and the volume of water they use/need. To improve our understanding of this area of water use, the WCWR Group has commissioned a piece of work to assess the water demand for mining, agriculture and private water supply across the West Country Region.

The outputs from this research have provided a useful indication of the potential demands for water from other abstractors in the West Country Region. Specifically for the Bristol Water supply area there was an estimated demand from private water supplies (commercial and domestic) of around 19Ml/d (7% of our 2021/22 dry year distribution input). The sources of registered private water supplies include boreholes, wells and surface water abstractions. It was also identified that there are potentially almost 12,000 properties in the Bristol Water area that may have an unregistered private water supply. It was estimated that the domestic demand associated with these unregistered supplies could be in the region of 4Ml/d (of the 19Ml/d total). Should these private water supplies fail during a drought situation then there is the potential that people would look to Bristol Water to support their water needs.

Livestock demands in the West Country were also assessed as part of the research. Using estimates of livestock numbers it was calculated that in the Bristol Water area water demand associated with livestock could be around 16Ml/d. Private water supplies are particularly important for livestock farms for drinking water, however there is significant uncertainty around what proportion of this demand is met by the private supplies. Data from Defra (2017)[17] indicated that in the West Country 49% of the farming water demand is met by mains water, which implies that 51% is potentially met by private water supplies.

This work has highlighted that there is potentially a significant volume of water being used from private supplies in the Bristol Water area and across the South West. However, there is also significant uncertainty associated with this estimated volume. Additional work will be required in order to better understand the resilience of these resources to drought and other extreme conditions. If feasible Bristol Water will endeavour to support those who may require it during an emergency situation.

Recent experience of extreme weather conditions affecting private water supplies occurred during storm Eunice in February 2022. A power outage resulted in a customer who usually relied on a private water supply from a borehole to support their cattle farm, switching to the

[17] Defra (Jan 2017): Water usage on farms: Results from the Farm Business Survey, England 2015/16

mains supply for all their water requirements. This resulted in a notable increase in demand on this area of the network, that we were having to support via tanker due to mains power outages affecting our pumping station. Despite the challenging conditions, we maintained a continuous supply to all our customers, including the additional emergency demand requirement of over 100 cattle and several thousand poultry from the farm. Although this is not a specific drought example, it demonstrates how we are able to support customer who usually rely on private water supplies in an extreme scenario.

4.3.2 Temporary variations to bulk supply agreements

Action Summary:

Trigger for implementation	DMZ3 – Prolonged dry weather – Level 1
Estimated yield	6.97Ml/d at DMZ3, with possible increase as drought worsens up to 11.3Ml/d
Area affected	Whole supply area / whole resource zone
Time to implementation	Implementation would be immediate, but discussion would be held with Wessex Water well in advance of any reduction.
Duration of action	For the duration of the drought
Permissions required	Discussion with Wessex Water
Risks	Drought response varies across the region, so any reductions need to be implemented in the context of the specific drought situation.

Details:

Bristol Water has a supply agreement with Wessex Water to provide up to 11.3Ml/d of water via a treated water pipeline to the city of Bath. In the water resource management plan (WRMP) 2019, both Bristol Water and Wessex Water included a reduction to this bulk supply volume to 4.4Ml/d from 2025/26 for the remainder of the planning period to 2044/45. Formal negotiations are ongoing with Wessex Water about the future changes to the contractual volume of this export. Without prejudice to contractual discussions, we have been working with Wessex Water to understand the effect of reducing this transfer during drought conditions, and the likely effect on both the Wessex Water system and the Bristol Water system.

On entering drought management zone 3 (prolonged dry weather – Level 1) we would reduce the bulk supply to a maximum of 4.4Ml/d (reflecting the proposals set out in our WRMPs). This would be implemented in discussion with Wessex Water and in the context of the wider regional drought position. On entering drought management zone 4 (drought – Level 2) we would consider the feasibility of reducing the supply further. This level of reduction would be maintained throughout zone 5 (drought – Level 3). The scenario modelling work carried out by Bristol Water and Wessex Water to support the development of this drought plan has suggested that a reduction of the transfer to 4.4Ml/d could be sustained through a number of serious droughts, but, depending on the drought, issues may arise for Wessex if this transfer

was reduced below this volume. However, under none of the drought events we have simulated, including the 1 in 500 extreme droughts, has the transfer needed to be reduced to zero. We would work very closely with Wessex Water throughout prolonged dry weather and drought to manage this transfer to reflect the best use of resource for the both the companies and their customers. The proposed reductions are summarised in table 8.

Table 8: Proposed reductions to bulk supply to Wessex Water at different stages of drought

Drought Management Zone	Bulk supply volume to Wessex Water (Bath) (Ml/d)	Additional yield available to Bristol Water (Ml/d)
Zone 2 – *Normal operation (dry weather management)*	11.37	0
Zone 3 – Prolonged Dry Weather	4.4	6.97
Zone 4 – *Drought*	4.4 - 0	6.97 – 11.37
Zone 5 – *Drought*	4.4 - 0	6.97 – 11.37

Every drought is different and we are likely to be affected by a drought in on a different timeframe to Wessex Water due to the differing nature of our resources and supply systems. The management of the transfer to Wessex Water would therefore be reflective of the specific drought conditions being experienced by both companies, and the need to implement the most efficient use of water resource across the region as a whole.

Once the contract negotiations are complete and a new bulk supply agreement is in place, any actions taken in a drought will reflect the terms of the new agreement and we will update drought actions so that any changes from the existing transfer contract will be reflected fully in our Drought Plan.

We also have some small imports and exports of water from/to Wessex Water at the periphery of our system, typically no more than 1Ml/d. Both Bristol Water and Wessex Water would not envisage needing to reduce these transfers during a drought. We would be liaising closely with Wessex Water as part of the West Country Regional Group drought management process and the reliability of these transfers under a specific drought would be closely monitored. A summary of these small transfers is provided in the table below.

Company		Name	Annual average (Ml/d)	Peak (Ml/d)	Drought reliability
From	To				
Bristol Water	Wessex Water	Marshfield	0.04	0.05	No expectation that these transfers would be reduced in the event of a drought
Bristol Water	Wessex Water	Ashcott	0.29	0.36	
Wessex Water	Bristol Water	Chapmanslade	0.13	0.16	
Wessex Water	Bristol Water	Corsley	0.09	0.11	
Wessex Water	Bristol Water	Lords Farm (Standerwick)	0.05	0.07	
Wessex Water	Bristol Water	Lydford	0.01	0.01	

Wessex Water	Bristol Water	Cowbridge to P25R (Malmesbury)		1.50	No expectation that these transfers would be reduced in the event of a drought
Wessex Water	Bristol Water	Compton Dundon/Ivythorn	0.85	1.07	

4.3.3 R24R & R24Ra (well head)

Action Summary:

Trigger for implementation	DMZ 4 (Drought – Level 2)
Estimated yield	2.4Ml/d dry year annual average yield
Area affected	Whole supply area / whole resource zone
Time to implementation	Up to 6 months to put in the required infrastructure.
Duration of action	Once in supply the source would be used to support reservoir refill until we move back to normal operation.
Permissions required	Source is licensed for 4.11Ml/d annual average but not used for 20 years, so need to give regard to the 'no deterioration' principle in the WFD when changing the operation of the source.
Risks	Water quality issues. Timing of getting the source into supply in response to a drought situation.

Details:

R24R & R24Ra (Well Head) is a licensed source that has been retained for emergency use. It has an anticipated yield of 2.4 Ml/d however, due to improvements in water quality standards it is unable to be put into direct supply as was done in the past. This option would involve constructing a 4.2km pipeline to Cheddar Reservoir and treating the water at Cheddar water treatment works. Some pre-planning work has already been completed on this option because it is identified as a feasible option via the water resource planning process. It is anticipated that it would take at least 6 months to implement this option (subject to any environmental legislation and assessment requirements and engineering feasibility).

In implementing this option, we would have to give regard to the 'no deterioration' principle set out in the Water Framework Directive when considering changes to the operation of the source. In addition, it is also likely that a drinking water safety plan would be required to support this option. Full details of the option are provided in the option summary form in Appendix C.

The drought scenario assessment carried out (Appendix B), confirmed that this option is only really effective for a multi-season drought due to the 6-month lead-in time required to put the source back into supply.

The R24R & R24Ra (Well Head) source is currently the subject of a Water Industry Environment Programme (WINEP) investigation to look at the sustainability of the source. The investigation is underway and will be completed in March 2022. All the latest information available from the investigation has been included in the environmental assessments carried out to support the drought plan. If the outcome of the WINEP investigation finds that abstraction from this source would cause deterioration, then the drought plan will be updated to reflect this.

4.3.4 Reduction of Blagdon Reservoir compensation release

Action Summary:

Trigger for implementation	DMZ 5 (Drought – Level 3). If forecasts suggest the need for drought permit applications within 6 weeks, we will notify regulators of intention to apply for permits and commence pre-application process. Once forecasts indicated that we would be entering DMZ 5 within 4 weeks, we would initiate the permit application process whilst in DMZ 4 with the aim of having the permit in place in DMZ 5.
Estimated yield	4.038Ml/d (15th May to 30th November)
Area affected	Whole supply area / whole resource zone
Time to implementation	Up to 6 weeks if no public hearing required. Longer if a public hearing is called.
Duration of action	Drought permit valid for up to 6 months. If reservoir storage recovers out of DMZ 5 we will consider lifting the permit earlier.
Permissions required	Drought permit from the Environment Agency (summer support)
Risks	Drought permit not being issued by the Environment Agency.

Details:

Bristol Water is required as part of its abstraction licence to make a compensation discharge of 8.638Ml/d into the Congresbury Yeo from Blagdon Reservoir, between 15th May and 30th November each year. A reduction of this discharge would potentially conserve additional water for public water supply by holding it in Blagdon reservoir. Under this option we are proposing to reduce the compensation by 4.038Ml/d to 4.6Mld between 15th May and 30th November.

This permit was re-introduced to our drought plan in 2018. We have since implemented a programme of baseline environmental monitoring and developed Environmental Assessment Reports to support this option. Full details of the environmental assessment for this option are provided in section 5.

A drought permit from the Environment Agency would be required in order to implement this option. This action is for a summer permit (May to November) which would be applied for to

maintain reservoir storage during the summer months. It is likely that this would be aligned with the application of summer permits for Chew Valley Reservoir and Cheddar Ponds given the yields that these permits provide and the benefits of retaining the water in reservoirs which all hold environmental designations. We will use the information from our ongoing environmental monitoring programme in consultation with the Environment Agency to inform our decision on whether to apply for summer permits together, at the same time or separately in response to each unique drought situation. Full details of the option are provided in the option summary form in Appendix C.

We are in the process of implementing Water Industry National Environment Program (WINEP) adaptive management trials at Blagdon Reservoir. These trials are assessing the environmental benefits to the river downstream of changing the compensation regime from the reservoir. They are being implemented over AMP7 (to 2024/25) and then any licence changes will be made in AMP8. This drought plan will be published before the trials are complete, so we have kept the permits to reflect the existing abstraction licence as it is in the context of the in force, statutory licence that the drought permit will be applied for. The permit will be updated to reflect any changes in the licence in our next drought plan review (c. 2027)

4.3.5 Reduction of Chew Reservoir compensation release

Action Summary:

Trigger for implementation	DMZ 5 (Drought – Level 3) If forecasts suggest the need for drought permit applications within 6 weeks, we will notify regulators of intention to apply for permits and commence pre-application process. Once forecasts indicated that we would be entering DMZ 5 within 4 weeks, we would initiate the permit application process whilst in DMZ 4 with the aim of having the permit in place in DMZ 5.
Estimated yield	7.32Ml/d (1st May to 30th Nov) based on a reduction in compensation flow from 14.32Ml/d to 7 Ml/d between May and July. 3.419 Ml/d (1st Dec to 30th April) based on a reduction in compensation flow from 6.819Ml/d to 3.4Ml/d between December and April.
Area affected	Whole supply area / whole resource zone
Time to implementation	Up to 6 weeks if no public hearing required. Longer if a public hearing is called.
Duration of action	Drought permit valid for up to 6 months. If reservoir storage recovers out of DMZ 5 we will consider lifting the permit earlier.
Permissions required	Drought permit from the Environment Agency (summer support or winter refill)
Risks	Drought permit not being issued by the Environment Agency.

Details:

Bristol Water is required as part of its abstraction licence to make a compensation discharge of 14.32 Ml/d (May to Nov) and 6.819Ml/d (Dec to April) into the River Chew. A reduction of this discharge would potentially conserve additional water for public water supply. Under this option we are proposing to reduce the compensation by 7.32 Ml/d to 7Ml/d between May and Nov, and by 3.419 Ml/d to 3.4 Ml/d between December and April.

A drought permit from the Environment Agency would be required in order to implement this option. Although Chew Valley Reservoir is a European designated site (a Special Protection Area (SPA)) this option will not cause a negative effect to the designated features of the SPA, we have therefore determined that the application for this temporary licence change should be via a drought permit application to the Environment Agency, as opposed to a Drought Order application to the Secretary of State. The type of permit required would depend on the drought conditions being experienced. A winter permit (December to April) would be applied for if the reservoir needed refill support. It is likely that this would be aligned with the application of a winter permit for Cheddar Ponds given the relatively small yields that these permits provide and the benefits of retaining the water in reservoirs which all hold environmental designations. Each drought is different, and we will use the information from our ongoing environmental monitoring programme in consultation with the Environment Agency to inform our decision on whether to apply for winter permits together, at the same time or separately in response to each unique drought situation. A summer permit (May to November) would be applied for to maintain reservoir storage during the summer months. Again, it is likely that this would be aligned with the application of summer permits for Cheddar Ponds and Blagdon Reservoir given the yields that these permits provide and the benefits of retaining the water in reservoirs which all hold environmental designations. We will use the information from our ongoing environmental monitoring programme in consultation with the Environment Agency to inform our decision on whether to apply for summer permits together, at the same time or separately in response to each unique drought situation. Full details of the option are provided in the option summary form in Appendix C.

We are in the process of implementing Water Industry National Environment Program (WINEP) adaptive management trials at Chew Valley Reservoir. These trials are assessing the environmental benefits to the river downstream of changing the compensation regime from the reservoir. They are being implemented over AMP7 (to 2024/25) and then any licence changes will be made in AMP8. This drought plan will be published before the trails are complete, so we have kept the permits to reflect the existing abstraction licence, as it is in the context of the in force, statutory licence that the drought permit will be applied for. The permit will be updated to reflect any changes in the licence in our next drought plan review (c. 2027).

4.3.6 Reduction of Cheddar Ponds compensation release to Cheddar Yeo

Action Summary:

Trigger for implementation	DMZ 5 (Drought – Level 3)

	If forecasts suggest the need for drought permit applications within 6 weeks, we will notify regulators of intention to apply for permits and commence pre-application process. Once forecasts indicated that we would be entering DMZ 5 within 4 weeks, we would initiate the permit application process whilst in DMZ 4 with the aim of having the permit in place in DMZ 5.
Estimated yield	3.4Ml/d (1st December to 14th May) based on a reduction in compensation flow from 6.8Ml/d to 3.4Ml/d Dec to May. 5.68Ml/d (15th May to 30th November) based on a reduction in compensation flow from 11.365Ml/d to 5.68Ml/d May to November.
Area affected	Whole supply area / whole resource zone
Time to implementation	Up to 6 weeks if no public hearing required. Longer if a public hearing is called.
Duration of action	Drought permit valid for up to 6 months. If reservoir storage recovers out of DMZ 5 we will consider lifting the permit earlier.
Permissions required	Drought permit from the Environment Agency (summer support or winter refill)
Risks	Drought permit not being issued by the Environment Agency.

Details:

Bristol Water is required as part of its abstraction licence to make a compensation discharge to the Cheddar Yeo from Cheddar Ponds of 6.8 Ml/d from 1st December to 14th May and 11.365Ml/d from 15th May to 30th November. A reduction of this discharge would potentially conserve additional water for public water supply. Under this option we are proposing to reduce the compensation by 50% to 3.4Mld between December and May and 5.68Ml/d between May and November.

A drought permit from the Environment Agency would be required in order to implement this option. The type of permit required would depend on the drought conditions being experienced. A winter permit (December to May) would be applied for if the reservoir needed refill support. It is likely that this would be aligned with the application of a winter permit for Chew Valley Reservoir given the relatively small yields that these permits provide and the benefits of retaining the water in reservoirs which all hold environmental designations. Each drought is different, and we will use the information from our ongoing environmental monitoring programme in consultation with the Environment Agency to inform our decision on whether to apply for winter permits together, at the same time or separately in response to each unique drought situation. A summer permit (May to November) would be applied for to maintain reservoir storage during the summer months. Again, it is likely that this would be aligned with the application of summer permits for Chew Valley Reservoir and Blagdon Reservoir given the yields that these permits provide and the benefits of retaining the water in reservoirs which all hold environmental designations. We will use the information from our ongoing environmental monitoring programme in consultation with the Environment Agency

to inform our decision on whether to apply for summer permits together, at the same time or separately in response to each unique drought situation. Full details of the option are provided in the options summary form in Appendix C.

4.3.7 Demonstrating an exceptional shortage of rain

Before applying for a drought permit, we must be able to demonstrate that there has been an exceptional shortage of rain. Evidence of this will need to be included with the drought permit application.

The Environment Agency has issued draft guidance on the technical assessment required for demonstrating an Exceptional Shortage of Rain (ESoR). If we need to submit a drought permit application, we will follow this guidance in demonstrating the ESoR case. It is not appropriate to set a prescriptive approach to assessing an ESoR case because each drought and situation is unique. The guidance provides a 'best practice' approach in relation to data selection and technical analysis methods to be used within the assessment.

To support the development of our drought plan we have implemented a 'mock' drought permit application exercise. This has included completing an ESoR assessment to support the application. Full details of the exercise are set out in section 8.4 and Appendix D.

4.4 Extreme drought management actions

As part of the review and update of our drought plan we have considered the actions that we could implement in the event of an extreme drought, after all the 'Level 3' (DMZ 5) restrictions have been put in place, in order to delay or remove the need for 'Level 4' (DMZ 6) emergency restrictions. The demand and supply options that could be available to Bristol Water are set out below. In principle we will prioritise our actions to implement those with the least environmental impact (and for which we have a high confidence in that assessment) first. This includes implementing demand options as a priority and taking more water from the environment only when no feasible alternative options are available.

A summary environmental assessment of these actions has been carried out and reported in the SEA, HRA and WFD reports accompanying the Drought Plan. The summary assessments include relevant information regarding the triggers for carrying out data collation to support more detailed assessment should an extreme drought event arise.

4.4.1 Media & Communications

Type of action	Demand – media campaign
Area affected	Whole supply area / whole resource zone
Trigger for implementation	Forecasting that we are going to be approaching the Level 4 trigger within 6 weeks.

Estimated benefit/saving	Aim to achieve average pcc of 80 l/h/d
Description	This would be a significant media campaign focused on the 'day zero' concept that would aim to get customer use down to 80 l/h/d or lower to prevent the requirement for an emergency drought order. Customers would be asked to only use water that is absolutely necessary for sanitation and hygiene. No garden watering or car washing. This action is similar to the measured put in place in Cape Town in 2018 when the city was 90 days away from cutting off the municipal water supply. This campaign could be coordinated with other water companies if they were in a similar position and Water UK. We would also work with Government and regulators to support the messaging.
Time to implementation	Immediate via social media channels 1 week preparation for implementing other types of campaigns. Other media outlets would include advertising on radio, billboards, and busses. Headline news articles about the supply situation. CEO in media interviews.
Permissions required	No formal permissions required.
Significant barriers	Uncertainty about customer response and whether deep reductions in demand are achievable under this scenario.

4.4.2 Pressure reduction

Type of action	Demand – pressure reduction
Area affected	Whole supply area / whole resource zone/ could be applied at DMA level and below if needed.
Trigger for implementation	Forecasting that we are going to be approaching the Level 4 trigger within 6 weeks.
Estimated benefit/saving	Unknown, but reduced pressure would reduce customer use/waste and leakage.
Description	Pressure reduction would be phased over the course of the drought. This action would be to reduce pressure at the customers tap to below the regulatory standards with the aim of reducing demand to 80l/h/d or lower, and to reduce leakage.
Time to implementation	Pressure reduction would have been gradually implemented throughout the duration of the drought. This would require a phased approach over the course of 4 weeks to implement this phase.
Permissions required	Notice to the fire service under Section 43(2) of the Fire and Rescue Service Act 2004. Close liaison with regulators (Ofwat & EA) and Government on implementation of action due to breach of Ofwat standards for network pressure.

Significant barriers	In breach of the Ofwat standards for network pressure (under Guaranteed standards scheme (GSS) pressure should be maintained at 0.7 bar). However, drought is cited in the GSS as an exception to the requirements to make a payment to customers if the pressure standard is not met. Possible implications for the fire service and access to water under pressure for fire fighting. We would work with the fire service to ensure that appropriate mitigation measures were in place and provide at least 7 days' notice in writing of the pressure reduction as required under Section 43(2) of the Fire and Rescue Service Act 2004.

4.4.3 River Axe drought permit

Action Summary:

Trigger for implementation	DMZ 5 (Drought – Level 3) If forecasts indicated that we would be entering DMZ 5 (Level 3) within 4 weeks, we would initiate the permit application process whilst in DMZ 4 with the aim of having the permit in place in DMZ 5.
Estimated yield	Additional yield of between 1.5Ml/d and 6.5Ml/d depending on the severity of the drought and flow availability in the river.
Area affected	Whole supply area / whole resource zone
Time to implementation	Minimum of 6 weeks if no public hearing required, depending on the supporting environmental information available. Longer if a public hearing is called.
Duration of action	Drought permit valid for up to 6 months. If the resource position started to improve significantly we would consider lifting the permit earlier.
Permissions required	Drought permit from the Environment Agency
Risks	Drought permit not being issued by the Environment Agency.

Details:

Bristol Water has a licence to abstract from the River Axe over the winter period from November and April. This water is pre-treated and then transferred into Cheddar Reservoir. An extension of the abstraction period and the total annual licence volume would provide additional support for reservoir refill over the winter period. Under this option we are proposing an extension of the period of abstraction by 2 months to include May and October (period of abstraction extended from November – April, to October to May) and an increase in the annual abstraction volume from 4750Ml/year to 7145Ml/year (increase of 2395Ml/year). As the drought permit would be valid for up to 6 months, we would apply for the appropriate terms of licence extension based on the time of year we were submitting the application.

A drought permit from the Environment Agency would be required in order to implement this option. A high level assessment of this option has been included within the SEA, HRA and WFD assessment processes. Baseline data for the River Axe, including those for water quality and macroinvertebrates, were collated and analysed for the AMP7 WINEP 'no deterioration' abstraction investigation (signed off March 2022). These data alongside further specifically collected data would support an environmental assessment report (EAR) once we enter DMZ 4 (Level 2) should an application for the River Axe drought permit be required during an extreme drought situation.

4.4.4 P08R drought permit

Action Summary:

Trigger for implementation	DMZ 5 (Drought – Level 3) If forecasts indicated that we would be entering DMZ 5 (Level 3) within 4 weeks, we would initiate the permit application process whilst in DMZ 4 with the aim of having the permit in place in DMZ 5.
Estimated yield	Estimated yield of c. 2Ml/d. This is based on a change to the authorised quantities of water to be abstracted at P08R when flow in the Ozleworth Brook is less than 13 Ml/d.
Area affected	Whole supply area / whole resource zone
Time to implementation	Minimum of 6 weeks if no public hearing required, depending on the supporting environmental information available. Longer if a public hearing is called.
Duration of action	Drought permit valid for up to 6 months. If the resource position started to improve significantly we would consider lifting the permit earlier.
Permissions required	Drought permit from the Environment Agency
Risks	Drought permit not being issued by the Environment Agency.

Details:

Bristol Water has a groundwater licence to abstract at P08R throughout the year. The volume of water that can be abstracted is linked to the flow in the Ozleworth Brook. A change to the maximum quantity authorised to be abstracted under the specified flow conditions would enable abstraction to continue under drought conditions. Under this option we are proposing that abstraction of up to 4.5Ml/d would be permitted when flows in the Ozleworth Brook drop below 13Ml/d.

A drought permit from the Environment Agency would be required in order to implement this option. A high level assessment of this option has been included within the SEA, HRA and WFD assessment processes. Bristol Avon Rivers Trust (BART) has undertaken some environmental survey work on the Little Avon and its headwaters including the Ozleworth Brook. Results from this work alongside specific Bristol Water survey outputs would support

an environmental assessment report (EAR) once we enter DMZ 4 (Level 2) should an application for the P08R drought permit be required during an extreme drought situation.

4.4.5 P05R drought permit

Action Summary:

Trigger for implementation	DMZ 5 (Drought – Level 3) If forecasts indicated that we would be entering DMZ 5 (Level 3) within 4 weeks, we would initiate the permit application process whilst in DMZ 4 with the aim of having the permit in place in DMZ 5.
Estimated yield	2.2 Ml/d based on the assumption of reducing the minimum flow condition at the River Kenn at Kenn Gauge to 2.21Ml/d.
Area affected	Whole supply area / whole resource zone
Time to implementation	Minimum of 6 weeks if no public hearing required, depending on the supporting environmental information available. Longer if a public hearing is called.
Duration of action	Drought permit valid for up to 6 months. If the resource position started to improve significantly we would consider lifting the permit earlier.
Permissions required	Drought permit from the Environment Agency
Risks	Drought permit not being issued by the Environment Agency.

Details:

Bristol Water has a groundwater licence to abstract from P05R Well throughout the year. The volume of water that can be abstracted is linked to the flow at the Kenn gauge. During the summer reduced river flows can restrict the volume of water available for abstraction. A change to the minimum flow at which abstraction is allowed would enable abstraction to continue for a longer period under drought conditions. Under this option we are proposing that the flow at the Kenn gauge above which abstraction is allowed is reduced from 4.41Ml/d to 2.21Ml/d. Full details of the proposed changes to the licence are set out in Appendix C.

A drought permit from the Environment Agency would be required in order to implement this option. A high level assessment of this option has been included within the SEA, HRA and WFD assessment processes. A WINEP abstraction investigation is being undertaken in AMP7 for P05R Well. The environmental assessments carried out to support this investigation would also support the development of an environmental assessment report (EAR) once we enter DMZ 4 (Level 2) should an application for the P05R drought permit be required during an extreme drought situation.

4.4.6 Emergency Storage & zero compensation releases

Type of action	Supply – Emergency storage and zero compensation releases

Area affected	Whole supply area / whole resource zone
Trigger for implementation	Forecasting that we are going to be approaching the Level 4 trigger within 6 weeks.
Estimated benefit/saving	The Emergency storage in the Mendip Reservoirs provides approximately 30 days supply as required from this part of the system. Assuming the compensation releases from the reservoirs have already been reduced, then between an additional 6.8Ml/d and 11.6 Ml/d would be available by reducing them to zero.
Description	On breaching the emergency storage level in the reservoirs, we would reduce the compensation volumes to zero in order to keep as much water in the reservoirs and available for public water supply as possible.
Time to implementation	Immediate. Reservoir level would drop into the emergency storage area and the compensation would be reduced to zero.
Permissions required	Drought permit from the Environment Agency to amend the licence conditions to implement zero compensation releases from reservoirs.
Significant barriers	Further compensation reductions would probably require an IROPI (imperative reasons of overriding public importance) case to be made under the Habitats Directive. The water quality in the lower parts of the reservoir could be poor and this might result in treatment issues.

4.4.7 Lowering pumps in boreholes

Type of action	Supply – lowering pumps in boreholes
Area affected	Whole supply area / whole resource zone
Trigger for implementation	Forecasting that we are going to be approaching the Level 4 trigger within 6 weeks.
Estimated benefit/saving	Unknown. Groundwater sources would be selected based on the drought response and how resilient they have been.
Description	If pump levels were the limiting factor in the groundwater source supply, and water was still available for abstraction below the normal pumping water level, then we would consider lowering the pumps to enable the remaining water to be abstracted.
Time to implementation	Relatively short time to implement this response. Depending on the site it is likely to require some engineering works.
Permissions required	Possible drought permit if action resulted in abstracting outside licence conditions. This would be reviewed on a site by site/licence by licence basis in close liaison with the Environment Agency.
Significant barriers	Environmental effects – could result in further lowering of the water table if the source already suffering from reduced yield. Could be environmental sustainability issues if other water bodies are affected by the additional abstraction. Depending on the licence it might result in abstracting outside the licence conditions.

4.4.8 Re-instate source at Cold Bath Springs

Type of action	Supply – re-instate source at Cold Bath Springs
Area affected	Whole supply area / whole resource zone
Trigger for implementation	Forecasting that we are going to be approaching the Level 4 trigger within 6 weeks.
Estimated benefit/saving	3Ml/d annual average yield (5Ml/d peak daily) based on historic licence conditions.
Description	Start abstracting from the source at Cold Bath Springs and pump into Barrow No 3.
Time to implementation	Engineering and infrastructure requirements would be associated with this option to bring it back into supply. Time to implementation likely to be up to 6 months.
Permissions required	Drought Permit from Environment Agency. Regulation 27 risk assessment to be completed and a Regulation 28 report submitted to DWI.
Significant barriers	Environmental effects – source has not been used for a significant period of time and is now not licenced so environmental assessment would be needed to determine any likely effects. DWI constraints regarding the water quality at the source.

4.4.9 Re-instate source at P38R.

Type of action	Supply – re-instate source at P38R
Area affected	Whole supply area / whole resource zone
Trigger for implementation	Forecasting that we are going to be approaching the Level 4 trigger within 6 weeks.
Estimated benefit/saving	2Ml/d yield based on estimated dry weather yield – previous licence 4.4Ml/d annual average from May to October (10Ml/d peak daily)
Description	Start abstracting from the source at P38R and either pump into Line of Works, or installation of temporary treatment plant of site.
Time to implementation	Engineering and infrastructure requirements would be associated with this option to bring it back into supply. Time to implementation likely to be up to 6 months.
Permissions required	Drought Permit from Environment Agency. Regulation 27 risk assessment to be completed and a Regulation 28 report submitted to DWI.
Significant barriers	Environmental effects – source has not been used for a significant period of time and is now not licenced so environmental assessment would be needed to determine any likely effects. DWI constraints regarding the water quality at the source.

4.4.10 Indicative implementation priority

The table below sets out the likely implementation priority for the extreme drought management actions based on the high level Strategic Environmental Assessment results. Full details of the assessment are provided in Appendix E of the SEA Report.

Priority	Action	Justification
1	Media & Communications	Demand side action Minor beneficial effects for biodiversity and flora and fauna.
2	Lowering pumps in boreholes	Supply side action Moderate temporary adverse effects regarding further reduction to local groundwater levels and storage.
=3	Re-instate source at Cold Bath Springs (drought permit)	Supply side action. Moderate to major but temporary adverse effects anticipated regarding water, biodiversity, fauna and flora.
=3	Re-instate source at P38R (drought permit)	Supply side action Moderate to major but temporary adverse effects anticipated regarding water, biodiversity, fauna and flora.
5	River Axe licence variation (drought permit)	Supply side action. Major short term adverse effects anticipated on biodiversity.
=6	P08R licence variation (drought permit)	Supply side action. Major short term adverse effects anticipated on biodiversity.
=6	P05R licence variation (drought permit)	Supply side action. Major short term adverse effect anticipated on biodiversity.
8	Pressure reduction	Demand side action affecting customer levels of service. Potential major adverse effects identified in SEA on population and human health.
9	Emergency Storage & zero compensation releases	Supply side action. Major adverse short term temporary effects anticipated on flow, levels and water quality. Also major adverse effects anticipated on biodiversity.

5 Environmental Assessment

5.1 Background

We have identified a number of supply side actions that may need to be implemented during a drought, should our normal operations become resource constrained. In all but one case (R24R & R24Ra (Well Head)) these actions involve us operating outside our normal abstraction licence conditions and will therefore require an application to the Environment Agency for a drought permit in order to vary these conditions. Detailed descriptions of the measures and their implementation are provided in Appendix C.

We have prepared detailed environmental assessment reports for the three drought permits which were also included in our last drought plan (i.e. Bladgon Reservoir, Chew Reservoir and Cheddar Ponds).

The drought permit options will not be implemented until combined reservoir storage enters drought management zone 5 (Level 3). In practice we have never needed to implement any of these drought permits but some or all of them may be required in a future severe drought.

5.2 Environmental Assessment

The Defra and Environment Agency Drought Plan Guidance requires that an environmental assessment of each drought permit includes the following information:

- Sets out the likely changes to the hydrology (or hydrogeology) due to a proposed drought permit;
- Identifies the key features of the environment which are likely to be affected by these changes and assesses their sensitivity;
- Assesses the likely impact on these features, allocates a level of confidence in the assessment and sets out the actions to be taken to reduce uncertainty;
- Sets out proposed mitigation measures against the potential impacts; and
- Where datasets are considered insufficient to undertake an environmental assessment specify environmental monitoring to be implemented to generate the information required.

We have produced detailed Environmental Assessment Reports (EARs) for our Blagdon Reservoir, Chew Reservoir and Cheddar Ponds drought permits which provide this information. We used a range of information sources in the assessment including Environment Agency and Bristol Water monitoring data.

We have consulted extensively with the Environment Agency and Natural England during the preparation of these EARs and the associated monitoring programmes. The EARs are

updated on a continual basis to reflect the data collected by the baseline monitoring programme and consultation with the regulators.

Table 9 summarises the key findings of these EARs, and further details are provided in Appendix C. Further detail is also provided in the Strategic Environmental Assessment, Habitats Regulations Assessment and Water Framework Directive Compliance reports that accompany this drought plan.

Table 9 also summarises the environmental assessments of the R24R and R24Ra (Well Head) abstraction. Further details are presented in Appendix C and the accompanying statutory environmental reports. Going forward we are committed to preparing an EAR (incorporating an Environmental Monitoring Plan) for this supply-side action in line with Defra and Environment Agency Guidance, taking full account of designated sites and in-combination effects with other drought management actions. Once complete, the EAR will be available for updating to support an application to the Environment Agency for a drought permit, should any be required in the future.

Table 9: Supply-side actions: environmental assessment summary

Drought Option	Existing Environmental Assessment Report?	Existing Environmental Monitoring Plan?	Hydrological Impact	Overall Environmental Effects Assessment
Reduction of Blagdon Reservoir compensation release	Yes	Yes	Major	Major
Reduction of Chew Reservoir compensation release	Yes	Yes	Major	Major
Reduction of Cheddar Ponds compensation release	Yes	Yes	Major	Major
R24R & R24Ra (Well Head)	No	No	Moderate	Moderate

5.3 Environmental Monitoring

5.3.1 Background

Monitoring is required to identify any environmental effects of implementing the supply side actions over and above the effects of natural drought conditions alone.

Monitoring recommendations for our supply-side actions focus on those environmental features that are assessed as most at risk of adverse effects from implementing the action based on the outcome of the environmental assessments.

5.3.2 Environmental Monitoring Plans

The Environmental Monitoring Plan for each drought plan action includes a specification for:

- *baseline monitoring* - to ensure an adequate baseline data set exists for those receptors likely to be impacted and fill any data gaps identified during the environmental assessment
- *onset of drought monitoring* - describes the prevailing environmental conditions prior to implementing a drought plan action, in order to inform the deployment and management of any mitigation actions during the drought;
- *during-drought permit implementation monitoring* - describes the environmental conditions during the implementation of the drought plan action, and will provide early warnings of any unpredicted environmental impacts and ensure that mitigation actions are operating as designed; and
- *post-drought plan action monitoring* - describes the recovery of environmental conditions following the cessation of a drought plan action and establishes whether the affected ecosystems have recovered to the baseline conditions prior to drought plan action implementation.

The EARs produced for our three pre-existing drought permits include details on the proposed environmental monitoring plan, setting out the monitoring requirements for each environmental feature, including:

- the associated waterbody;
- environmental feature to be monitored;
- details on survey sites (e.g. site names, locations);
- historical data for each site and data source; and
- the proposed survey programme to maintain the baseline dataset.

The monitoring specifications are summarised in Appendix C.

We have been undertaking the baseline surveys which are specified in the Environmental Monitoring Plans for each of the pre-existing drought permits and will continue to implement these surveys as required throughout the period of this drought plan.

Monitoring specifications for the R24R and R24Ra (Well Head) action are also provided in Appendix C. Once the new EAR is completed, we will be in a position to identify the work required to update the Environmental Monitoring Plans and any additional monitoring requirements to fill data gaps. Moving forward, we are committed to ensuring that we have all the necessary data and information required to support applications for the three new

drought permits should any be required as well as to support implementation of the R24R and R24Ra (Well Head) action if required.

5.4 Mitigation

Where potential adverse effects associated with our supply side drought plan actions have been identified, we have considered what mitigation measures might be implemented to help reduce the magnitude of the identified effects, where feasible. These mitigation measures are set out in Appendix C.

Post drought, assessment of the environmental situation will be undertaken in liaison with the Environment Agency and Natural England in order to determine if additional remedial measures are required if adverse effects due to implementation of the supply-side actions are identified through the post-drought monitoring activities.

Mitigation measures will be agreed with the Environment Agency (and Natural England, where applicable) prior to the implementation of supply-side actions. The mitigation measures will be based on the level of understanding gained through the environmental monitoring and from any previous drought experience.

In order to implement some of the mitigation measures identified, we will need to obtain some permits/approvals in order to carry out this work. Based on the types of mitigation we have identified (set out in Appendix C), the permits/approvals required will include:

- Environment Agency Section 27 authorisation under the Salmon and Freshwater Fisheries Act 1975.
- Application to the Environment Agency for a Site Permit under the Keeping and Introduction of Fish Regulations 2015.

The Environment Agency has confirmed that no permits are required to deploy aeration equipment.

The list of required permits/ approvals is indicative and not exhaustive and will be reviewed in the context of the specific circumstances as a drought progresses.

5.5 Habitats Regulations Assessment

Under Regulation 61 of the Habitats Regulations, any plan or project which is likely to have a significant effect on a European site (either alone or in combination with other plans or projects) and is not directly connected with or necessary for the management of the site, must be subject to an assessment to determine the implications for the site in view of the site's conservation objectives.

As a competent authority, Bristol Water is required to undertake a Habitats Regulations Assessment of its Drought Plan to assess the potential effects on European sites of implementing the plan. European sites include those sites designated as Special Areas of Conservation (SAC) under the EU Habitats Directive (as amended), Special Protection Areas (SPA) under the Birds Directive and Ramsar sites under the international Ramsar Convention.

In April 2018[18] there was an important judgment in the Court of Justice of the European Union (CJEU) which ruled that Article 6(3) of the Habitats Directive (as amended) must be interpreted as meaning that it is not permissible to take account of mitigation measures at the screening stage of the HRA process and that an Appropriate Assessment is required if the screening indicates likely significant effects on a European site. We have taken full account of this judgment in carrying out the HRA screening of our Drought Plan.

Some of the supply-side actions in our plan are located within or in close proximity to European sites. HRA screening has therefore been undertaken to establish whether there may be any likely significant effects on designated features or species. Where the screening has indicated likely significant effects, we have undertaken an Appropriate Assessment to assess whether the supply-side action will have any adverse effects on the integrity of any European site. The results of HRA are presented in a separate report alongside the Drought Plan.

The HRA screening of the Drought Plan indicated that the R24R and R24Ra (Well Head), Blagdon and Chew Valley Reservoir reduced compensation flow and Cheddar Reservoir prescribed flow supply-side actions have likely significant effects on European sites alone but not in-combination with each other. These actions were therefore taken forward for Appropriate Assessment as the second stage of the HRA process. In-combination effects on any European sites of the Drought Plan with our WRMP19, the Environment Agency's regional Drought Plan, the Severn River Basin District RBMP 2015, and other water company WRMPs and Drought Plans are not considered likely. No likely in-combination effects with other plans or projects have been identified.

The Appropriate Assessments for the R24R and R24Ra (Well Head) supply augmentation measure and the Blagdon drought permit actions considered the possible adverse effects on the North Somerset and Mendips Bat Special Area of Conservation (SAC) and Mendip Limestone Grassland SAC. During operation, downstream effects of these actions on river flow have the potential to affect habitat quality for foraging horseshoe bats. The Appropriate Assessment concluded that the hydrological impacts would not alter the habitat and foraging resource and would only create an adverse effect if implemented in multiple years. These two Drought Plan measures would not cause adverse effects on the integrity of the SACs taking account of the duration of their implementation and the scale of hydrological impact in the context of drought conditions. .

[18] Court of Justice for the European Union's ruling on People Over Wind and Sweetman ('Sweetman II') vs Coillte Teoranta, Case C-323/17.

The Appropriate Assessment for R24R and R24Ra (Well Head) also considered possible adverse effects from construction activity for the pipeline route within a Bat Conservation Zone for the North Somerset and Mendip Bat SAC. Mitigation measures have been developed in consultation with Natural England and taking account of the technical guidance for the North Somerset and Mendips Bats SAC, including: avoidance of linear features through directional drilling methods for laying the pipeline to avoid habitat fragmentation; habitat reinstatement (temporary habitat loss is very minor at 0.001ha of the habitat within the foraging zones); and measures to mitigate for potential disturbance and accidental pollution/dust effects on habitat. With the above mitigation in place, the impacts will not have an effect on site integrity of the SAC, nor will the temporary supply augmentation measure result in any long-term impacts.

The Appropriate Assessment considered the possible adverse effects of the Bladgon, Cheddar and Chew drought permit actions on the Severn Estuary Ramsar and SAC site. Operation of the Blagdon drought permit has the potential to impact on the flow/level regime downstream of Blagdon Reservoir within the river Congresbury Yeo. The drought permit implementation period is largely outside the spawning periods of the designated migratory species associated with the SAC. A fish migration barrier assessment was completed in August 2021 within the zone of hydrological influence of the Blagdon drought permit. Significant barriers were identified within the impacted river reaches which significantly limits the upstream movement of migratory fish species during low flow and natural drought conditions. These barriers are considered non-passable even without the implementation of the drought permit. As such, the implementation of the drought permit will not have adverse effects on migration of designated fish species. Mitigation measures include timing restrictions of the drought permit operation, water quality monitoring with triggers for an environmental response plan, protection of 'spate' flows and fish passes. With the implementation of these mitigation measures, the Blagdon drought permit will not have any adverse effects on the site integrity of the Ramsar or SAC, either alone or in combination.

Implementation of the Cheddar drought permit would have an impact on the flow/level regime in the Cheddar Yeo downstream of the reservoir, with potential for impacts on brown/sea trout, Atlantic salmon and European eel. Migration of these fish species within the zone of hydrological influence is closely linked to sluice management within the river system and is unlikely to be affected by the implementation of the drought permit. Mitigation measures include water quality monitoring with triggers for an environmental response plan, protection of 'spate' flows and fish passes. With the implementation of these mitigation measures to allow fish migration, the drought permit will not have any adverse effects on the site integrity of the Ramsar or SAC site, either alone or in combination.

The Chew drought permit has the potential to reduce flow within the River Chew by approximately 50%, with impacts continuing downstream to the confluence with the R15, with potential for impacts on migratory brown/sea trout, Atlantic salmon and European eel. The drought permit implementation could coincide with the spawning and migratory periods of these designated fish species. A fish migration barrier assessment was completed within

the zone of hydrological influence of the drought permit, which noted several in-river structures that act as significant barriers to migratory fish during natural drought conditions and limits the potential usage of the impacted reaches during the implementation of the drought permit. Mitigation measures to prevent adverse effects on the migratory fish species include water quality monitoring with triggers for an environmental response plan, protection of 'spate' flows and fish passes, as well as improvement to fish passes. With the implementation of these mitigation measures, the drought permit will not have any adverse effects on site integrity of the Severn Estuary Ramsar and SAC, either alone or in combination.

We have considered the findings of the HRA in determining the priority and phasing of implementing the drought plan supply-side actions set out in the drought plan. The supply-side actions that are in close proximity to the European sites are implemented in the latter stages of the drought, with all demand management options being implemented as priority before taking additional water from the environment.

5.6 Strategic Environmental Assessment

We have undertaken SEA of the Drought Plan, considering both the demand-side and the supply- side options. The SEA Environmental Report presents an assessment of the likely social and environmental effects of the Drought Plan and identifies ways in which adverse effects can be avoided, minimised or mitigated and how positive effects can be enhanced.

The SEA identified the social and environmental effects (beneficial or adverse) of implementing the Drought Plan actions to help inform the selection of actions and their subsequent phasing against our drought triggers.

The results of the SEA assessment are presented in the SEA Environmental Report accompanying the Drought Plan. Where appropriate, mitigation measures have been identified in the SEA to prevent, reduce or offset significant adverse environmental effects. These mitigation measures have been taken into account in assessing the residual effects on the environment.

5.7 Water Framework Directive (WFD) Compliance Assessment

The Drought Plan Guideline (2020) requires that an assessment is provided of how the Drought Plan may affect WFD status (or potential for Heavily Modified Water Bodies), and how the plan might affect the environmental objectives and measures set out in the relevant River Basin Management Plans (RBMPs).

We have undertaken a WFD compliance assessment for all supply-side actions in our Drought Plan. The test of WFD compliance is against the principal WFD objectives set out in Regulation 13 of the national WFD Regulations[19]. In accordance with the Drought Plan

[19] Water Environment (Water Framework Directive) (England and Wales) Regulations 2017 (WFD Regulations)

Guideline 2020, we have assessed the potential implications of the supply-side actions on WFD objectives, both in isolation and in-combination. We have considered the following WFD objectives in the assessment:

- WFD objective 1: To prevent deterioration of any WFD element of any water body.
- WFD objective 2: To prevent the introduction of impediments to the attainment of 'Good' WFD status or potential for any water body. It is accepted that for some water bodies achievement of Good status or potential is currently technically infeasible or disproportionately costly. Where this is the case, the test is applied to the currently agreed objectives for that water body rather than against Good status/potential.
- WFD objective 3: To ensure that the legally binding planned programme of measures in the 2nd cycle of RBMPs to protect and enhance the status of water bodies are not compromised.

As set out in UKWIR (2021)[20] the principal WFD objectives relate to biological status elements in surface water bodies and groundwater quantitative status. Our assessment includes hydrogeological/ hydrological pathways, hydro-morphological effects and physico-chemical water quality effects. All relevant WFD water body types have been considered – groundwater, lake (for our reservoirs) and river.

For the supply-side drought plan actions, the risk of temporary (not permanent) deterioration in WFD water body status between status class for one or more WFD elements in the downstream watercourse has been identified. We note this is a risk, not a certainty and mitigation measures will be deployed to minimise this temporary risk. These mitigation measures have been considered further as part of the development of our existing EARs or will be considered further in the forthcoming EAR regarding the R24R and R24Ra (Well Head) supply augmentation measure. The Drought Plan Guideline 2020 requires supporting information to catalogue these risks and these have been documented in the accompanying Water Framework Directive Regulations Compliance Assessment.

[20] UKWIR 2021. Environmental Assessment of WRMPs and Drought Plans.

6 Customer Communications

6.1 Background

This communications plan sets out clear guidance on what and how we will communicate during a period of dry weather. Effective communications with all our customers, stakeholders, neighbouring water companies and regional water resource groups are an important part of drought management, to understand and raise awareness of the developing resources position and ensure customer co-operation to help drive down demand and protect water resources.

The plan will be flexible because we know that every drought situation has its own characteristics and complexities. We will, however, make sure that focus is given to external stakeholders and influences such as the Environment Agency, Natural England, Defra, Ofwat, DWI etc as well as the media.

6.2 Approach

The role of this communications plan is to raise awareness of a drought situation and to give timely and accurate information on the water resource situation to regulators, stakeholders and customers whilst encouraging our customers to use water wisely.

On formation of the Drought Management Group the Head of Communications will appoint a Drought Communications Manager from the External Communications team. This will be a temporary role alongside that person's day job and that person will be responsible for all external communication activity relating to the drought. Other members of the Communications team and Customer Services team will assist the Drought Communications Manager as and when needed.

We work closely with other water companies both on a regional and national level through water demand working groups and have made significant contributions to support the customer demand focused projects that have been developed through these groups. All this work will increase our understanding of customer water use, and how better to manage demand.

We have also been involved in supporting the Defra/Environment Agency/ Welsh Government/ Natural Resources Wales project RADAR (**R**eviewing **A**pproaches for communicating **D**rought status **A**nd **R**isk). This project is being run by the UK Centre for Ecology and Hydrology, and aims to evaluate existing approaches for communicating drought risk and status and explore alternative approaches that could improve the efficacy of risk communication in England and Wales. We have provided feedback on public focus groups and have taken part in industry wide surveys and workshops. The research coming out of this

project is incredibly useful and will be used to inform our drought communications style and approach.

6.3 Stakeholder groups

The effects of drought on society are far reaching and there are many stakeholders who will have an interest in the situation as it progresses. In table 10 we have summarised the key groups that we will aim to target through our communications in a drought situation.

Table 10: Stakeholder groups for communications actions

Stakeholder Group	Name or Organisation
Customers	▪ Bristol Water Challenge Panel ▪ Business and non-household customers and their associated retailers ▪ Domestic ▪ New Appointments and Variations (NAVs)
Regulators	▪ Consumer Council for Water ▪ Defra ▪ Drinking Water Inspectorate ▪ Environment Agency ▪ Historic England ▪ Natural England ▪ Ofwat ▪ Water UK
Other Organisations	▪ Avon & Somerset Local Resilience Forum ▪ Canal & River Trust ▪ Environmental organisations (including but not limited to Avon Wildlife Trust, Gloucestershire Wildlife Trust, Somerset Wildlife Trust, Bristol Avon Rivers Trust) ▪ Fire Service ▪ Gloucestershire Local Resilience Forum ▪ Horticultural Trades Association (HTA) ▪ Local Authorities ▪ National Farmers Union (NFU) ▪ Neighbouring water companies (Wessex Water, South West Water, Severn Trent Water, Thames Water) ▪ Political representatives e.g. MPs, MEPs, Bristol Mayor, Local Councillors. ▪ Regional Water Resources Groups (WCWRG, WRW, WRSE) ▪ Somerset Internal Drainage Board ▪ Wiltshire & Swindon Local Resilience Forum
Staff	▪ Contractors working for Bristol Water ▪ Direct employees of Bristol Water

6.4 Communication actions and techniques

Table 11 sets out the communications campaign we will deploy in a drought situation. We would use the 'agile communications' approach that encompasses a flexible and adaptive communications plan that promotes using varied and innovative communications channels to help customers reduce water use. Our messaging and channel use would therefore flex and change as the drought situation develops with the type and severity of the drought dictating the details.

The following media spokespeople have been identified to support the communications during a drought; CEO, Director of Strategy & Regulation, Customer Services Director, Head of Water Resources & Environment, Water Resources Manager, and the Drought Communications Manager. The CEO would only be used during drought management zones 5 and 6. Directors will be used during zones 3 and 4. Departmental Heads and Managers will be used as appropriate throughout the drought situation.

Table 11: Drought Communications Campaign

Water Resource Position	Communications Technique	Audience/ Stakeholder	Key Messages
Normal (Drought Management Zone 1)	Ongoing water efficiency programme across the year including: ▪ Regular messaging across website and social media ▪ Educational worksheets for schools and home-teaching ▪ Compulsory metering for house movers ▪ Metering options campaign ▪ Promotion of "Love Water, Save Water" products ▪ Joint efficiency campaign 'Resource West' with partners across utilities. ▪ Retailer and NAV branded water efficiency posters ▪ Wholesale to manage communications with Retailers following the Retailer Wholesaler Group (RWG) unplanned good practice guidance[21]	Very broad base – all customers (NHH, NAV and domestic) Parents and teachers of KS1-2 students	Use what you need but don't waste it. Water saving tips in home and garden.

[21] Retailer Wholesaler Group – Good Practice Guidance (June 2020) *Unplanned Events and Incidents*.

Water Resource Position	Communications Technique	Audience/ Stakeholder	Key Messages
Normal (Drought Management Zone 2)	Ongoing water efficiency programme across the year plus: Greater prominence of messaging with website homepage banner directing customers to water saving pages and increased social media. Social media geo-targeted adverts (including video/animation) to remind people not to waste water.	Very broad base - all customers, (NHH, NAV and domestic) stakeholder, retailers and online panel.	Our water resources (basically the amount of water we have in our lakes), are slightly below normal so we've got our best team on the job who are working hard to address this. While this might not be anything to worry about right now, you can still help out by continuing to use water wisely and only use what you need. We still need you to help by continuing to use water wisely Believe it or not, but the weather's been pretty dry recently. This can mean our reservoirs aren't quite brimming with all that lovely drinking water, but you can help us solve this just by using water wisely in your home.

Water Resource Position	Communications Technique	Audience/ Stakeholder	Key Messages
Developing Drought (Drought Management Zone 3 – Level 1)	Everything in Zone 2 plus: Information added to 'service-status' page as an ongoing incident. Press release reporting of developing drought situation on the local weather forecast. Maximise 'Leakstop' campaign via website and social media Key messages added to standard customer communication letters sent by OCS and Pelican. Information issues to retailers and NAVs to provide to their customers. Series of events in high footfall public spaces (garden centres / supermarkets / train stations) to raise awareness of the situation. Look to partner with appropriate organisations e.g. UWE / Water UK / City to Sea / Wessex.	Very broad base - all customers (NHH, NAVs and domestic) Additional focus on retailers and non-household customers.	If you spot any leaks whilst you're out and about, please let us know by using our online map (link to DigDat) and we'll take care of the rest. All this dry weather is causing a big stress on our environment, and although it's not a huge issue right now, it could be if this continues in the long term. We're doing everything we can by monitoring water levels carefully with the support of the Environment Agency and ask you to use water wisely at this time. If this doesn't improve, we could see a Temporary Use Ban (TUB). Find out more about what this means here. (LINK) We're seeing lower water levels than usual and unless it's fixed soon, we could see a Temporary Use Ban put in place.

Water Resource Position	Communications Technique	Audience/ Stakeholder	Key Messages
	Public & stakeholder consultation regarding TUBS to gauge public reaction to possible water ban. Formal 14-day consultation on implementation of TUBs		We're doing everything we can, but unfortunately, we can't control the rain levels, which is becoming more variable especially as we see the environment deteriorate due to climate change. However, you can help out by doing your bit in the home. Please remember to use water wisely.

Water Resource Position	Communications Technique	Audience/ Stakeholder	Key Messages
Drought (DMZ 4 – Level 2 and DMZ 5 – Level 3)	Everything in Zone 3 plus: Social media messaging to reflect current drought situation with daily updates and real time information Press release across supply area with direct appeals for TUBS compliance. TV/radio interviews and phone-in sessions	All customers across the supply area (NHH, NAVs and domestic). Mass awareness required. Focus on PSR register and social customers too.	As you know, we've been working hard these past few weeks to avoid implementing a temporary use restriction (TUB) but the ongoing dry weather leaves us with little choice because water is now in short supply. This is essential for us to maintain your water supply. You can find out more here (link to more detailed info on website). We appreciate your support and hope to have things back to normal as soon as possible.

Water Resource Position	Communications Technique	Audience/ Stakeholder	Key Messages
Drought (DMZ 4 – Level 2 and DMZ 5 – Level 3)	Local and digital radio adverts highlighting the drought situation and customer restrictions in place. High impact outdoor advertising (bus stops, billboards, train stations, supermarkets) Public meetings and speaker programme for schools, clubs, local groups etc. Targeted SMS messages to high demand areas Targeted messages to our 'Customer Care Plus' priority customers regarding TUBs restrictions and how this might affect them personally. This should include non-household sensitive customers Broadcast SMS messaging to our customers with key information about new restrictions.	All customers across the supply area (NHH, NAVs and domestic). Mass awareness required. Focus on PSR register and social customers too.	We've introduced a NEUB restriction. This means XXXXXX and is one way of helping us ensure that your water supply isn't interrupted. Please do your bit to help us keep this situation under control by being careful with water use. Our LeakStop campaign is vital at times like this when water supplies are low. You can help by reporting any leaks you spot (however small!) using our online tool (link to digdat) If the drought continues, we may have to implement an Emergency Drought Order. You can find out more about what this means here. (link to website)

Water Resource Position	Communications Technique	Audience/ Stakeholder	Key Messages
Severe Drought (Drought Management Zone 6 – Level 4)	Everything in Zones 4&5 plus: Media interviews with Directors/CEO on local TV and radio news during peak hours (am and pm).	All customers across the supply area (NHH, NAVs and domestic). Mass awareness required. Focus on PSR register and social customers too.	Thanks for your support during this tough time. Our teams are working flat out to ensure water resources are used efficiently and wisely during this drought period. Please continue to be sensible with your water use as restrictions are still in place and it'll help us get things back to normal quicker. Our water resources are now exceptionally low. This means for a short time, we're unable to sustain supplies to all customers. If your area is affected directly, we'll be in contact with more information about what this means. For information on how best to use water wisely, why not take a look at XXXX

Water Resource Position	Communications Technique	Audience/ Stakeholder	Key Messages
End of Drought	Press release – announcing the end of the drought. Coordinated with stakeholders including Environment Agency and local authorities where required. Social media messaging to announce the end of the drought and the lifting of TUBs and NEUB restrictions Homepage banner announcing end of drought period. Ongoing water efficiency campaign to maintain the water efficiency culture developed during the drought	All customers (domestic NHH and NAVs) across the supply area	Thanks for your support during this drought period. We're very happy to tell you that our water resources position has improved and we're now able to remove the restrictions on your water use!

6.5 Communication with customers on temporary use restrictions (TUBS)

Customers, retailers. NAVs and interested parties will be given the opportunity to make representations prior to any temporary use ban being implemented. We will give formal notice in 2 local newspapers and on our website of our intention to implement the TUB and provide the details of the restrictions we are proposing to apply. We will also use social media to raise awareness of the consultation. We will allow a 14-day consultation period, within which customers would be able to make representations. By this stage of the drought the implementation of TUBs will not be unexpected to our customers due to the ongoing communications campaign and awareness raising that would have been taking place for several weeks, if not months, prior to the advertisement of the TUB.

To promote consistency across the industry, we will use the example notifications for water use restrictions under a temporary use ban provided in Appendix C of the UKWIR (2013) Code of Practice and Guidance.

The Water Resources Manager will be responsible for collating any representations received and presenting these to the Drought Management Group for review and consideration. We will consider all fully evidenced representation that indicate a water use ban would result in substantial and lasting damage to categories of business or result in physical harm or damage to health. In such cases we may be willing to modify the restriction to avoid or limit damage.

If appropriate we would agree common approaches to TUBs implementation with the other West Country Water Resource Group companies. Details of our approach to communications at the regional level is set out in section 6.7.

6.6 Priority Services

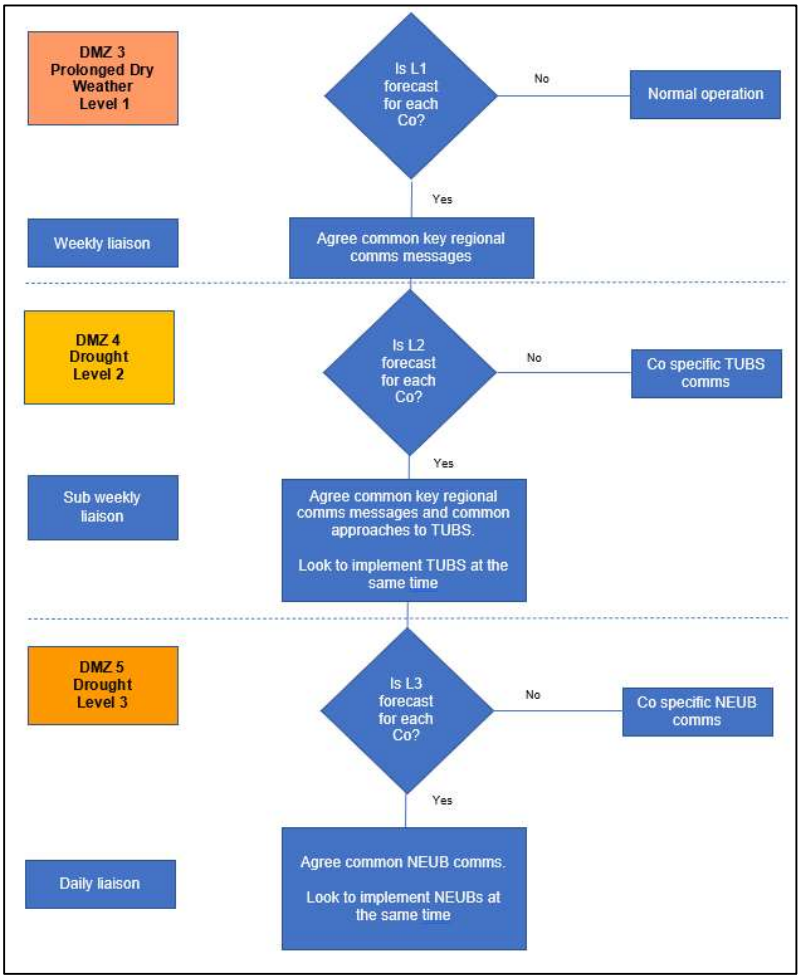
Our Priority Services Register (PSR) provides services to our customers requiring additional assistance. As part of this service we maintain a register of customers who require extra care. This includes a range of special services such as the haemodialysis register, and support to customers who are blind or partially sighted or who have difficulties reading to ensure that messaging about supply interruptions is received and understood. During a drought we will use the PSR to target appropriate information and messaging to our priority customers. This will include the offer of free supply pipe leakage repairs for vulnerable customers under our Leakstop campaign, and dedicated support from a private leak coordinator to make private leak repairs as easy for customers as possible. Details of the scheme and how to register are available on our web site: https://www.bristolwater.co.uk/home/account-and-services/your-account/priority-services

6.7 Regional Groups and working with neighbouring water companies.

Analysis and reporting on the 2012 and 2018 droughts highlighted the success and importance of the joint working between water companies and regulators. Bristol Water is a core member of the West Country Water Resource Group, along with Wessex Water and South West Water, and we are also a member of the Water Resources West Group due to our interest in the River Severn via our abstraction from the Sharpness Canal. Throughout the drought we would be in regular liaison with the Regional Water Resources Groups. The frequency of this liaison would increase as the drought severity increased. This would be done through a drought working group which would be formed as dry weather conditions signalled that media campaigns may be needed.

We would implement an agile communications approach across the West Country region, and if appropriate agree common communications messages and common approaches in each phase if drought conditions are forecast to be affecting the whole region. Due to the varied nature of the water resource systems across the region, drought response, and triggers are different and timings for actions are unlikely to be coincident. We would therefore use the agile communication process to flex the timing of the implementation of the actions if this provided a more coherent customer communication message. The flow chart below shows outlines this proposed approach.

Figure 4: WCWRG approach to aligning customer messages.



The WCWR Group would also work with CC Water and the Environment Agency in the co-ordination of a joint approach to water efficiency communications and messaging.

6.8 Communication and data exchange with the Environment Agency

During a drought the Environment Agency (EA) Operations Catchment Services (OCS) water company lead is the first point of contact for us to ensure that the appropriate liaison and lines of communication are put in place between ourselves and the EA. The EA Area Integrated Environment Planning (IEP) lead also has close liaison with water companies, both before, during and after a drought. Both teams have a role to play in ensuring joined up messaging between EA and water companies, checking that our drought plan actions are being enacted, ensuring that any drought permit applications are dealt with efficiently, and reporting to Government.

In the initial stages of a developing drought situation there will be regular liaison between Bristol Water and the EA. Monthly meetings would supplement the weekly e-mail updates we provide on our water resource position. When our Drought Management Group is convened, we will inform the EA and agree the appropriate level of liaison for the drought position.

In addition, once the EA has moved to 'Drought' status as defined within their Wessex Drought Action Plan – Final Plan 2020 v1 (May 2020), an Area Communications & Engagement Manager (ACEM) will be appointed. Our Drought Communications Manager will liaise closely with the EA ACEM to ensure a consistent and joined up approach to drought related communications.

Data and information exchange with the Environment Agency occurs regularly under normal operating conditions. It is anticipated that this will increase as the drought situation develops and we will make available any relevant drought related information requested by the EA as queries arise. It is likely that data and information about the ongoing resource position will be provided to the OSC and Area teams at increasing frequency reflective of the ongoing drought situation, and forecasts of the likely resource position over the coming months will be provided as part of the 'water resource prospects' reporting process.

If the drought situation continues to deteriorate, we may have to consider implementing TUBs, NEUBs and applying for drought permits. We will maintain close liaison with the Environment Agency on the implementation of any of these restrictions and permits.

At a national level we will work with the National Drought Group, chaired by the Environment Agency, via Water UK, to contribute to the national picture of the developing drought situation. This includes providing regular resource position updates and forecasts looking at

the likely resource position under specified drought scenarios. Details of this group and its purpose and structure are set out in the Environment Agency's report Drought response: our framework for England (June 2015).

6.9 Communication with Canal & River Trust

Bristol Water's supply of water from the Gloucester & Sharpness canal is implemented under agreement with the owners of the canal and the abstraction licence, the Canal & River Trust. Due to the importance of this supply as part of Bristol Water's overall operations, we consult with the Canal & River Trust on a regular basis to discuss issues such as maintenance, outage, River Severn flows and forecasts of canal abstractions. During a drought we would increase the frequency of our discussions to ensure there are no operational or resource issues arising. The regulation of the River Severn is managed by the Environment Agency. Routine communication occurs between Bristol Water and the Environment Agency regarding the operation of the River Severn regulation across the year. As discussed in section 3.2.3, the River Severn Drought Order will limit the volume of water available for abstraction by the Canal & River Trust from the River Severn to the Gloucester & Sharpness canal. During a drought, if the need for the River Severn Drought Order was triggered, then the Environment Agency will form the River Severn Drought Management Group to discuss the developing drought situation and implications on the River Severn and wider river catchments. Both Bristol Water and the Canal & River Trust will be represented on this group and will both look to ensure that the impact of any drought restrictions on the operation of the Gloucester & Sharpness canal is carefully managed and minimised where possible.

6.10Communication with Retailers

During a drought Bristol Water will communicate with business/non-household (NHH) customers and their Retailers regarding the on-going situation and any temporary use bans. For our communication with Retailers, we will use the latest RWG Planned Events Good Practice Guidance template. We will also seek advice and guidance from Retailers throughout the journey and look for opportunities to work collaboratively especially around water usage and water efficiency. This includes asking retailers to put out messages to their customers in the affected area to be mindful of their usage and the times at which they use water, requesting they use storage during the day and draw off the network overnight when overall demand is lower. Any press releases will be also issued to the retailers to include in their communications and social media.

We will also communicate with New Appointments and Variations (NAVs) about the ongoing drought situation, providing them with the same messaging that we are providing our own customers on water efficiency and demand management on NAV branded media, and if necessary any TUBs restrictions that may be being put in place.

Vulnerable non-household customers are listed on our systems and will be identified during a drought situation and communications targeted as appropriate to their circumstances via

e-mail or telephone call to the account managers to ensure relevant information and updates are being passed on to their customers.

Larger NHH/business customers account for approximately 30% of our daily NHH demand, therefore the relationship between NHH customer, Retailer and Bristol Water is key in ensuring good communications around the drought situation and potential restrictions that may be needed.

6.11Communication with other organisations

Fire Service

We will work closely with the Fire and Rescue service to ensure that the actions we implement during a drought do not compromise our obligations under Part 5 of the the Fire and Rescue Services Act 2004. Water supply for fire fighting may be affected if pressure reduction measures are put in place that reduce pressure below the regulatory standards (see extreme drought measures in section 4.4.2). This is an extreme drought management action and would only be implemented to prevent the need for Level 4 restrictions. As required under Section 43(2) of the Act we would always provide a least 7 days' notice in writing to the relevant fire and rescue authority if these extreme pressure reduction measures were being put in place. We would work with the fire service to ensure the appropriate mitigation measures were available.

Horticultural Trades Association (HTA)

We will work closely with the HTA as the drought develops to establish links to local members. These links will be used to raise awareness of the drought situation and identify opportunities for partnership working that will help to delay the need to implement TUBs restrictions. This work will aim to mitigate the potentially damaging economic effect of water use restrictions on nurseries and garden centres. Targeted communications at the appropriate time via this route is likely to influence, or significantly reduce, water used for garden watering by the public.

Local Resilience Forums

The Local Resilience Forums communication networks will be used to communicate the current drought position to a wide group of stakeholders that will have an important role should the drought escalate into a critical situation. Ongoing updates on the drought situation will be communicated out via this network. Local Resilience Forums within our supply area include; Avon & Somerset, Gloucestershire, and Wiltshire & Swindon.

6.12Employee information programme

Throughout a drought regular briefings and updates on the on-going situation will be provided to our employees. This is especially important for all customer facing employees, but also for those who are not directly customer facing. This is an important part of achieving

consistent messaging from the company on the water resource situation. We will keep staff informed through the communication channels we already have in place:

- Weekly internal staff newsletter
- Regular video briefings on Inflow (internal comms platform)
- Internal e-briefings to team leaders to cascade to their reports.

In response to the drought situation, all staff will be given a targeted briefing note, setting out the current situation and any direct effects to customers such as demand restrictions. This will be aligned with the key messages going out as part of our wider communications and tailored to each team accordingly.

7 Drought Management Structure – roles & responsibilities

During normal conditions, each month Bristol Water has a high level water resources strategy meeting ('Sources') to review the water resources position and plan the operational strategy for the coming month and a 12-month management plan. This is done in the context of the water resources position, the anticipated customer demand at the time, any planned maintenance activity and consideration of any operational risks. In addition a longer term forecast is also presented to support the overall operational strategy. The on-going water resources situation is reported on a daily basis and circulated within Bristol Water and reported to the Environment Agency on a weekly basis.

The routine monitoring carried out by both Bristol Water and the Environment Agency enables any decline in the resource situation to be identified and responded to. If we experience a period of notably dry weather, or the long-range weather forecast indicates that this is reasonably likely, we implement the 'dry weather action/task force' as part of our normal operational response to dry weather conditions. If the water resource position starts to change and a prolonged dry weather (DMZ 3 – Level 1) situation is indicated, then Bristol Water will form the 'Drought Management Group'. The decision to form the Drought Management Group will be agreed by those who attend the 'Sources' monthly meeting and the 'dry weather action/task force' which will have already been put in place.

The Drought Management Group will be formed from the relevant departments across the business that are able to provide the required expertise to support the drought management process. The departments that will be represented include Production, Network, Environment & Water Resources, Communications, Water Quality, Business Resilience, Customer Services. The Drought Management Group will be responsible for delivering the actions detailed within the drought plan.

The roles and areas of responsibility and/or expertise likely to form the Drought Management Group are set out in Table 12.

On formation of the Drought Management Group a Chairman and a Drought Co-Ordinator will be appointed. The Drought Co-Ordinator will provide administrative support and governance for the group. The minutes and action log from the Drought Management Group meetings will be widely circulated within the organisation. The frequency of the Drought Management Group Meetings will reflect the severity of the drought situation at the time. A summary of the proposed Drought Management Group process is set out in Table 13. When the drought management group is formed, deputies for each of the roles within the group will be identified in order to ensure business resilience to the overall management structure and process should any member of the group be absent for an extended period over the course of the drought.

In addition to the internal Drought Management Group, as drought conditions are encountered liaison will be increased with both the Environment Agency and our

neighbouring water companies via the Regional Groups (WCWR Group and Water Resources West). This process will provide the opportunity to implement consistency of messaging to customer/the public and allow opportunities for joint working where appropriate.

Table 12: Proposed Bristol Water Drought Management Group

Area of Responsibility	Job Title	Department
Overall Management	Chief Executive Officer	CEO Office
Drought Management Responsibility	Head of Water Resources & Environment	Asset Management
Regulatory and Government liaison	Director of Strategy & Regulation	Strategy & Regulation
Water Production & Network	Chief Operating Officer	Network/Production/Asset Management
Water Production	Head of Water Production & Operations	Production
Water Network	Head of Water Network Operations	Network
Water Resources Planning and Resources/ Environmental Monitoring and Assessment	Water Resources Manager	WR & Environment - Asset Management
Water Resources Strategy	Water Supply & Energy Manager	WR & Environment - Asset Management
Environmental monitoring and assessment	Catchment Strategy Manager	WR & Environment – Asset Management
Communication & Water Efficiency	Drought Communications Manager	CEO Office
Customer Contact	Head of Customer Experience	COO Front Office Services
Legal Compliance	Legal Counsel	Legal
Demand Forecasting	Head of WR & Environment	WR & Environment - Asset Management
Leakage	Asset Leakage Manager	WR & Environment - Asset Management
Water quality issues	Head of Water Quality	Water Quality
Engineering schemes	Head of Capital Delivery	Projects
Emergency Planning	Business Resilience & FM Manager	CFO Support Services
Administrative support and governance	Drought Co-Ordinator	WR & Environment - Asset Management

Table 13: Drought Management Group actions

Water resources position:	Actions:
Normal	Routine monitoring and reporting of water resource situation
	Monthly 'Sources' meetings for resources and operational planning Dry Weather Action/Task Force put in place to implement dry weather operation
Prolonged Dry Weather	Drought Management Group convened: ▪ Initial meeting held and meeting frequency agreed (fortnightly recommended) ▪ Communications plan put into effect as set out in section 6. ▪ Pre-planning for TUBs and NEUBs
	Weekly meetings with Regional Groups to understand wider situation
	Liaison meetings with Regulators (Environment Agency, Natural England, DWI and Ofwat). Frequency and format to be agreed with the individual regulators. For EA possibly monthly meetings to supplement weekly e-mail updates on resource position.
Drought	Drought Management Group meets weekly (DMZ4) and twice weekly (DMZ5): ▪ Forecast of future water resource and demand position presented and discussed. ▪ Management and tracking of drought actions (demand and supply), and their effect put in place. ▪ Agreement on drought actions to be progressed.
	Sub-weekly meetings with Regional Groups continue with aim of potentially co-ordinated response where appropriate
	Liaison meeting with all Regulators continue, possibly increase in frequency
	In DMZ 4 Water Resource Manager submits drought order application for NEUB if forecasting to be within DMZ 5 within 4 weeks and agreed by the Drought Management Group
	In DMZ 4 Water Resource Manager submits supply side drought permit applications to Environment Agency if forecasting to be within DMZ 5 within 4 weeks if agreed by the Drought Management Group
	In DMZ 5 if forecasting to be in DMZ 6 within 6 weeks then start to implement the extreme drought options to prevent the need to Level 4 restrictions (emergency drought orders).
Severe Drought	Drought Management Group escalated to incident response and meet daily: ▪ Water Resource/demand position and drought situation closely monitored and reported. ▪ Management and tracking of drought actions (demand and supply), and their effect. ▪ Implementation of the Bristol Water incident response procedures.
	Continued ongoing liaison and meetings with Regional Groups
	Close liaison with Regulators on the ongoing situation
Recovering Drought	The Drought Management Group will monitor the resource position indicators to identify when the resource position is improving, and the drought is ending.

Water resources position:	Actions:
	The Drought Management Group is responsible for agreeing the processes for stopping the drought management actions implemented during the drought and communicating this to customers.
Post Drought	Internal lessons learned workshop to discuss and record the drought experience and identify whether any elements of the drought plan need updating as a result of the recent drought. A 'lessons identified' report will be produced by the Water Resources Manager within 4 months of the end of the drought
	External joint lessons learned workshop with Regulators (and possibly neighbouring water companies) to discuss the drought experience and identify the effective joint working and opportunities for improvement
	If post drought environmental monitoring is required as a result of drought permit applications, this will continue

8 End of Drought

8.1 Drought recovery

An ongoing improvement in the water resource situation, triggered by an extended period of good rainfall could indicate the end of the drought. The combined volume of water stored in our reservoirs relative to the drought management zones will be used to confirm our position and inform the decision to cease any drought actions that are being imposed/implemented. We would assess whether there was an ongoing risk to the security of supply to customers, and when this is not greater than it would be in a normal year, we will confirm that the water supply drought has ended. We would work with the Environment Agency to understand the ongoing risk to the environment as the drought conditions ease and support the environmental recovery wherever possible.

The recovering water resource position will be monitored by the Water Resource & Environment Team and the Drought Management Group. The decision to end any drought management actions and the timing of this will be based on expert knowledge and experience of our water resources system and an assessment of any ongoing risks to customers' security of supply. We will also engage with the Regional Groups and the Environment Agency in advance of the decision to lift drought restrictions to understand the wider water resource and environmental situation and explore possible opportunities for coordinating any messages to reflect the changing circumstances. The process for lifting drought management actions and how this will be communicated to customer is set out in Table 11.

Throughout the post-drought stage as conditions recover, post-drought environmental monitoring will be undertaken as required by any drought permits implemented and set out in section 5.3.

8.2 Post drought review

Once the drought has ended and we have returned to operating under 'normal' conditions, a post drought review will be implemented. The review will provide an opportunity for those involved with the drought to identify any lessons learned and any potential improvements that could be made as a result to the drought plan and/or the overall drought management strategy. This will include identifying any vulnerabilities that became apparent during the drought, and the investment that may be required to mitigate these and build resilience into the water resource system.

The outcomes of the post drought review will be documented in a 'lessons learned' report. This report is likely to include information on:

- A review of the effectiveness of the communications campaign used to engage with the customer base, including retailers and NAVs as well as domestic customers.

- The suitability of the hydrological indicators and triggers used to identify the developing drought situation and whether they are still considered appropriate.
- Customer responses to the drought measures imposed, the effectiveness of restrictions in reducing demand, and whether assumed reductions in demand associated with demand restriction were comparable to those experienced during the drought.
- The actual yield achieved from the supply side measures implemented and identification of any operational difficulties that may have arisen during implementation.
- The management decisions made during the drought relating to the timing and implementation of the drought measures.
- Any environmental monitoring data collected during the drought and comparisons with the baseline situation prior to the onset of drought and implementation of any supply side drought actions.
- The effectiveness of any mitigation measures carried out relating to supply side drought actions.
- The effectiveness of cooperation between key stakeholders such as the Environment Agency and other water companies. We will work directly with the stakeholders to assess this.
- Whether the drought has any implications for our customer levels of service.

We would aim to complete the post drought review and prepare the lessons learned report within approximately 6 months of the drought ending. The post drought review process will be led by the Water Resources & Environment Team, under the direction of the Head of Water Resources & Environment.

8.3 Revision of drought plan

Any recommendations from the post drought review would be included within the appropriate operational programmes and/or incorporated into the statutory planning process via updates to the drought plan and/or the water resources management plan as appropriate.

8.4 Testing our drought plan – draft drought permit exercise

To support the development of our drought plan and the requirement to be 'application ready' we have carried out a 'mock' drought permit application exercise for our drought permit to reduce the compensation release at Chew Reservoir. We commissioned consultants HR Wallingford to support us and have prepared all the information required to submit the application based on a drought scenario that would trigger the need for this drought permit.

We have worked with the Environment Agency in the development of the 'mock' application, getting input and feedback on the requirements of the permit application process, the development of the exceptional shortage of rain case (ESoR) and the level of environmental information provided to support the application (Environmental Assessment Reports). The documents developed for this exercise are available in Appendix D.

Appendix: produced as separate supporting document