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South West Water Bournemouth Water

Final Drought Plan

September 2022



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Our Drought Plan

This is the South West Water final Drought Plan 2022. This Plan covers the South West Water supply area (Devon, Cornwall and the Isles of Scilly, parts of Dorset and Somerset) and the Bournemouth Water supply area.

See Section 1.1 for a summary of the drought planning process.

We published our draft Drought Plan for public consultation on 8th June 2021. Representations on our draft Drought Plan were received from six organisations. We considered all comments and feedback in the representations and published our Statement of Response and revised draft Drought Plan in September 2021. After making a few further amendments required by Natural England, the Environment Agency and Defra, Defra have given us permission to publish our final Drought Plan (this Plan).

We have included the Isles of Scilly draft Drought Plan as a separate document. The Isles of Scilly plan will remain draft until we have completed a more detailed assessment of the islands' vulnerability to drought. A timeline for consultation on the Plan and publication of the final Plan is included within the separate Isles of Scilly document. We expect to publish the final Plan in late 2024.

Purpose of the Plan

Although thankfully rare events, droughts can present a major challenge to public water supply and can have a detrimental impact on the natural environment. With the impacts of climate change liable to produce more variable weather patterns, including the chances of deeper and more prolonged droughts, it is essential we have plans in place which ensure our water supplies are maintained.

At South West Water (SWW) we continue to improve our operational resilience to droughts through a variety of approaches. We are doing so in a sustainable way which minimises the impacts of abstraction on the environment, whatever the severity of drought we may be faced with.

Our latest Water Resources Management Plan (WRMP)¹ is a long term, 25-year strategy which sets out how we will deliver our stated Levels of Service to our customers even if our region was to experience another drought similar to that of 1975/76, which was the most severe drought in the south west region in the last 100 years. Alongside the WRMP, we have developed our Drought Plan which details how we would respond and the actions we might take if we were to experience droughts of even greater severity. The Drought Plan is a tactical plan.

The dry and hot weather events since development of our current Drought Plan, as well as an unprecedented demand for water as a result of the COVID-19 pandemic, has put stresses on our sources of supply and tested our water supply system. We have used our

¹ SWW BW Water Resources Management Plan 2019, SWW, August 2019

experiences to identify where to target improvements and when we may need to prepare for specific actions. Such responses will provide the most benefit whilst having the least impact on our watercourses, waterbodies and their ecology.

The Drought Plan sets out possible actions and interventions to reduce the demand for water and options for increasing access to water. Our Plan also details how we will communicate with the public and stakeholders in a clear and timely manner. This is particularly important as a drought develops, potentially becoming severe and of long duration.

The purpose of this Drought Plan is to explain our operational approach to how we will manage water resources and reduce the demand for water during periods of drought. In doing so, this document covers:

- A description of our water resources and water supply system
- The Levels of Service we plan to meet for our customers in South West Water mainland and Bournemouth Water supply areas
- Clear information on the drought triggers we use to identify drought severity
- The demand-reducing and supply-enhancing actions which we will take to manage the drought
- Where we may need to apply for Drought Permits and the environmental assessments we have undertaken to ensure permit readiness
- The management structure we would put in place to minimise the impact of the drought on public water supply
- The communications plan which will explain the drought is developing, its implications and the decisions we are taking to maintain public water supply as well as the process for communicating the end of the drought
- How we identify the end of a drought.

What is new in this Plan

Since 2018, when our current Drought Plan was published, we have been able to use our experience from the hot, extended dry period in 2018 and the very high peak demands for water which occurred at times in 2019 and 2020, to guide us in how we can improve our drought planning.

We have also had discussions with our customers and stakeholders which have helped to shape the development of our new Plan. The key changes we have introduced are:

- Developing the Plan as a tactical manual, to complement our strategic WRMP, allowing our actions and responses to be better tailored and reactive to the drought event as it occurs and as its severity increases
- Improvements in the presentation of information to make the decision-making process and actions we might take more transparent

- Following planning guidelines, we have categorised potential droughts in severity between Level 1 and Level 4 and provided clear examples showing our actions and their timing as a drought deepens
- We have modelled a variety of plausible severe droughts, first considered in our WRMP, to test our system and to identify potential stress points in our operations which we will look to make more robust
- Ensuring our actions prioritise demand savings and that we utilise options to increase supply which have the least environmental impact
- The inclusion of potential extreme drought management options that could be considered to ensure we would avoid the need for emergency Drought Orders
- Working with our neighbouring companies in the south west to develop a regional response where appropriate, to improve communication strategy and make it easier for our customers to understand the situation and where restrictions apply
- Ensuring a high level of preparedness for the likely Drought Permit supply options we have included
- Planning our interventions to minimise the impact on the environment with enhanced monitoring proposals and resource management to support rivers during low flow periods
- Inclusion of information on the Isles of Scilly operation.

These new elements are also to align with the latest Environment Agency drought planning guidelines. The Environment Agency guidelines include a checklist of requirements as a helpful summary of what should be included in a plan. We have included this checklist in Appendix 1 and indicated the location of each item in our Plan to enable easier correlation of the Plan with the guidelines.

Our water resources and water supply system

Since our merger with Bournemouth Water (BW) we operate across two geographically separate areas. In the west, our SWW area provides drinking water to a population of 1.8 million across Devon, Cornwall and parts of Dorset and Somerset. Our water resources consist of three large reservoirs, several smaller reservoirs, river intakes and some groundwater sources which are predominantly in East Devon.

To the east, we manage the BW area in Hampshire, Dorset and parts of Wiltshire, supplying approximately 0.5 million customers. Water resources are largely reliant on large river abstractions with some groundwater.

Since April 2020 we also manage water supply on the Isles of Scilly.

Tourism is one of the biggest industries in our region and this can result in large increases in total water supplied in the summer months.

In order to optimise the yield of all our water resources, our SWW supply area sources are operated in conjunction with one another as Water Resource Zones (WRZ), each based

around a large strategic reservoir. Our BW supply area is a separate WRZ. Its groundwater sources provide a continuous output supplying the rural area in the northern half of the zone whilst the major river resources meet the large urban demands in Bournemouth and Christchurch.

How drought affects our resources

We are fortunate in that the three SWW supply area WRZs have access to significant volumes of stored water as a result of the programme of reservoir building over the 1970s and 1980s. Our three large strategic reservoirs at Colliford, Roadford and Wimbleball were specifically designed to provide substantial reserves of water in dry periods. They store more than 84,000 million litres of water between them – that alone is equivalent to approximately six months of our current water demand.

In addition, we have winter pumped storage systems for Colliford and Wimbleball reservoirs which ensure we can recover substantial storage even in severe and extended dry periods.

Although our Bournemouth WRZ does not contain large storage reservoirs, it has major abstractions on the River Avon and River Stour. These rivers receive significant base flow from the underlying Chalk aquifer which can maintain high flows even after prolonged dry periods.

Similarly, although we are less reliant upon groundwater for supply, our groundwater abstractions are very resilient to drought, either due to the high storage capacity of the local geology, such as in the Otter Valley sandstone of East Devon, or due to their proximity to major watercourses which ensures stable groundwater levels, such as along the valley of the River Stour.

Our Drought Plan has close links with our WRMP19² and we assessed the drought vulnerability of our WRZs in our WRMP19. Our modelling shows that our water supplies are resilient to a repeat of any weather events observed in the last 50 years. Whilst a repeat of a drought similar to the most severe historic drought on record (1975/76) could result in a need for temporary water use restrictions in the Roadford WRZ (including temporary restrictions on the use of hosepipes), our other zones do not require any actions in a similar drought.

Extreme drought – definition in this Drought Plan

Within this Drought Plan and in agreement with the Environment Agency, an “extreme drought” is considered to be a drought with a 1 in 500 year return period or more severe. Wherever we refer to “extreme drought” in this Plan, we are referring to this severity of drought.

² SWW BW Water Resources Management Plan 2019, SWW, August 2019

More severe droughts than 1975/76

To test our supply system, we have modelled the impact of more severe droughts than 1975/76 and identified their probability of occurrence, described as their return period³ for droughts of differing severity and identified when drought actions would need to be triggered.

This has shown that on planned demands both our Bournemouth WRZ and Colliford WRZ are resilient to droughts with a return period of 1 in 500 years, whilst our Roadford and Wimbleball WRZs are resilient to droughts with a return period of between 1 in 200 and 1 in 500 years.

Severity of drought, triggers and actions

We have followed Environment Agency guidance and categorised different severity of drought from Level 1 (less severe, but more frequent droughts) through Level 2 and Level 3 to Level 4 (very rare, but very severe droughts). As a drought develops, we would consider different responses or actions appropriate to the level of drought (Table 0.1⁴).

The Drought Plan sets out the triggers that we will use to assess the current level of drought. We term these triggers drought management curves. Details of each of the curves are included in Appendix 2 of this Plan.

In the SWW supply area, the curves relate the storage in a reservoir to the time of year and the level of risk to water resource availability. For example, if a reservoir is only half full at the end of the summer there will be less risk to supplies than if it is half full at the beginning of the summer when high demands and low rainfall might be expected in the following months.

In the Bournemouth WRZ the curves relate to the level of customer demand. For example, if demand is very high there is a higher risk to water resource availability than when demand is low.

Table 0.1 shows the specific actions which may be taken as the severity of a drought increases across a WRZ.

Our approach in a drought will be to take actions which will reduce the demand for water (demand-side actions) and if needed, actions which result in access to additional water (supply-side actions) whilst always considering how to minimise the environmental impact.


Our Plan only includes actions up to drought severity Level 3. This is in accordance with the requirements of the guidelines and is appropriate as we do not plan for Level 4 emergency Drought Orders in our Levels of Service. The nature of our supply system means we would only need to resort to such measures in a very extreme drought, well beyond a frequency of drought expected once every 500 years, on average.

³ Return Period – the average frequency of occurrence of an event of this severity or greater

⁴ *Water Company Drought Plan guideline_December 2020 UPDATE_FINAL*, Environment Agency, Dec 2020

However, we have included a list of potential options we could consider, as well as the triggers for their implementation, in order to avoid the need for emergency Drought Orders in the highly unlikely event of an extreme drought. This is provided and discussed further in Section 4.

Table 0.1: Drought severity and actions we might take

Severity of the drought	Level	Demand side actions	Supply side actions
Drought Plan 	Level 1	Communications campaign, increased leakage control	Drought actions with minor environmental impacts (optimising sources, outage).
		Temporary use bans	
	Level 2	Non-essential use bans	Moderate environmental impact drought permit and ordinary drought orders.
		All possible actions to avoid emergency drought orders	All possible actions including major environmental impact drought permits and orders
Emergency Plan	Level 4	Emergency drought orders (such as standpipes)	

As indicated in Table 0.1, Level 3 drought actions comprise of two separate groups of actions. Throughout the Drought Plan we refer to these as:

- Level 3: See Section 3.3.2 and Appendix 3 for details
- “More before 4” actions: these actions have risk of major environmental impacts than Level 3 drought actions and would only be used in order to avoid needing Level 4 actions (emergency drought orders) such as standpipes and rota cuts. See Appendix 4 for details.

Levels of Service

The Levels of Service to all our customers are laid out in Table 0.2. We have regularly consulted with our customers and other stakeholders on our Levels of Service. Their preference is for no changes to be made.

Table 0.2: Levels of Service

Actions	Levels of service used within strategic water resources planning for South West Water mainland & Bournemouth Water
Publicity, appeals for restraint and water conservation measures	1 in 10 years
Temporary Use Bans (TUBs) ⁵	1 in 20 years
Supply-side Drought Orders or Drought Permits	1 in 20 years
Demand-side Drought Orders ⁶	1 in 40 years
Emergency Drought Orders – partial supply, rota cuts or standpipes ⁷	>1 in 200 years

Management structure

If we identify there is a risk of entering a drought, we need to operate tactically to ensure the right responses are taken. For this to happen a specific management team will be put in place to monitor developments, appropriate to the level of risk, with the ability to act early and effectively.

This Drought Plan sets out the details of our internal management arrangements during a drought, including the meeting structures and key roles required at each.

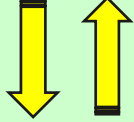
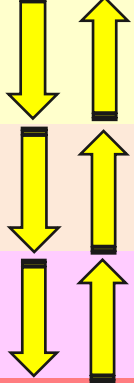
Our Drought Management Structure is set out in Section 5 and summarised below in Table 0.3. Both this and our communications plan build on actual tactical responses from 2018 and 2019.

⁵ Formerly termed hosepipe bans.

⁶ Formerly termed bans on non-essential use. All WRZs do not currently enter our Level 3 drought management zones based on our worst historic drought of 1975/76. This has a return period of greater than 1 in 100 years across all zones.

⁷ Previously service level listed as unacceptable. Following further guidelines from the Environment Agency we have included an estimated return period for this service level based on our drought analysis. Drought return periods of this magnitude are inherently uncertain, but the events that would cause these interventions are rare.

Table 0.3: Overview of management structure and communications plan described in Section 5

Drought Severity Stage	Level	Supply/Demand Actions	Drought Management - leading group	Communications plan (inc Regional liaison)
Normal operation stage	0	Actions as per drought triggers 	<ul style="list-style-type: none"> Water Resources Review Group (weekly/monthly) 	<ul style="list-style-type: none"> Normal operation
	0		<ul style="list-style-type: none"> Silver Drought Group (weekly) 	<ul style="list-style-type: none"> Comms work commenced Customer research commences
Communications group formed				
Drought operation stage	1 (prolonged dry weather)		<ul style="list-style-type: none"> Gold Drought Group (weekly) 	<ul style="list-style-type: none"> Weekly comms group Drought Liaison Officer in place Regional water resource co-ordination in place
	2 (drought)		<ul style="list-style-type: none"> Gold Drought Group (weekly) 	<ul style="list-style-type: none"> Daily comms group Specific team in place to deal with customer Q&As and representations LRF liaison
	3 (drought)		<ul style="list-style-type: none"> Platinum Drought Group (daily-weekly) 	<ul style="list-style-type: none"> Sub daily comms meetings Tailored comms for NEUB impacts Board level spokesperson for media
Emergency operation stage	4 (severe drought causing rota cuts)		<ul style="list-style-type: none"> Platinum Drought Group/ Emergency operation 	<ul style="list-style-type: none"> Emergency operation

Communications Planning

We understand the concerns our customers may have when we experience a drought. It is most important that we allay some of these concerns by providing clear and timely information on the current resources situation and the steps we are taking to maintain supplies.

This Drought Plan details our agile communications strategy in a drought and includes details on the type and content of communication we would take with each stakeholder (Section 5). This includes details of communications with non-household retailers following the opening of the non-household retail market in April 2017 and reflects recent changes in customer expectations with regards to digital media channels. This reflects actual experience from 2018 and 2019 and best practice on communications.

Regional and National Co-ordination

Droughts can often span more than one water company operational area. This Drought Plan has been developed in conjunction with the regional West Country Water Resources Group

(WCWRG). Common text and processes are included in each company's drought plan on how we will work across the region.

We have also included information on how we will liaise and align to any National Framework requirements. This is presented as a flow chart to give transparency (Figure 5.1) and discussed in Section 5.10.

As part of future drought plans, we will be incorporating the results of the latest regional plans when they are published.

National Framework

In 2020, the Environment Agency published a national framework for the management of water resources. This signals a move to building higher resilience to avoiding severe water resource restrictions (from a 1 in 200 to a 1 in 500 year return period) as well as deeper demand and leakage reductions. In the 5-year lifetime of this Drought Plan this Direction⁸ does not affect the tactical response. However, in future plans if demand has been reduced on a more permanent basis, the ability for the Drought Plan actions to make further demand reductions will be reduced. Future Drought Plans will reflect this.

Commercial and security information

The published version of the Drought Plan is required to exclude any matters of commercial confidentiality and any material contrary to the interests of national security. There were no matters of commercial confidentiality.

In the published version of the Plan we will exclude information relating to the location of key assets on the advice of our certifier for emergency planning and in the interests of national security.

End of a Drought

This Drought Plan sets out how we will step back from our tactical response as a drought ends.

Assurance and Defra Direction⁹

We have assessed our Plan for compliance with the Defra Direction¹⁰. We also had a third-party independent assurance review prior to consultation.

⁸ *The Drought Plan (England) Direction 2020*, Defra, April 2020

⁹ *Ibid.* 8

¹⁰ *Ibid.* 8

1. Introduction

In this section we provide:

- An overview of the Drought Plan process
- A summary of the SWW supply system
- A list of other related regulatory plans and environmental assessments.
- Isles of Scilly – see separate document *Isles of Scilly Draft Drought Plan*

1.1 Overview of the drought planning process

As the appointed water undertaker in the south west region, we have a duty to prepare and maintain a drought plan under Sections 39B and 39C of the Water Industry Act 1991, as amended by the Water Act 2003 and in accordance with the Drought Plan Regulations 2005 the Drought Plan (England) Direction 2020.

We have developed our Plan following and complying with the latest Defra and Environment Agency drought planning guidance and consultation documents:

- Drought response: our framework for England
- Drought Plan (England) Direction 2020
- Water Company Drought Plan guideline December 2020 UPDATE_FINAL
- Drought permits and orders guidelines_2020draft final OCT 2020
- LIT 55303 - Environmental assessment for water company drought planning – accessible
- WCDP Consultation response summary December 2020 Final Final
- Drought_plan_2021_government_expectations_final_Public

We have published this final Drought Plan as part of the process leading to Drought Plan finalisation and publication. In summary the process is:

- Submission of draft Drought Plan to Defra by the end of March 2021
- Permission from Defra to publish the draft Drought Plan for consultation
- Publication of draft Drought Plan on 8th June 2021 for consultation
- 15-week consultation period leading to Publication of a Statement of Response and a revised draft Drought Plan (published in September 2021)
- Permission from Defra to publish Final Drought Plan
- Publication of final Drought Plan in 2022 (subject to Defra approval) (this Plan)

1.2 Pre-draft consultation details

Consultation is an important element in the Drought Plan process. As part of the preparation of this Plan we advised various organisations that we were commencing a review of our Drought Plan and seeking comments at this early stage of the process. These included:

- the Secretary of State for the Environment, Food and Rural Affairs
- the Environment Agency (because this Plan affects water resources in England)
- Natural England
- Ofwat
- Where relevant, other water supply licensees that supply water to premises in our area through our supply system
- Other stakeholders including key riparian owners

We have held pre-consultation meetings with the regional West Country Water Resources Group which includes Wessex Water and Bristol Water, as well as non-public water supply companies. We have taken their views into account in our regional communications strategy.

We have also held several pre-consultation technical meetings with the Environment Agency to inform the development of the Plan. These have focussed on our preferred supply-side drought actions, how these options are triggered and scenarios we have undertaken to identify potential actions for a variety of severe, but plausible droughts. In addition, we outlined our mitigation and monitoring plans to protect the environment should we need to use specific supply-side options, particularly those requiring Drought Permits.

We have agreed to work with the Environment Agency on potential approaches to mitigate the impact on rivers during very low flow periods where feasible, through early exchange of information and the identification of measures to offset stress on the environment.

Records of our meetings with the Environment Agency, the topics discussed and other information are provided in Appendix 1.

We have also liaised with neighbouring companies to align approaches. Common text will be seen in this Plan and their Plans.

1.3 Our water supply system

1.3.1 Supply area

This Plan covers Cornwall, Devon, Bournemouth and parts of Hampshire, Dorset, Somerset and Wiltshire. Since April 2020 we have taken over responsibility for the water and waste water services of the Isles of Scilly. We are currently in the process of developing drought actions for the islands. Given this, along with their unique and remote situation, we have provided a separate Isles of Scilly document as part of this Drought Plan.

1.3.2 Water Resource Zone

For water resource planning purposes, we divide our water supply area into Water Resource Zones (WRZs). A WRZ is defined as the largest possible zone in which all resources, including external transfers, can be shared. A WRZ is therefore a zone in which all customers experience the same risk of supply failure from a resource shortfall.

We have four WRZs - Colliford, Roadford, Wimbleball and Bournemouth. The WRZs in our Drought Plan are consistent with the WRZs in our current WRMP. The basis for dividing the supply area up into these zones is fully explained within the WRMP. As we took responsibility for the Isles of Scilly after publication of our current WRMP, we have not yet completed our water resources planning for the islands. Whether the islands will be considered a single WRZ, a group of WRZs or incorporated into our Colliford WRZ has yet to be established. More information for the islands is provided in the separate *Isles of Scilly Drought Plan* document.

For Devon and Cornwall, each WRZ is served primarily, but not exclusively, by one of the three strategic reservoirs: Colliford, Roadford and Wimbleball. For example, customers in the Roadford WRZ have a very high proportion of their water supplied by Roadford Reservoir and its associated sources, but a small proportion of their water is provided by transfers from the Wimbleball WRZ.

We operate a conjunctive use system with links between and within WRZs, which enables us to transfer water from less stressed to more stressed areas and to optimise use of existing resources before we would consider drought management actions.

In the Bournemouth WRZ, sources of water are dominated by direct run-of-river abstractions from the River Stour in Dorset and the River Avon in Hampshire with interconnectivity across the zone. These abstractions are located low in the catchment and demand has been reducing over time, which is enabling us to minimise the environmental impact of any actions before, during or after a drought.

The WRZs are shown in Figures 1.1, 1.2 and 1.3 below.

Figure 1.1: Colliford, Roadford and Wimbleball WRZs (SWW supply area)

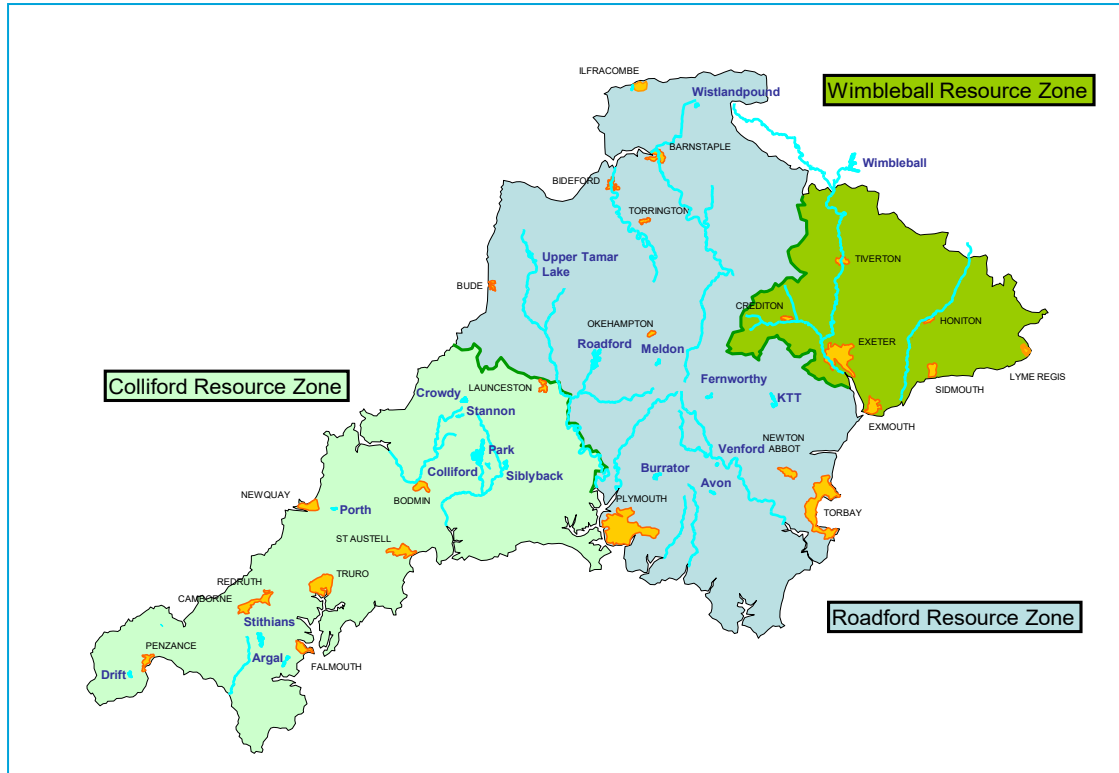


Figure 1.2: Bournemouth WRZ

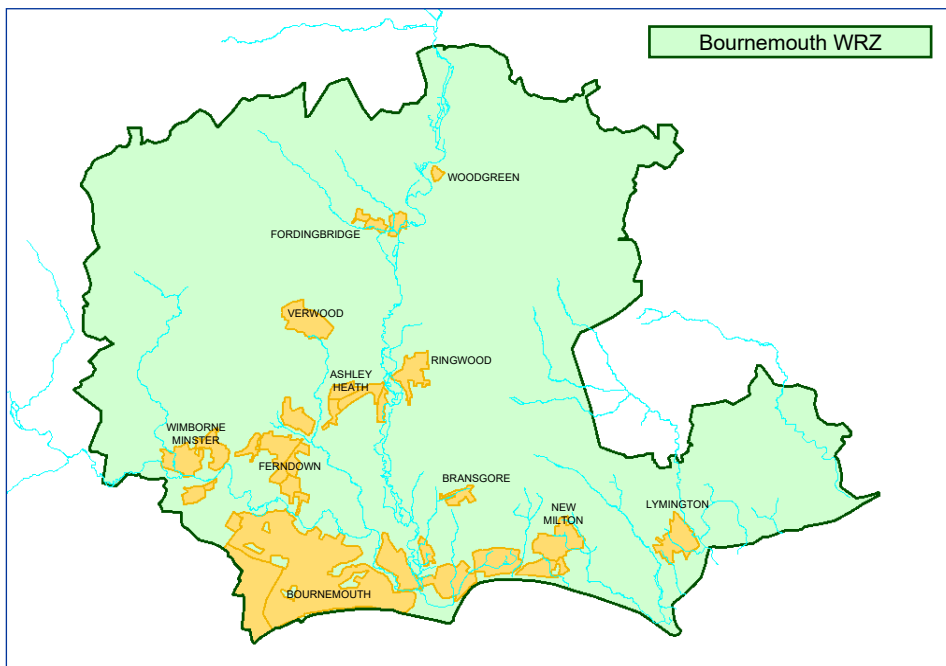


Figure 1.3: Isles of Scilly



Further information on our WRZs is given in our WRMP. Schematics of our WRZs showing rivers, reservoirs, water treatment works and indicative raw and treated water pipelines are included in Appendix 1.

The SWW area is unusual in that it borders just one other water company, Wessex Water. Colliford WRZ and Roadford WRZ have no neighbouring water companies. Wimbleball WRZ neighbours Wessex Water and we share a major water resource on Exmoor, Wimbleball Reservoir. During our normal operations we are in regular discussions with Wessex Water on the operation of this source. Neither company has plans to apply for additional access to water from Wimbleball beyond their currently licensed volumes during a drought but optimising the resource for supply purposes and to reduce environmental stress would be covered in inter-company discussions which are part of our communications and drought management strategies (Section 5).

The SWW area has two small exports to Wessex Water of only 0.04 MI/d. Discussions with Wessex Water have confirmed that we would not expect these transfers to be either increased or decreased during a drought. We have no imports from Wessex Water.

Our Bournemouth WRZ borders both Wessex Water and Southern Water. We have a shared resilience main with Wessex Water, where water can be transferred in either direction. The operation of this asset during a drought is covered further in Section 5. There are no imports or exports with Southern Water and no connectivity.

1.3.3 Isles of Scilly

We took responsibility for water and wastewater services on the Isles of Scilly in April 2020.

The principal five islands which make up the Isles of Scilly are mostly supplied by groundwater from boreholes. There are no significant surface watercourses which have the potential to be used for water supply purposes and a large raw water storage reservoir is not viable due to the size of the islands.

St Mary's, the largest of the islands, also operates a desalination plant in the summer months to supplement groundwater supplies during the tourist season.

The geographic location and separation from the mainland makes them distinct from a water resources perspective. Access to freshwater is restricted due to the nature of the geological formations underlying the islands which have a relatively low capacity to store water. This makes the islands vulnerable to drought. We have been studying the water resources and water supply of the islands since 2018, when an extended dry period and high temperatures in the summer led to concerns over possible shortages. Public notices from the critical period are provided in Appendix 1.

We are taking the experience of 2018 and the hydrological data obtained from that year to inform our water resources planning. However, it is clear that a specific approach tailored to the islands will be needed given the low population and unique setting. Actions commonly employed in large WRZs, such as Colliford or Roadford, may not represent the best response and tactical, small-scale options may be more appropriate. This is covered in detail in the separate *Isles of Scilly Drought Plan* document. This document is draft and will remain so until we have gained a better understanding of the islands' vulnerability to droughts. We expect to have gained this understanding after sufficient environmental data have been gathered. A timeline for environmental data collection and analysis and consequent revision of the Isles of Scilly draft Plan, consultation on this Plan and publication of the final Plan is included within the separate Isles of Scilly document. We expect to publish the final Plan in late 2024.

1.4 Bulk Supply Agreements & Shared Resources

Southern Water and Wessex Water neighbour our Bournemouth WRZ. Wessex Water also neighbours Wimbleball WRZ, with Wimbleball Reservoir being a shared water resource between SWW and Wessex Water.

We will ensure that we communicate with neighbouring companies early in the drought management process to ensure that we are able to offer or receive assistance when needed. More information on this is provided in Section 5.

1.5 A Regional Approach

We helped initiate a new water resources group – the West Country Water Resources Group (WCWRG). The group has been set up to support a co-ordinated approach to water

resources planning in the south west of England and neighbouring water company areas and to understand opportunities for water trading.

However, the group will also present an opportunity to ensure joined-up working and consistent drought messaging to customers across the region in the event of a drought. How we will work together is explained in detail in our Management and Communications Strategy in Section 5.

1.6 Related Plans

The Drought Plan is linked to a series of other key plans, both company and regulatory documents which are important in ensuring maintenance of supply both for the long term and under any unexpected situation.

1.6.1 Previous Drought Plans

This Plan is an update of our previous Drought Plan which was published in 2018. It is produced in accordance with the Defra and Environment Agency guidelines, principally the *Water Company Drought Plan guideline December 2020 UPDATE_FINAL*, as well as supporting documents (see Section 1.1).

1.6.2 Water Resource Management Plans and Water Company Business Plans

Our Plan is consistent with our current WRMP, particularly in relation to Levels of Service and drought triggers for South West Water mainland and Bournemouth Water supply areas. The WRMP is available from our website¹¹.

Our Plan is in line with our latest SWW Business Plan which set out our strategic objectives and proposed investments. The Business Plan is downloadable from our website¹².

1.6.3 Emergency plans

Our Plan is not intended to cover details of arrangements for providing water supplies when there is a civil emergency, as advised by the latest guidelines. A civil emergency could include, for example, a major pollution incident at a strategic reservoir.

Every production site has a contingency plan which is an International Organisation for Standardisation (ISO) document. The contingency plan sets out steps to undertake to maintain supplies in the event of significant interruptions. These plans include procedures to deploy alternative water supplies (e.g. standpipes, bowsers). SWW has contracts in place to facilitate this, such as tanker provision and distribution. Such plans are not covered further in this Drought Plan.

1.6.4 Environment Agency Drought Plans

There are no specific additional drought management actions relating to SWW applicable to our Drought Plan within Environment Agency Drought Plans. However, we will work with the

¹¹ https://www.southwestwater.co.uk/siteassets/document-repository/environment/sww-bw-wrmp19---finalplan_aug2019.pdf

¹² <https://www.southwestwater.co.uk/waterfuture/business-plan-2020-2025/>

Environment Agency to ensure our actions and those of the Environment Agency provide the best approach to mitigating the environmental impacts during and after a drought.

1.6.5 Water Framework Directive - River Basin Management Plans

We believe there are no actions identified within the River Basin Management Plans that would be affected by this Drought Plan, nor do we expect any temporary deterioration in WFD status.

1.6.6 Environment Agency National Water Resources Framework

This was published in 2020. There are no direct impacts on our Drought Plan. However, it does signal long-term demand reductions. This may affect the volume of water available that could be saved from demand measures in future Drought Plans due to a reduction in 'discretionary' use in day to day water consumption.

1.7 **Regulatory environmental considerations**

1.7.1 Habitats Regulation Assessment (HRA)

Current legislation requires us to ensure our Plan meets the requirement of the Conservation of Habitats and Species Regulations 2017 (as amended). Therefore, we must determine if a plan or project either alone, or in combination with others, may produce Likely Significant Effects (LSEs) on the protected features of a habitats site before deciding whether to undertake, permit or authorise it.

The HRA assessment and determination with "habitats sites" refers to European Sites which include Special Areas of Conservation (SACs), candidate SACs (cSACs), Special Protection Areas (SPAs), potential SPAs (pSPAs), Ramsar sites and proposed Ramsar sites (pRamsar).

A proportionate HRA has been conducted of the Drought Plan with further details provided in Section 6. The technical HRA Report is available from SWW on request.

1.7.2 Strategic Environmental Assessment (SEA)

The Environmental Assessment of Plans and Programmes Regulations 2004 (as amended) requires a determination of whether the emerging Drought Plan is likely to have significant effects on the environment either alone, or in combination with, other plans or programmes, and therefore would require a full SEA. As the responsible authority, we must therefore determine whether our Drought Plan falls within the scope of the SEA Regulations.

A proportionate SEA of the Drought Plan has been conducted with further details provided in Section 6. The technical SEA Report is available from SWW on request.

1.8 Baseline water resources situation and policy on demand restrictions

1.8.1 Baseline water resources situation

Our current WRMP, which forecasts our supply demand position until 2045, shows our plans should ensure the supply demand balance in all four of our WRZs is in surplus, in that we do not envisage that demand plus Target Headroom (an allowance for uncertainty in our calculations) will exceed our capacity to supply under known risks.

1.8.2 Policy on demand restrictions

Our policy is to try to avoid imposing demand restrictions, such as temporary water use restrictions or seeking Drought Orders and/or Drought Permits, and in this we have been successful for the last 25 years in Devon and Cornwall. No demand restrictions have ever had to be imposed in the Bournemouth WRZ.

Whilst ensuring security of supply, it is also our policy to balance the direct effect on customers with that on the environment. As part of our drought planning we will take into account stresses on the environment in deciding on our actions. We may need to prioritise demand actions where feasible, to minimise the impact on the environment. Only if necessary would we introduce a supply-side action if additional, alternative demand-side options were inappropriate at the time.

All droughts are different and the form of any drought and how it evolves greatly influences the mitigation actions needed. We have therefore developed this Plan to be flexible and adaptable to different outcomes, in keeping with a tactical manual. This is embedded in both the management structure and communications plan.

1.8.3 Stress testing

Our analyses in this Plan and the WRMP show situations and types of drought which could give rise to stress on our supply system. The types of drought we have considered include, but are not limited to:

- Long, multi-season droughts extending over the summer and spanning summer-winter-summer or winter-summer-winter
- Exceptionally high demand or population changes with prolonged dry weather periods
- Loss of resource due to outage

These scenarios can occur singularly or in tandem. The potential interaction of these situations means it is not feasible or practical to assign risks a simple return period. They act as trigger points for adapting our response. Were these scenarios to arise, we would liaise with the Environment Agency on the specific issue to highlight the risk to public supply and the actions we would promote. Such discussions would include the role of Drought Permits and/or Drought Orders.

The response of our supply system typically means we would look to start that process the season before any issue might threaten public water supply. This is covered further in

Section 2. This is a precautionary approach and aligns to our learning from the 2018 and 2019 dry weather events.

2. Drought triggers

In this section we provide details on:

- Our primary drought triggers
- Additional environmental drought triggers
- Drought trigger monitoring
- Historic and plausible drought events
- Testing drought triggers
- Impact of raw water quality and outage risks

2.1 Introduction

In this Section we set out the triggers that we will use to manage water resources in a drought and how we have tested them against the worst historic drought, a more severe drought and against high demand.

Every drought is different in terms of severity, location, duration and impact and therefore the Drought Plan must be flexible within an agreed, consistent framework.

We have derived a series of drought triggers which encompass forecasting, monitoring and discussions with the Environment Agency as a drought develops.

We use these drought triggers to identify when we should consider implementing specific drought actions to reduce demand and, if necessary, to obtain extra water resources. These triggers are used as part of a framework for drought management, being used in conjunction and with consideration of various environmental and societal information. These include current river and rainfall data, weather forecasts and resultant river flow forecasts, time of year and likely customer demand levels.

Professional judgement and experience are required to interpret these triggers and indicators as a specific drought develops to assess what actions are necessary and appropriate in order to ensure a wholesome, continuous supply of water to our customers. Decisions are also affected by Environment Agency Drought Plan responses and national and regional decisions.

As all droughts vary, the management structure and decision making in this Plan is set up to be able to adapt as droughts develop and change. Our overall approach in our tactical response is one of taking precautionary decisions. This can be seen in the modelling of the drought trigger actions (see Sections 2.2 to 2.6).

The drought triggers can be divided up into three different types: groundwater triggers, surface water triggers and demand triggers. Different types of triggers are appropriate for different water resources systems; we use different drought triggers and drought management zones for the SWW and BW supply areas and this reflects the different water resources systems in each supply area.

In the SWW supply area surface water abstraction dominates, with 90% of total abstraction being from rivers and reservoirs and with this abstraction being split roughly 50:50 between the two, although this ratio varies depending on the weather experienced in any particular year. Groundwater abstraction accounts for the other 10% and these groundwater sources are generally constrained by licence, not by water available. When there is plenty of water available abstraction is mainly from the groundwater, local reservoirs and local rivers. However, as a drought develops less water is available from the local river and reservoir sources and we need to increase abstraction from strategic river sources which are supported by releases from our strategic reservoirs (Colliford, Roadford and Wimbleball). We also need to ensure that we hold back sufficient water in our local reservoirs to meet peak demand. Because of this, in the SWW supply area our drought triggers and drought management zones need to be set on reservoir storages. The triggers and drought management zones relate the storage in a reservoir to the time of year and the level of risk to water resource availability. For example, if a reservoir is half full at the end of the summer there will be less risk to supplies than if it was half full at the beginning of the summer when high demand and low rainfall might be expected in the following months.

In the BW supply area surface water abstraction dominates, with 85% of total abstraction being from rivers and the remaining 15% being from groundwater. The groundwater sources are licence constrained. There are no impounding reservoirs in the BW supply area. The location of the river abstraction points (low down in the catchment) and the quantities licensed for abstraction mean that even in an extreme drought there is sufficient water available for abstraction. Hence the constraint in the BW supply area is peak demand; we would have an issue meeting customer demand if this demand was to exceed the daily volume of water licensed for abstraction and/or the capacity of our WTWs to treat it. Therefore, our drought triggers and drought management zones in the BW supply area are demand related.

We describe how we use these different triggers in Sections 2.2, 2.3 and 2.4 below.

2.2 Groundwater triggers

Our groundwater sources contribute approximately 10% of the water we put into distribution across the area covered by our Colliford, Roadford and Wimbleball WRZs, and 15% in our Bournemouth WRZ.

For most groundwater abstraction sites in our area, the controlling constraint is either an abstraction licence limit or the abstraction capacity of the source. Therefore, the impact on supply capability of a groundwater drought in our area is significantly less critical than that of a surface water drought.

The introduction of specific groundwater triggers has been considered for this Plan but such triggers are not appropriate to our water resources system for the reasons set out below:

- The groundwater sources are operated in conjunction with the surface water sources. Therefore, in our Colliford, Roadford and Wimbleball WRZs it is more appropriate to identify triggers within the remaining storage in the surface water reservoirs.

- In our Bournemouth WRZ, the groundwater abstractions are strongly licence constrained, rather than being constrained by groundwater levels. It is therefore more appropriate to use demand triggers, as explained in Section 2.1.
- The licence limit is the principal constraint, not resource availability.

We still routinely monitor the groundwater levels to assist us with the operation of our sources and as additional evidence when assessing the current level of environmental stress. Examples are shown in Appendix 2. At a few specific local groundwater sites, output can be affected by low groundwater levels. Examples include Otterton 1A Borehole, Wilmington Springs and Hook Springs (East Devon); and Vennbridge and Duckaller boreholes (Teignbridge). The lower projected output during periods of low groundwater levels from sources such as these is already considered in the derivation of the drought triggers, as these sources have routinely reduced in output in past droughts.

2.3 Surface water triggers and drought management zones (Colliford, Roadford and Wimbleball WRZs)

2.3.1 Description of triggers, reservoir drought management zones and link to Levels of Service

The essence of our Drought Plan for our Colliford, Roadford and Wimbleball WRZs is a series of drought management triggers on our reservoirs which relate drought management actions to remaining reservoir storage through a series of drought management curves. We have developed these at WRZ level as well as at a more local level. The drought management zones are operated in conjunction with each other as appropriate. Local curves can also be used to give guidance should a very severe drought develop that is only localised in nature.

The drought management zones divide the storage of the strategic reservoirs into Levels 0 (normal), 1, 2, 3, and 4 and the storage of local reservoirs into Levels 0 (normal), 1, 2 and 3. These zones are shown in Appendix A2.2 for each reservoir.

The drought management zones relate to the Levels of Service described in Section 0 and define drought management actions that could be taken. For example, if reservoir storage is in Level 2, then the possible actions could include demand-side actions such as TUBs and/or supply-side actions such as the use of existing licensed sources not usually in supply and Drought Permits to access non-licensed sources of water.

As every drought is different in nature, we also use other data and information such as local river and/or rainfall data, to help inform the most appropriate drought management actions. Drought management actions may be implemented on either a whole WRZ or a local reservoir area depending on circumstances and the type of drought being experienced.

The strategic reservoir curves will typically take primacy on invoking the Drought Plan tactical response. The sequence of actions defined by our drought management zones is consistent with the Environment Agency's guidelines and there is a balance between supply-side and demand-side actions. These actions are detailed further in Section 3.

2.3.2 Derivation of triggers and reservoir drought management zones

The derivation of our drought triggers and reservoir drought management zones is consistent with our assessment of Deployable Output in our WRMP19 (SWW, 2019)¹³. The triggers and drought management zones were derived using historical rainfall records, reservoir levels, river flows and groundwater levels, as well as our conjunctive use water supply systems in our water resources network optimisation model of the three WRZs.

The triggers and drought management zones were derived using historical flow records, post 1957 for the Wimbleball and Roadford WRZs and post 1962 for the Colliford WRZ. These flow records therefore include a variety of serious historic droughts. This is further covered in Section 2.4 below.

The triggers and drought management zones for our surface water reservoirs are shown in Appendix A2.2, where they have been grouped by WRZ.

2.4 Demand triggers (Bournemouth WRZ)

2.4.1 Description of triggers and link to Levels of Service

Even in very dry conditions, the water resources in the Bournemouth WRZ are robust and therefore, in this area, drought triggers focus on the management of very high demands which could occur in drought periods. Very high, unusual demand (for example during exceptionally hot, dry weather) could potentially put excessive pressure on our water supply system infrastructure. This is particularly relevant to the short-term peak summer demands that we experience, arising from the dual factors of household external water use such as garden watering and the influx of tourists.

The drought triggers divide demand into Levels 0 (normal), 1, 2 and 3. An example template is given in Appendix A2.2.

The drought management zones relate to the Levels of Service described in Section 1 and define drought management actions that could be taken. For example, if the demand is in Level 1 we would increase operational monitoring and request voluntary savings of water via an enhanced media campaign.

As every drought is different in nature, we also use other data and information such as local river, rainfall and demand data to help inform the most appropriate drought management actions.

Derivation of triggers

The triggers have been derived by an analysis of demand and infrastructure constraints and are consistent with the assessment of Deployable Output in our WRMP19 (SWW, 2019)¹⁴.

¹³ SWW BW Water Resources Management Plan 2019, SWW, August 2019

¹⁴ *Ibid.* 10

Peak demands are related to weather and are, therefore, transient. We use demand drought management zones as our triggers, which allow for a measure of flexibility when implementing drought management actions. We propose to implement a succession of escalating actions linked to rising demand levels, should there be areas of concern. Demand-side actions are further detailed in Appendix 3. The transient nature means the operational drought response for Bournemouth WRZ is designed to differ from the other WRZs.

2.5 Additional environmental drought triggers

In addition to reservoir storage and demand levels, other criteria can also be considered in assessing the drought severity level. As well as more company-focused triggers such as demand, reservoir storage and groundwater levels, triggers which could cause environmental stress are also included, such as rainfall and river flow.

Table 2.1 and Appendix A2.1 detail some of the specific triggers that are likely to be considered when assessing drought severity level and identifying when associated drought actions should be triggered. Not all of these trigger conditions need to be met; some triggers may be added or disregarded based on expert judgement in an individual drought scenario. It is also unlikely that all trigger conditions for a specific drought level would be reached at the same time. Depending on the geographical area affected by the drought, drought triggers in one or more WRZs may be considered.

Current conditions are usually compared to historic long-term average (LTA) conditions (the exact date range used varies, but is typically 1961-1990) over the same time of year e.g. in a specific month, or six-month range. Data sources for triggers include, but are not limited to:

- SWW data (reservoir storage and demand) provided in the SWW Weekly Water Situation Report (Appendix 2.1)
- Environment Agency data (rainfall, river flow, groundwater levels and soil moisture deficit (SMD) provided in the weekly Rainfall and River Flow Summary report, monthly Water Situation Report (Appendix 2.1) and Hydrology Data Explorer (<https://environment.data.gov.uk/hydrology/explore>)
- Weather forecasts from the Met Office, DTN Group or other providers
- Hydrological data from the Centre for Ecology & Hydrology (CEH) monthly Hydrological Summaries, Drought Portal (displays Standardized Precipitation Index, SPI) or Water Resources Portal.

Routine monitoring (Section 2.6.1) will become more frequent as conditions get closer to these trigger levels. Preparations for implementing drought actions will start when projections indicate the risk of trigger conditions being met is significant. The lead-in time will depend on the specific drought action but will generally need to be a minimum of 4 weeks in advance of the date it is estimated that the trigger conditions will be reached. This is to allow for sufficient time for appropriate actions to take place e.g. applying for Drought Permits or issuing TUB notifications, so that the drought actions are ready to implement once the relevant trigger conditions are met and the WRZ entering the drought management zone is confirmed.

Table 2.1 gives an overview of some of the key hydrological / environmental parameters that will be considered as drought triggers (in addition to the primary trigger of reservoir storage or demand). Appendix 2.5 provides further detail including definitions of the trigger levels and key monitoring sites per WRZ.

Table 2.1 Overview of additional parameters considered as drought triggers

Hydrological parameter	Drought Level 1 trigger	Drought Level 2 trigger	Drought Level 3 trigger	Drought Level 4 trigger
Strategic reservoir storage (or demand for Bournemouth WRZ)	Level 1	Level 2	Level 3	Level 4
Local reservoirs storages	Level 1	Level 2	Level 3	N/A
Rainfall	Notably Low	Exceptionally Low	Exceptionally Low and lower than historic worst drought years	Exceptionally Low over widespread area and significantly lower than historic worst drought years
River flows	Notably Low	Exceptionally Low	Exceptionally Low and lower than historic worst drought years	Exceptionally Low over widespread area and significantly lower than historic worst drought years
Groundwater levels	Notably Low	Exceptionally Low	Exceptionally Low and lower than historic worst drought years	Exceptionally Low over widespread area and significantly lower than historic worst drought years
Soil moisture deficit (SMD)	Notably High	Exceptionally High	Exceptionally High for a sustained period	Exceptionally High over widespread area for longest period on record

2.6 Testing our drought triggers

When implementing drought management actions, whether they are demand-side actions (e.g. TUBs) or supply-side actions (e.g. distribution zone management, Drought Permits), it is very important to consider the time taken to implement the measures. Therefore, resource monitoring and projections are regularly undertaken and updated in order to give as much warning as possible of the potential need for any drought management actions. Details of the monitoring and forecasting work we undertake are given below.

2.6.1 Routine Monitoring

Significant regular routine monitoring of resource status and environmental conditions is carried out throughout the year, even when not in a potential drought period. When routine monitoring starts to identify that we are moving into a drier / more resource constrained situation, the frequency of all monitoring increases. When monitoring indicates that we are

approaching the first (or next) drought level, the rate of deterioration in drought trigger conditions will be considered as part of the assessment of how far in advance preparations to implement drought actions should take place.

Examples of some of the routine monitoring which takes place (monthly to weekly under normal operating conditions) includes:

- Monitoring of all reservoir storages, river intakes, boreholes, WTW outputs, planned maintenance and unplanned outage, abstraction and impounding licence compliance, and other constraints on abstractions and outputs, etc
- Monitoring of river daily mean flows (DMFs) against river abstraction licence prescribed flows, to identify when we may need to start to reduce abstraction from river sources and increase abstraction from reservoirs
- Monitoring of river DMFs compared to historic flows to identify when they are approaching similar flows to historic drought years (Appendix A2.1)
- Monitoring reservoir storage following normal operational rules, which defines which abstraction sources should be prioritised at different times of year at various storage levels to ensure there is enough water in storage to meet demand through the peak demand period and until reservoirs start to refill in the autumn. These rules also define when pumped storage schemes should be activated to assist reservoir refill during winter and when other schemes, such as enhanced flow programmes to release extra water for the benefit of the environment, should take place
- Modelling reservoir storage projections for 60 years of historic flow conditions to evaluate the likelihood of storage reaching drought trigger levels (Appendix A2.1)
- Spot gaugings of river flow and downstream of dams undertaken as a check to ensure automated monitoring instrumentation are recording flow correctly and hence prescribed flow and compensation flow conditions are being complied with
- Review of external data related to drought triggers (Section A2.1) including regular Environment Agency and CEH hydrological summaries, and weather forecasts
- Weekly Water Situation Report containing key data on: reservoir storages, demand, river flows, rainfall and groundwater levels (see Appendix A2.1 for example)
- Regular operational Supply Update Reports (during Spring-Autumn) focussing on drought risk, current and planned operational constraints, and short term and strategic operational actions required
- Monthly Water Resources Review Group (WRRG) meetings to review all the above and identify any changes to normal operational practice required to meet current conditions.

In Section 5 we refer to this monitoring and how it adapts as droughts deepen or intensify.

2.6.2 Rainfall and river flow monitoring and forecasting

As a dry period develops, we monitor cumulative rainfall totals in the affected area for the relevant period (usually from when the reservoir was last full). As per Environment Agency guidance¹⁵, we primarily use Environment Agency data including monthly rainfall totals generated from their Daily Rainfall Tool (recent) and Met Office HadUK (historic) data at the Environment Agency hydrological area scale (large scale river catchment). We also consider information from the Environment Agency in their reports available on the internet, reports from the Centre of Ecology and Hydrology, information from the Met Office and detailed bespoke meteorological reports from DTN Group which supports daily and quarterly operating decisions. We can also use the Tabony Tables (Tabony, 1977)¹⁶ to get an indication of the return period for rainfall totals experienced in the current dry weather period so far. We would also commission the Met Office to provide estimates of return period using Extreme Value Analysis, as was undertaken for our WRMP19 plausible droughts work, an example of which is given in Appendix A2.1. See Appendix A2.5.1 for more detail on analysis that could be carried out to demonstrate an exceptional shortage of rainfall (ESOR).

We also compare river flow data in the surrounding area to data available from historic droughts and river recession curves, which helps us project when river abstractions may be affected by licence hands-off flow conditions, as well as provide information on the projected reservoir inflow. An example is given in Appendix A2.1.

Table 2.2: Rainfall locations reported weekly in the Water Situation Report

Area	Rainfall Station	WRZ
Bastreet	Bastreet	Colliford
Helston	Wendron	Colliford
Penryn	Penryn	Colliford
Penzance	Trengwainton	Colliford
St Cleer	St Cleer	Colliford
Roadford	Roadford	Roadford
Ilfacombe	Wistlandpound	Roadford
Fernworthy	Fernworthy	Roadford
Postbridge	Dartmoor	Roadford
Yelverton	Dousland	Roadford
Ottery St Mary	Ottery	Wimbleball
Tiverton	Tiverton	Wimbleball
Bournemouth	Alderney	Bournemouth

Table 2.3: River flow locations reported weekly in the Water Situation Report

River	Gauging Station	WRZ
Fowey	Restormel	Colliford
Hayle	St Erth	Colliford
Kenwyn	Truro	Colliford
Camel	Bodmin Dunmere	Colliford
Gannel	Gwills	Colliford
Erme	Ermington	Roadford
Dart	Austins Bridge	Roadford
East Dart	Bellever	Roadford
Teign	Chudleigh Bridge	Roadford

¹⁵ Hydrological guidance for the assessment of an Exceptional Shortage of Rain (ESoR), Environment Agency, March 2021

¹⁶ R C Tabony (1977), *The variability of long-duration rainfall over Great Britain*, Met Office Scientific Paper No. 37

River	Gauging Station	WRZ
Tavy	Ludbrook	Roadford
Tamar	Gunnislake	Roadford
Torridge	Torrington	Roadford
Taw	Umberleigh	Roadford
Mole	Woodleigh	Roadford
Otter	Dotton	Wimbleball
Axe	Whitford	Wimbleball
Exe	Thorverton	Wimbleball
Stour	Throop	Bournemouth

2.6.3 Reservoir monitoring and forecasting

In addition to the general monitoring and surveillance of the water situation using, for example, our weekly Water Situation Report (see example extracts in Appendix A2.1), we also produce projections of how the drought might develop. Such forecasts look at alternative scenarios up to 18 months ahead for the strategic reservoirs, and for shorter periods for our local reservoirs, as the majority of these are single season (i.e. they are highly likely to refill every year). This work is probabilistic in nature and based on the use of models driven by historic flow sequences. The storage projections are interpreted in conjunction with analysis of rainfall and river flow data, together with weather forecasts, to assess the likelihood of storage dropping into drought management zones.

Examples of reservoir projections for a strategic reservoir are shown in Appendix A2.1. Analysis from 2018 and 2019 show the projections are good predictors for strategic decision making.

Table 2.4: Reservoir storages reported weekly in the Water Situation Report

Reservoir	WRZ
Roadford	Roadford
Colliford	Colliford
Wimbleball	Wimbleball
Stithians	Colliford
Burrator	Roadford
Siblyback	Colliford
Meldon	Roadford
Park	Colliford
Kennick, Tottiford & Trenchford	Roadford
Fernworthy	Roadford
Wistlandpound	Roadford
Upper Tamar	Roadford
Avon	Roadford
Argal & College	Colliford
Drift	Colliford
Crowdy	Colliford
Stannon	Colliford
Venford	Roadford

2.6.4 Groundwater monitoring and forecasting

As detailed above, the impact on our supply capability of a groundwater drought in our area is significantly less critical than that of a surface water drought. However, we still undertake groundwater monitoring to assist us with the operation of our sources.

The best indication of the state of groundwater resources is obtained by comparing current groundwater levels across the South West Region with long term statistics. Currently, three locations are monitored regularly and reported each week in the Water Situation Report, and these are listed in Table 2.5.

Table 2.5: Groundwater locations reported weekly in the Water Situation Report

Station Name	Location	Aquifer	WRZ
Otterton S1	Otterton	Triassic Sandstone	Wimbleball
Cofton Cross	Starcross	Permian Sandstone	Roadford
Greatwell 9	Ottery St Mary	Triassic Sandstone	Wimbleball
West Woodyates	Woodyates	Wessex Chalk	Bournemouth

These sites have been chosen as they provide a guide to the yield of specific groundwater abstraction points in the local area, where borehole abstraction may be constrained during droughts. In addition, we routinely assess groundwater levels on Bodmin Moor (Colliford WRZ) and at Woodyates borehole (Bournemouth WRZ) close to where we abstract groundwater, although these abstraction sites are not groundwater level sensitive.

General projections of future groundwater levels can be made by assessing the recession of the groundwater level in comparison to historical trends. At times when declining water levels could potentially follow past drought patterns, we both increase monitoring frequency and commence additional groundwater level monitoring at appropriate sites.

We keep our projections under review and develop groundwater monitoring plans relevant to the geographical area of impact and scale of any impending drought condition. We also take into account other indicators of a possible groundwater drought such as:

- declining yields from both borehole and spring sources
- deepening pumping water levels
- an increase in pump power consumption
- abnormal variations in groundwater quality

Greater monitoring of these parameters is a further element of our groundwater drought forecasting strategy.

2.6.5 Demand monitoring and forecasting

Although we monitor demand for all our WRZs, this is particularly important in the Bournemouth WRZ because this WRZ is demand constrained. We use a well-established correlation between summer water consumption, temperature and precipitation to anticipate likely demands. An example is given in Appendix A2.1.5, where a chart of Bournemouth

WRZ weekly average demand, monthly average temperature and monthly average rainfall for the period January 2012 to December 2020 is given. The chart shows that demand is consistently lower in months where the average temperature is below 10 or 12 degrees but increases steadily as the temperature rises above this threshold. We can use this type of tool to forecast periods of likely increases in demand.

Demand is heavily influenced by tourism and agriculture, especially in Devon and Cornwall. Whilst the weather drives demand in these industries, the large tourism sector leads to increases in demand during holiday periods regardless of the weather.

Table 2.6: Demand areas reported weekly in the Water Situation Report

Area	WRZ
West Cornwall	Colliford
East Cornwall	Colliford
Plymouth	Roadford
North Devon	Roadford
South West Devon	Roadford
Wimbleball	Wimbleball
Bournemouth	Bournemouth

2.7 Historic and plausible droughts

2.7.1 Historic droughts

The derivation of the triggers and drought management curves, along with the scenario testing, is based on nearly 60 years of data and incorporates a variety of serious droughts such as those of 1959, 1975/76, 1984, 1989 and 1995. The Met Office provided estimates of return period for key historic droughts and these are summarised in Table 2.7 and Table 2.8. Note that these return periods are meteorological drought return periods and do not directly relate to drought management zones (Levels 1 to 4); the drought level will depend on the drought return period, the time of year and on the resilience of the individual WRZ.

Table 2.7: SWW supply area drought return periods

Historic drought	Return period (years) Extreme Value Analysis (EVA)			For reference - Return period (years) Tabony		
	Colliford WRZ	Roadford WRZ	Wimbleball WRZ	Colliford WRZ	Roadford WRZ	Wimbleball WRZ
1975/76	40 - 135	175 - 220	110 - 125	6-24	40 - 170	40 - 160
1984	25 - 50	30 - 35	15 - 20	20-80	20 - 80	13 - 50
1989	20 - 40	10 - 11	<10	15-60	7 - 26	5 - 18
1995	65 - 200	35 - 45	30 - 40	50-200	15 - 60	23 - 90

Table 2.8: BW supply area drought return periods

Historic drought	Return period (years) EVA	For reference - Return period (years) Tabony
1975/76	130 – 150	60 – 240
1984	~10	8 – 32
1989	<10	5 – 18
1995	75 – 80	90 - 360

We have tested the behaviour of our water resources systems to these historic droughts. Details are included in our WRMP19. Worked examples of how we would manage our WRZs if we were to experience the worst historic drought again in future with our current water resources conjunctive use systems and forecast dry year demand are given in Appendix A2.4. We have also included worked examples with higher demand. These worked examples show how we would manage in drought events containing heatwaves, prolonged dry weather and high demand. In light of recent heatwaves, we have compared 1976 with 2018 and 2020 temperature and rainfall (see Appendix A2.3). This comparison shows that 1976 was drier and experienced hotter, longer duration heatwaves than 2018 or 2020.

2.7.2 Plausible droughts

The Environment Agency guidelines advise that our Plan should consider not only historic droughts, but also droughts that are of longer duration and lower rainfall than those in the historic record.

We have therefore considered the characteristics of our water resources systems in periods of drier weather to derive a sequence of plausible droughts. These plausible droughts include the consideration of a drought continuing further into the autumn, drier winters, as well as the sequence of historic years in the mid 1970s being different.

These droughts are described in our WRMP19. An extended 1975/76 drought has the biggest impact on deployable output (plausible drought scenarios PD-1 and PD-2). The Met Office provided estimates of return period for these plausible droughts. The return periods for the PD-1 and PD-2 plausible droughts are given in Table 2.9.

Table 2.9: Plausible drought return periods

WRZ	Plausible drought PD-1		Plausible drought PD-2	
	Return period (years)	% chance in any given year	Return period (years)	% chance in any given year
Colliford	> 10,000	< 0.01	1,100 – 5,000	0.09 – 0.02
Roadford	1,500 – 4,000	0.07 – 0.03	400 - 430	0.25 – 0.23
Wimbleball	1,250 – 2,500	0.08 – 0.04	525 - 675	0.19 – 0.15
Bournemouth	5,000 - >10,000	<0.1%	850 – 1,200	0.4% to 0.58%

Details of the impact of these droughts on resource availability are given in the WRMP19.

In Appendix A2.4 we have included worked examples that test the behaviour of our water resources systems and how we would manage them to the PD-2 plausible drought.

2.8 Linking actions with timing information

2.8.1 Colliford, Roadford and Wimbleball (WRZs with conjunctive use of resources)

We have examined how effective our drought triggers are by testing different drought scenarios. This approach can be used to demonstrate how and when drought management actions would be implemented as reservoir storage passes through the drought management zones.

Reservoir storage drawdowns have been produced by simulating both critical historic droughts and the plausible droughts described above. We have assumed the current infrastructure and operational practices. The demand level and demand patterns used in the simulations are those which might be anticipated during a drought and align with the demand forecasts in our WRMP19. The simulations also include an allowance for the fisheries water bank releases which are made from some of our reservoirs.

The drought triggers and drought management zones are derived from analysis of historic inflows and combine the most severe historic low flow sequences. Therefore, modelling specific drought years will not result in a drawdown that enters the lower storage zones for long periods of time.

Demand-side and supply-side drought management actions are as set out in Section 3.

2.8.1.1 Historic droughts

The worked examples in Appendix A2.3 are examples of the reservoir drawdowns that could occur in each of the three strategic reservoirs assuming the policies and measures set out in this document are followed. An example of a local reservoir (Wistlandpound) is also given to show how the strategic and local sources work in conjunction with each other.

The worked examples in Appendix A2.3 can be used to give an indication of the likely timing of implementation of the drought management actions. As referenced above, river recession curves and reservoir storage drawdown projections will be used to inform when to start the preparation of drought measures which require a long lead-in time.

As can be seen from the charts, strategic reservoir storages do not enter Level 4 in the worst historic drought in our period of record (1975/76). This is further explained below:

- Colliford Reservoir

Colliford Reservoir is a multi-season reservoir and hence is more susceptible to longer periods of drought. In a repeat of the 1975/76 drought, Colliford Reservoir storage should not drop into any of the drought management zones in a single season and hence no drought actions would be required if the demand experienced matches our forecast drought year demand plus an allowance for outage. In our higher demand scenario, in a repeat of 1975/76 Colliford Reservoir storage would drop into the Level 1 drought management zone. Charts showing

projected reservoir storage and drought management actions (if required) for these examples are given in Appendix A2.3.

- Roadford Reservoir

Roadford Reservoir is a multi-season reservoir and hence is more susceptible to longer periods of drought. In a repeat of the 1975/76 drought Roadford Reservoir storage would drop into the Level 1 drought management zone if the demand experienced matches our forecast drought year demand plus an allowance for outage. In our higher demand scenario, in a repeat of 1975/76 Roadford Reservoir storage would drop into the Level 2 drought management zone briefly. Charts showing projected reservoir storage and drought management actions (if required) for these examples are given in Appendix A2.3.

- Wimbleball Reservoir

Wimbleball Reservoir is a single season reservoir as it benefits from a large pumped storage scheme which supplements the natural winter inflow. The drought of 1976 shows how drought measures could be introduced as the storage in Wimbleball Reservoir falls. The projected reservoir drawdown is shown in Appendix A2.3.

- Local reservoirs

Our local reservoirs tend to be single season reservoirs, i.e. they are highly likely to refill even in multi-season droughts. An example of a local reservoir drawdown for 1976 is given in Appendix A2.3. If a local source enters Level 2, it is likely there is also concern about a strategic source and a series of drought management actions may be necessary, covering a range of scenarios within the affected WRZ.

The management structure and response is set up to deal with single and multi-season drought management.

2.8.1.2 Plausible droughts

Analysing the impacts on water resources to droughts outside of the historic record is a requirement for the WRMP and Drought Plan. These types of droughts are termed “plausible droughts”. As described in Section 2.3.2 and in our WRMP19, we derived a series of plausible droughts and we have tested our systems against these in our scenario testing.

We commissioned the Met Office¹⁷ to assign return periods to the plausible droughts for each WRZ. The results indicate some plausible droughts have return periods in excess of 1,000 years, depending on the type of plausible drought and location. A summary of the return periods assigned to each plausible drought is presented in Section 2.7.2 and Table 2.9 above.

¹⁷ Severe Drought Analysis for Water Resources Management Plan and Drought Plan – v4.0, Met Office, 2017

Our scenario testing concluded:

- Colliford WRZ
The plausible droughts considered in this analysis do not impact on Water Available for Use (WAFU) or the supply demand balance. The WRZ is in supply demand balance surplus and is therefore resilient to the types and severities of plausible droughts considered.
- Roadford WRZ
Some of the plausible drought scenarios considered in this analysis impact on WAFU. However, because the WRZ is currently in a supply demand balance surplus and has a large target headroom allowance, they are unlikely to impact on the actual supply demand balance within the planning horizon of this Drought Plan. The WRZ is therefore resilient to the types and severities of plausible droughts tested within the planning horizon of this Drought Plan. The longer-term risk is described in WRMP19.
- Wimbleball WRZ
Some of the plausible drought scenarios considered in this analysis impact on WAFU. However, because the WRZ is currently in a supply demand balance surplus, they are unlikely to impact on the actual supply demand balance within the planning horizon of this Drought Plan. The WRZ is therefore resilient to the types of plausible droughts tested within the planning horizon of this Drought Plan.

Since the WRMP19 and Drought Plan 2018 were published, the government has moved from requiring water companies to be resilient to a 1 in 200 year drought to a 1 in 500 year drought by the 2030s. Our plausible droughts analysis includes plausible droughts of a severity of 1 in 500 years or more severe. These plausible droughts can therefore be used to test the resilience our WRZs to a 1 in 500 year drought. Worked examples of how our strategic reservoirs are likely to respond to this severity of drought and what drought actions may be required to manage demand and supply through such a drought are given in Appendix A2.3.

2.8.2 Bournemouth WRZ

2.8.2.1 Historic droughts

Comparison of demand in different historic flow years is shown in Appendix A2.1. As noted in Section 2.1 above, peak demand is the constraint in Bournemouth WRZ and hence drought triggers are mainly linked to reducing demand as opposed to increasing supply, although we do have supply options that may be required in extreme droughts.

2.8.2.2 Plausible droughts

We have examined how effective our drought triggers are for Bournemouth WRZ by testing the same plausible drought scenarios as for the SWW WRZs. The plausible droughts

considered in this analysis do not impact on Bournemouth WRZ WAFU or the supply demand balance.

We commissioned the Met Office¹⁸ to assign return periods to the plausible droughts for each WRZ. The results indicate some plausible droughts have return periods in excess of 1,000 years, depending on plausible drought and location (see Table 2.9 in Section 2.7.2 above).

The results show that the Bournemouth WRZ is currently resilient to historic and more extreme droughts with higher return periods. This is consistent with the assessment of the supply demand balance which shows there is a surplus of supply over demand for the lifetime of this Plan. It is also consistent with observed history.

However, whilst we would normally expect to maximise our Lower Avon licensed abstractions before applying for Drought Permits, because Natural England have expressed concern over the possible environmental impacts of these licences during prolonged dry periods, we will work with them and with the Environment Agency during a developing environmental drought to consider the possibility of using alternative sources if practical to do so. Examples include making use of the Wessex to Bournemouth resilience transfer (if water is available) and/or bringing forward supply-side drought actions ahead of maximising Lower Avon abstraction.

If there are any changes in abstraction licensing as a result of the WINEP investigation of the Lower Avon that reduce the amount of water available enough to materially affect the supply demand balance, we will review this Drought Plan.

2.9 Testing the Plan against the impact of raw water quality variability and outage risk

Our drought triggers are generated on the assumption that the water quality of our raw water sources is acceptable for treatment as is normally the case. However, from time to time, often unpredictably, water quality may experience short term deterioration. This may impact on our ability to operate our system in an optimal way.

A key learning point from our recent experiences since 2018 has been the importance of planning for water quality in influencing water availability and posing potential outage risk, simultaneous with high demand for water.

Gradual variations in raw water quality are often observed throughout the year, but we have seen some changes that can be more rapid or more severe than normal and this can lead to stress on treatment systems or ultimately cause temporary cessation of use (outage) to meet DWI standards. This is particularly difficult to manage during high demand periods and droughts. The management structure in Section 5 explicitly includes water quality risks for aiding Drought Plan decisions. The following examples demonstrate how we respond to reduce their impact and ensure adequate resilience in our supply system.

¹⁸ *Ibid.* 16

2.9.1 Algal blooms on reservoirs

The development of algal blooms on large storage reservoirs is not uncommon, particularly at times of high temperatures. They are unwelcome as they can put excessive load on treatment systems and pose a risk of taste and odour issues.

Sources and treatment facilities can usually be managed to mitigate their occurrence. However, in recent years very high ambient temperatures have contributed to earlier and more significant algal growth than we have historically observed.

In the summer of 2018, high temperatures combined with an extended, very dry period saw algal issues which tested the capacity of the local treatment works.

Testing the Plan:

We considered the impact of the 2018 algal bloom event on water availability in North Devon and assessed how it influenced our operational strategies for drought planning. This showed that there is an impact on the ability of some local treatment works to maximise output when needed in periods of high demand and impacting our ability to optimise sources in a drought if treatment processes are not adjusted.

Mitigation measures, operational improvements:

In response we have bolstered our local supply system to offset local supply risk to proactively mitigate the impact from algal blooms at the main North Devon reservoir. A major investment in 2019 saw the introduction of a water mixing and agitating system at this reservoir to prevent stratification, which encourages algal growth. To compliment this, we have invested in a specialist mobile treatment plant capable of removing the risk of unacceptable treated water quality.

From a drought planning perspective, we have reassessed the water resources strategy for the North Devon region and included a supply option for Slade Reservoir which could be made operational at short notice. The key learnings included in this plan have been to implement additional treatment technology ahead of need and make water quality a key item on the management agenda.

2.9.2 Spate events on rivers

Even in droughts, the south west can see short duration, but heavy rainfall events which can result in spate conditions on local rivers.

River water quality can deteriorate hugely at such times as major run off brings both inorganic and organic material into watercourses.

At such times we may be forced to temporarily shut down river intakes, putting pressure on our reservoir supplies to compensate. This is not commonplace but we have seen this more often in recent years as we experience heavier rainfall deluges associated with climate change.

Testing the Plan:

We tested our Plan against the short-term loss of key river abstractions which operate in the summer months and which are particularly important during dry spells. Such outage events caused by river spates are short-term but can lead to operational complications and increasing demand on local reservoir sources. Our drought planning assumes that loss of supply may occur, but any local stored water losses should be minimised where possible.

Mitigation measures, operational improvements:

As a mitigation measure, and to avoid a significant impact from a drought planning perspective, we have improved our winter maintenance activities at key river intakes to overcome degraded performance resulting from highly turbid water. We have also changed our operating rules for associated reservoirs to hold back water in storage and offset the impact of reduced river water availability. An example is our Gunnislake intake on the River Tamar which has an enhanced maintenance programme developed from our experiences since 2018. Additionally, this source is now brought into service earlier than historically to protect Burrator Reservoir, an important source for Plymouth. Starting Gunnislake abstraction earlier conserves water in Burrator Reservoir for use during spates when river water is of poor quality and Gunnislake abstraction is likely to need to reduce or cease. As part of our monitoring process, our 14-day production plan now routinely shuts abstractions ahead of any spate conditions if there is a DWI compliance risk.

Our new WTW supplying the Plymouth area has much better ability to treat poor quality water than its predecessor. This includes poor water quality resulting from spate events and also from high concentrations of organic compounds that tend to be present in the River Tamar and River Tavy in spring and early summer.

2.9.3 Poor groundwater quality

We have seen an intermittent deterioration in groundwater quality at two of our key East Devon abstraction boreholes in the last year which we have linked to spate events in the adjacent river and high intensity rain patterns. Although such events are less common in the high demand, summer months, if they do occur this can put short-term stress on our ability to supply water, leading to sub-optimal utilisation of resources.

Testing the Plan:

We tested our Plan by considering the impact of the loss of supply from the boreholes at key times during the high demand year of 2018. This revealed a potential local risk in the East Devon area.

Mitigation measures, operational improvements, root cause investigations:

To reduce this risk, we have adopted a multi-track approach by:

- a) Installing an ultra-violet treatment process to combat potential contamination concerns

- b) Investigating the pathways which poor quality groundwater is using to reach the affected boreholes
- c) A detailed operational manual to manage any risk in advance of need

The pathway investigation has involved both a detailed examination of possible contributing factors as well as a practical on-going study into the borehole inflow patterns during pumping. An improved understanding of how the poorer groundwater is entering each borehole should lead to options for borehole remediation later in 2021.

3. Drought actions

In this section we describe our:

- Drought actions for each WRZ at each drought level
- Demand-side drought actions
- Supply-side drought actions
- Support we can provide for private and non-public water supplies and environmental droughts

3.1 WRZ drought actions summary

This is a framework of possible actions. Actual actions will vary depending on a range of factors, including the specific drought situation, current water demand and time of year. Our response will include a combination of the actions listed in the following tables.

Once an action had been introduced, it will usually remain in place throughout more severe drought levels, until we have moved back into a less severe drought level.

The below tables help to demonstrate the following general principles which will be followed when implementing drought actions, but there may be occasions where a specific drought situation makes some options infeasible:

- Demand actions will be implemented ahead of supply actions at the same drought level
- Demand actions may take place proactively where feasible as a drought intensifies prior to drought triggers being met (internal company actions and media campaigns are likely examples)
- Timescales for implementation of supply actions will be planned so that the effect of implemented demand actions can be assessed to confirm that supply actions are still required
- Timescales to plan and implement supply and demand actions vary depending on the action and are detailed in Appendix 3. Testing drought triggers including during historic dry weather and our worked examples (Section 2 and Appendix 2) has helped confirm that these timescales are appropriate
- Supply actions which have high confidence of minimal environmental impact are also prioritised ahead of actions with greater environmental impact.

The actions below are referenced in the management and communications plan in Section 5.

Table 3.1: Colliford WRZ drought action summary

Severity of the drought	Drought Severity Level	Drought return period (years)	Demand side actions	Supply side actions**
Drought Plan	Level 1	>1 in 500	<ul style="list-style-type: none"> Enhanced media campaign Increased leakage control Enhanced pressure management Network optimisation 	
				Drought actions having a risk of minor environmental impacts: <ul style="list-style-type: none"> optimising sources outage Restormel annual abstraction increase*
Drought Plan	Level 2	>1 in 500	<ul style="list-style-type: none"> Temporary use bans Further enhanced media campaign Further increased leakage control Further enhanced pressure management Further network optimisation 	
				Drought actions having a risk of minor environmental impacts: <ul style="list-style-type: none"> Stannon daily abstraction increase*
Drought Plan	Level 3	>1 in 500	Non-essential use bans	
			All possible actions to avoid emergency Drought Orders: <ul style="list-style-type: none"> Demand-side drought actions listed in Appendix 4 	Drought actions having a risk of moderate environmental impact: <ul style="list-style-type: none"> Porth/Rialton All possible actions including Drought Permits and Orders having a risk of major environmental impact: <ul style="list-style-type: none"> Drought Permits and Orders listed in Appendix 4
Emergency Plan	Level 4	>1 in 500	Emergency Drought Orders (such as standpipes)	

* Level 1 to 2 Drought Permits are proposed in Colliford WRZ but these Drought Permits are unlikely to be needed unless the WRZ experiences an extreme drought (a drought with a 1 in 500 year return period or more severe). However, as Restormel is one of the largest WTWs in Colliford WRZ, further environmental studies and assessment underpinned by appropriate monitoring and stakeholder engagement is anticipated for the Restormel Level 1 Drought Permit.

** Where a Drought Permit is indicated, it may be determined that a Drought Order is required.

Table 3.2: Roadford WRZ drought action summary

Severity of the drought	Drought Severity Level	Drought return period (years)	Demand side actions	Supply side actions*
Drought Plan	Level 1	1 in 200 - 1 in 500	<ul style="list-style-type: none"> Enhanced media campaign Increased leakage control Enhanced pressure management Network optimisation 	
				Drought actions having a risk of minor environmental impacts: <ul style="list-style-type: none"> Optimising sources Outage Lyd to Roadford winter pumped storage (Jan-March)
Drought Plan	Level 2	1 in 200 - 1 in 500	<ul style="list-style-type: none"> Temporary use bans Further enhanced media campaign Further increased leakage control Further enhanced pressure management Further network optimisation 	
				Drought actions having a risk of minor environmental impacts: <ul style="list-style-type: none"> Slade Reservoir
Drought Plan	Level 3	>1 in 500	Non-essential use bans	
				Drought Permits and ordinary Drought Orders having a risk of moderate environmental impact: <ul style="list-style-type: none"> Challacombe Reservoir Meldon/Vellake to Northcombe abstraction Lee Moor Quarries
			All possible actions to avoid emergency Drought Orders: <ul style="list-style-type: none"> Demand-side drought actions listed in Appendix 4 	All possible actions including Drought Permits and Orders having a risk of major environmental impact: <ul style="list-style-type: none"> Drought Permits and Orders listed in Appendix 4
Emergency Plan	Level 4	>1 in 500	Emergency Drought Orders (such as standpipes)	

* Where a Drought Permit is indicated, it may be determined that a Drought Order is required.

Table 3.3: Wimbleball WRZ drought action summary

Severity of the drought	Drought Severity Level	Drought return period (years)	Demand side actions	Supply side actions*
Drought Plan	Level 1	1 in 200 - 1 in 500	<ul style="list-style-type: none"> Enhanced media campaign Increased leakage control Enhanced pressure management Network optimisation 	
				Drought actions having a risk of minor environmental impacts: <ul style="list-style-type: none"> Optimising sources Outage Bramford Speke & Stoke Canon
Drought Plan	Level 2	>1 in 500	<ul style="list-style-type: none"> Temporary use bans Further enhanced media campaign Further increased leakage control Further enhanced pressure management Further network optimisation 	
				Drought permits having a risk of minor environmental impacts: <ul style="list-style-type: none"> Hook Springs annual abstraction increase Wilmington Springs annual abstraction increase
Drought Plan	Level 3	>1 in 500	Non-essential use bans	
				Drought Permits and ordinary Drought Orders having a risk of moderate environmental impact: <ul style="list-style-type: none"> Abstraction of Wimbleball compensation flow when making supply releases
			All possible actions to avoid emergency Drought Orders: <ul style="list-style-type: none"> Demand-side drought actions listed in Appendix 4 	All possible actions including Drought Permits and Orders having a risk of major environmental impact: <ul style="list-style-type: none"> Drought Permits and Orders listed in Appendix 4
Emergency Plan	Level 4	>1 in 500	Emergency Drought Orders (such as standpipes)	

* Where a Drought Permit is indicated, it may be determined that a Drought Order is required.

Table 3.4: Bournemouth WRZ drought action summary

Severity of the drought	Drought Severity Level	Drought return period (years)	Demand side actions	Supply side actions**
Drought Plan	Level 1	>1 in 500	<ul style="list-style-type: none"> Targeted peak period media campaign Discussion with large commercial customer to time water use to avoid peak demand periods Enhanced media campaign Increased leakage control Enhanced pressure management Network optimisation 	
				Drought actions having a risk of minor environmental impacts: <ul style="list-style-type: none"> Optimising sources Outage
Drought Plan	Level 2	>1 in 500	<ul style="list-style-type: none"> Temporary use bans Further enhanced media campaign Further increased leakage control Further enhanced pressure management Further network optimisation 	
				Drought actions having a risk of minor environmental impacts: <ul style="list-style-type: none"> Wimborne
Drought Plan	Level 3	>1 in 500	Non-essential use bans	
				Drought Permits and ordinary Drought Orders having a risk of moderate environmental impact: <ul style="list-style-type: none"> Stanbridge boreholes
			All possible actions to avoid emergency Drought Orders: <ul style="list-style-type: none"> Demand-side drought actions listed in Appendix 4 	All possible actions including Drought Permits and Orders having a risk of major environmental impact: <ul style="list-style-type: none"> Drought Permits and Orders listed in Appendix 4
Emergency Plan	Level 4	>1 in 500	Emergency Drought Orders (such as standpipes)	

* There is currently a WINEP investigation on the Lower Avon. Until that concludes and given Natural England's concerns regarding the potential impacts of abstracting at high rates within the current licence limits during prolonged dry periods, as a drought develops we will consider options to abstract from alternative sources to the Lower Avon sites where practical. We will not use the supply-side extreme drought actions related to the Lower Avon River until we have completed the Lower Avon HRA Appropriate Assessment and the conclusions have been agreed with the regulators.

** Where a Drought Permit is indicated, it may be determined that a Drought Order is required.

3.2 Demand-side actions

As a drought develops the water environment will be subject to increasing stress; demand-side actions allow a reduction in abstraction and contribute to maintaining supply security. The first actions that we will implement during a drought are those which reduce demand while having a low impact on customers. Asking customers to voluntarily reduce their demand, in parallel with taking actions to reduce leakage and the amount of water we use, fall into this category and form our Level 1 actions described in Section 3.2.1 below. Section 5 sets out how this will be managed including the actions and process preceding Level 1.

If a drought continues, we may need to implement actions that further restrict water use. We aim to ensure that these actions are sensible and proportional to the risk, with Temporary Use Bans (TUBs) and Non-Essential Use Bans (NEUBs) identified as Level 2 and 3 actions and described in Sections 3.3 and 3.4 respectively.

When considering the imposition of any demand-side actions, we would examine any potential adverse effects on customers in the areas affected. We will seek to minimise disruption wherever possible and address any specific needs of sites such as hospitals, schools and critical national infrastructure. Section 5 sets out the management process for this.

Any demand-side actions that rely on behavioural change among customers must be well communicated to ensure success, so an effective communications plan is essential. More details of our communications plan are given in Section 5. Recent experience during both past droughts and the Coronavirus pandemic have shown the importance of clear, consistent messaging in engaging the public. Therefore, we will liaise closely with neighbouring water companies to coordinate messaging and improve the impact of communications campaigns.

It is important to consider how these actions will impact the peak demand we experience, our understanding of which we have developed with reference to UKWIR methodology (UKWIR, 2006)¹⁹. These options cover the demand of our customers, as well as our own usage and leakage control measures and are described in this section with further details given in Appendix 3.

It is extremely difficult to forecast the effectiveness of demand-side drought management actions compared to the potential increase of supplies provided by supply-side drought management actions. There is limited evidence available on which to base our assumptions, particularly given that the last time that demand restrictions were applied in the region for an extended period was in 1996. Much has changed since that time, of particular note is the level of metering which has increased significantly, and this adds additional uncertainty above that resulting from the difficulty of assessing the impact of past interventions. Because of this uncertainty we take a conservative view of the potential impacts to ensure that we do not overestimate potential savings.

¹⁹ UKWIR (2006), *Peak Water Demand Forecasting Methodology* (06/WR/01/7)

Our demand-side drought management actions are described below and in Appendix 3. The actions are presented under the level at which these actions will first be introduced, and they will be continued should higher level restrictions subsequently be required.

3.2.1 Level 1 actions

3.2.1.1 Enhanced media campaign

An enhanced media campaign will be implemented when Level 1 triggers are met. The purpose is to provide information on the resource position and the importance of voluntary reductions in water use.

We will adopt an agile communications strategy (described in Section 5). As the supply situation continues to deteriorate social media, radio, television, press publicity and direct mailing would be increased in frequency, and the message is hardened. Messaging would inform customers how they can reduce their water consumption. This messaging would be targeted both geographically and towards particular customer segments.

We will liaise with water retailers operating in our area to improve communication with business customers, ensuring appropriate and consistent messaging. Such activity could take the form of joint communications campaigns, or assisting retailers to develop clear, effective messaging for their customers. Details on how this will be managed is given in Section 5.

For the purposes of drought planning, we estimate that actions such as those above could give a demand saving of around 2.5%.

3.2.1.2 Company use of water

While appealing to customers to reduce their water consumption, it is important that we are also seen to be making efforts to do so. We use water for a variety of purposes at our sites and at the onset of drought conditions we will:

- Increase messaging to staff to reduce their use of water wherever possible
- Reduce, and suspend where appropriate, routine activities such as the washing of windows and buildings
- Suspend mains cleaning activity on the network that requires controlled releases of flushing water and would attract adverse comment from the public
- Review water consuming processes around our sites and try to identify those that can be scaled back or adapted to reduce consumption
- Review activities such as washing vehicles and filling fishponds and cut back to levels commensurate with road safety and animal health respectively.

The overall demand saving of this is likely to be relatively small, but it is important in helping us to more effectively engage our customers when asking them to reduce consumption. To place this in perspective, our own use of water in wastewater treatment works is approximately 15 MI/d from a total supply of 650 MI/d during summer peaks.

3.2.1.3 Leakage control and pressure management

During a drought we will increase our leakage control activity where it is practical to do so, prioritising work in the most drought stressed areas. This activity includes:

- Increasing the priority given to repairing customer supply pipe leaks to minimise losses and avoid visible leaks
- Increasing our leakage detection resources and mobilising additional leak repair gangs
- Bringing forward any pressure management schemes where practical
- Installing water meters into existing boundary boxes at unmeasured properties. The customer would continue to pay an unmeasured bill, but the meter would provide us with additional visibility of potential customer supply pipe leakage and plumbing losses, which we could then assist in resolving
- Within existing pressure management installations, reducing pressure to a lower level where it is possible to do so. Such opportunities are limited as we aim to set these to minimum acceptable levels to maintain suitable supply pressures for customers.

We have trialled this process during the 2018 and 2019 dry weather events.

In a drought, the further reductions related to leakage control and pressure management could currently be in the order of up to 5 Ml/d over a short-term period. However, as leakage is reduced in the future, further reductions during drought will become harder to realise and this potential saving is likely to reduce.

3.2.2 Level 2 actions

3.2.2.1 Temporary Use Bans

Triggers and estimated demand reduction

If the water resources situation has not improved after implementing Level 1 drought actions, we may need to implement Level 2 actions such as issuing a Temporary Use Ban (TUB). TUBs aim to reduce demand by temporarily restricting certain types of customer water use, mainly using hosepipes for domestic purposes. If the imposition of TUBs becomes necessary, we will follow the guidance contained in the UKWIR code of practice on water use restrictions (UKWIR, 2014)²⁰. The code outlines principles to ensure that restrictions are implemented in a transparent, consistent and proportionate manner.

Section 5 sets out how we would start the TUBs process during the management of Level 1 actions, so it is prepared in advance of need.

A TUB would typically be implemented when reservoir storages reach Level 2. However, many other factors would also be considered such as weather forecast, time of year, expected and actual effect of other measures implemented, number and location of

²⁰ UKWIR (2014), *Managing through drought: Code of practice for water companies on water use restrictions* (14/WR/33/6)

reservoirs with low storage, and availability of alternative sources. This means that reservoir storages reducing to Level 2 would not necessarily trigger implementation of a TUB in every scenario. For example, we are unlikely to implement a TUB if storage in one local reservoir has reduced to Level 2 but storage in all other reservoirs (including the WRZ strategic reservoir) in the WRZ remains significantly above Level 2. In this case we would be more likely to focus on redistributing water around the WRZ by e.g. implementing network changes.

We are also unlikely to implement TUBs during periods where it is expected to only result in minimal demand reduction, for example during cooler wetter weather in October to March (this indicative period may be extended earlier or later, e.g. due to weather patterns or high demand). Justification for not applying for a TUB when applying for a winter (supply-side) Drought Permit would be provided by an assessment of the minimal benefit in terms of expected demand reduction that is likely to be provided by the TUB due to e.g. weather conditions and demand (current, forecast, typical or projected).

Reservoir storages are reviewed weekly to daily depending on the current water resources position as set out in Section 5. Consideration of whether a TUB will be required would start as reservoir storages drop to Level 1 and/or the rate of decline in reservoir storage suggests there is a risk that storage could reach Level 2 in less than four to six weeks. If there is potential that a TUB will need to be implemented, preparations will commence.

We estimate that implementation of a TUB (during the summer) could reduce demand by 5%. This figure is consistent with that assumed in our WRMP and is in line with the findings from other parts of the country where hosepipe bans have been imposed more recently. UKWIR guidance (UKWIR, 2014)²¹ estimates restricting hosepipe usage results in a demand reduction of 5% – 9.5%. We assume that some of this demand reduction is attributable to the water saving media campaign prior to TUB introduction, with TUBs providing an additional 5% saving. There is high confidence that implementation of a TUB will result in a relative decrease in demand, although uncertainty remains regarding the extent, particularly due to the strong influence of other factors such as weather and peak tourist and holiday periods.

Demand restrictions are generally expected to be implemented over a whole WRZ. However, depending on the type of drought being experienced, there may be an occasion when it is appropriate to consider implementation of a TUB across a smaller or larger area. This may mean a more local area, across multiple WRZs, the whole company area, across the wider West Country Regional area (in alignment with TUBs imposed by Wessex Water and Bristol Water), or some other variation such as by county. The TUB area will be selected based on what will most effectively reduce water demand in areas where water resources are threatened and that can be clearly defined for customers to understand whether restrictions apply to them or not.

The regional co-ordination process is set out in Section 5.

²¹ *Ibid* 19

Legislation and notice

TUBs are authorised under Section 36 of the Flood and Water Management Act 2010, which specifies in Section 76(2) that the following uses of water may be prohibited:

- watering a garden using a hosepipe
- cleaning a private motor-vehicle using a hosepipe
- watering plants on domestic or other non-commercial premises using a hosepipe
- cleaning a private leisure boat using a hosepipe
- filling or maintaining a domestic swimming or paddling pool
- drawing water, using a hosepipe, for domestic recreational use
- filling or maintaining a domestic pond using a hosepipe
- filling or maintaining an 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.

In line with the legislation, any TUB will be advertised in at least two newspapers in the area affected as well as on our websites (www.southwestwater.co.uk and www.bournemouthwater.co.uk). This notice will include as a minimum: the date from which it applies, the area to which it applies, what uses are prohibited, any exceptions that have been applied, and details of how to make representations regarding the proposed restriction (to object or request an exception). An example TUB notice and representation form is provided in Appendix A3 Tables A3.6 and A3.7. The TUB notice has been developed in line with the UKWIR guidance (UKWIR,2014)²² and notices recently issued by other water companies (United Utilities, 2018).

Media engagement will have been taking place from the start of the drought. Prior to the TUB notice being issued, this will be updated so customers are aware of the possibility that a TUB may be issued, with the aim that this message will start three weeks prior to the TUB start date. The legal notice will be issued, and representations allowed at least one week prior to the planned TUB start date. This timespan may be longer where proportionate to the likely customer impact and interest balanced with the urgency of demand reductions required.

Section 5 sets out the process for communications and management.

Exceptions

It is expected that a TUB will prohibit all the uses specified in the Flood and Water Management Act 2010 (listed above) and all the statutory, discretionary universal and

²² *Ibid* 19

discretionary concessional exceptions listed in the UKWIR guidance (UKWIR, 2014)²³, but no additional exceptions will be applied. The exceptions are listed in Table A3.8.

The discretionary universal exceptions have been signed up to by all water companies and we believe most water companies would choose to apply most or all the discretionary concessional exceptions as well (e.g. United Utilities TUB notice, 2018). Exceptions often relate to health and safety considerations and the main difference between universal and concessional exceptions is to expand the exceptions that apply to Blue Badge holders, to also apply to customers on the SWW Priority Services Register. Other exceptions include purposes such as watering newly purchased plants or turf, where very low water use technologies are used, and to prevent or control the spread of invasive non-native species. Including these concessional exceptions on the TUB notice would mean these exceptions would apply without these customers needing to make representation to SWW, and the nature of the exceptions mean the impact on demand reduction is likely to be minimal.

We believe this will allow us to implement a proportionate approach which is reasonable and fair to our customers. Where possible we would also work with customers that appear to be breaking the TUB, to educate and persuade them to comply, rather than proceed directly to prosecution.

A long-term tracking survey of customers' views on temporary water use restrictions carried out between 2013-2017 indicated most customers felt any restrictions should treat people equally and share responsibility but if groups of customers were to be given exceptions, this should be people with a physical disability (62%) and the elderly (55%). This indicates customer preference alignment with our approach to the main concessional exceptions as detailed above.

Updating and adapting our approach

Earlier in the drought process, as part of preparing for the media campaign phase, customer research focussing on water restrictions would be carried out (see Section 5). The results of this will be reviewed along with any research available from other water companies and used to influence our TUB implementation approach, including appropriate exceptions and communication methods to ensure that restrictions are implemented in a consistent, proportionate and clearly communicated manner.

Prior to 2022 the last water restriction applied in the SWW supply area was in 1996. However, during the 2018 dry weather event a SWW TUB Working Group was formed and the TUB preparation process followed, including senior management liaison with the wider West Country Water Resources Group, in case a TUB was required. This group produced a draft formal TUB notice, representation form and process, approved exceptions list, FAQs and customer-friendly notice pdf for our website, and call centre briefing. It is expected that this material would be suitable for use in a future drought. As set out in Section 5 a Regional Working Group would again be formed as part of the preparation process to review and refresh these as required given the latest customer surveys, water company experience and UKWIR research to co-ordinate any response.

²³ *Ibid* 19

Communications

Full details of how the introduction, update and end of TUBs will be communicated to customers, other water companies, regulators such as the Environment Agency, other national water industry bodies, NAVs, water retailers for business and interest groups is provided in the communications plan (Section 5).

Ending TUBs

As the drought lessens and reservoir storages start to improve, the requirement to continue the TUB will be regularly reviewed. Typically, once reservoir storages in the affected area rise above Level 2, the TUB will be revoked. However, confidence is required that the reservoir storages will continue to rise and remain above Level 2 for the rest of the year (or normal time to refill), as revoking a TUB and then needing to reimplement it shortly afterwards would cause considerable disruption and confusion for customers. Therefore, when assessing whether to revoke a TUB, many factors such as weather forecast and rate of increase in reservoir storage will be considered and balanced with customer impact, but it is likely that a TUB will remain in place for at least a couple of weeks after reservoir storage rises above Level 2 to have confidence that the improvement will continue.

When the decision is made at the end of the drought to revoke a TUB, we will give notice of this in at least two newspapers in the area affected as well as on our websites (www.southwestwater.co.uk and www.bournemouthwater.co.uk). It is likely we would also use additional methods of communication in line with those used to originally advertise the TUB, such as social media and literature with customer bills.

If the situation has not improved after a TUB has been implemented, Level 2 supply-side Drought Permits will be implemented where appropriate. In practice it is likely that preparing for a TUB and preparing for a supply-side Drought Permit would take place simultaneously during Level 1 as reservoir storages decrease towards Level 2, but we envisage that a TUB would be in place for at least two weeks before the date a Drought Permit is expected to be issued, so that the impact of demand reduction measures introduced (including TUBs) have an opportunity to be measured. However, it is unlikely that the reduction due to each individual measure (e.g. TUB vs media campaign) will be able to be precisely determined, and changes in demand are likely to be strongly influenced by external factors such as weather and timing of peak tourist and holiday periods.

Note that key parts of the above process and communication needs are repeated in Section 5 for completeness.

3.2.3 Level 3 actions

3.2.3.1 Demand-side Drought Orders / Non-Essential Use Bans

If the water resources situation has still not improved after implementing all appropriate Level 2 drought actions, we may need to implement Level 3 actions such as applying for a Drought Order to restrict the non-essential use of water, otherwise known as a Non-Essential Use Ban (NEUB). This type of restriction is authorised by the Secretary of State

under Section 74 of the Water Resources Act 1991 and Drought Direction 2011. The uses of water which can be prohibited or limited are:

- watering outdoor plants on commercial premises
- filling or maintaining a non-domestic swimming or paddling pool
- filling or maintaining a pond
- operating a mechanical vehicle-washer
- cleaning any vehicle, boat, aircraft or railway rolling stock
- cleaning non-domestic premises
- cleaning a window of a non-domestic building
- cleaning industrial plant
- suppressing dust
- operating cisterns.

We have assumed that a demand-side Drought Order will result in a reduction in demand of 2.5% over and above the reduction produced by TUBs (UKWIR, 2011)²⁴. This figure is consistent with our WRMP and in line with the findings from other parts of the country where demand-side Drought Orders have been imposed more recently. There is high confidence that implementation of a Drought Order will result in a relative decrease in demand, although uncertainty remains regarding the extent, particularly due to the strong influence of other factors such as weather and peak tourist and holiday periods.

As set out in Section 5, consideration of whether a demand-side Drought Order will be required would start as reservoirs reach Level 2 and/or the rate of decline in reservoir storage suggests there is a risk that storage could reach Level 3, typically in less than four to six weeks. If there is potential that a Drought Order will need to be implemented, preparations will commence using a similar approach to TUBs.

Media engagement will have been taking place from the start of the drought. Prior to demand-side Drought Orders being imposed, this will be updated so customers are aware of the possibility, with the aim that this message will start three weeks prior to the Drought Order start date. The legal notice will be issued and representations allowed at least one week prior to the planned Drought Order start date. This timespan may be longer where proportionate to the likely customer impact and interest balanced with the urgency of demand reductions required. Through our continuing drought liaison with neighbouring water companies we will ensure that the communications each company provides are consistent and clear for customers across the region.

In line with the legislation, any demand-side Drought Order will be advertised in at least two newspapers in the area affected as well as on our websites (www.southwestwater.co.uk and www.bournemouthwater.co.uk). We would also use additional communication methods where appropriate and feasible, such as social media and literature with customer bills, to reach as wide an audience as possible. This notice will include as a minimum: the date from which it applies, the area to which it applies, what uses and any exceptions that have been

²⁴ UKWIR (2011), *Code of practice and guidance on water use restrictions* (11/WR/33/3)

applied, and details of how to make representations regarding the proposed restriction (to object or request an exception). In some cases, there could be a justified reason for an exception, such as on the grounds of health and safety.

We follow guidance from Ofwat regarding compensation available to customers if there are demand restrictions. This guidance can be viewed here:

<https://www.ofwat.gov.uk/households/supply-and-standards/standards-of-service/>.

As the drought lessens and reservoir storages start to improve, the requirement to continue the Drought Order will be regularly reviewed. Typically, once reservoir storages in the affected area rise above Level 3, the Drought Order will be revoked. However, confidence is required that the reservoir storages will continue to rise and remain above Level 3 for the rest of the year (or normal time to refill), as revoking a Drought Order and then needing to reimplement it shortly afterwards would cause considerable disruption and confusion for customers. Therefore, when assessing whether to revoke a Drought Order, many factors such as weather forecast and rate of increase in reservoir storage will be considered and balanced with customer impact, but it is likely that a Drought Order will remain in place for at least a couple of weeks after reservoir storage rises above Level 3 to have confidence that the improvement will continue.

When the decision is made at the end of the drought to revoke a Drought Order, we will give notice of this in at least two newspapers in the area affected as well as on our websites (www.southwestwater.co.uk and www.bournemouthwater.co.uk). It is likely we would also use additional methods of communication in line with those originally used to advertise the Drought Order.

3.3 Supply-side actions

The following sections set out the supply-side actions. The timing of these and delivery will be managed by the process in Section 5.

3.3.1 Optimising water availability using existing licensed, operational sources

Alongside actions to reduce demand, there are actions we can take to access additional water. Our first priority is to ensure we maximise capacity within our current permits for water abstraction. We do this by carrying out internal changes and actions to optimise the water available to us or by discussing possible water trading with third parties. We tailor our actions to the nature of the drought and the specific impact it may pose to our system.

These actions comprise a mix of initiatives to ensure treatment works outputs can be maximised and improve our capacity to move water around our network. These include:

- Carrying out treatment works maintenance where there is potential to increase works output capacity

As key treatment works processes are put under higher load their performance may decline and this may lead to a slight reduction in the works' ability to output at its design rate. Our in-house capability to carry out non-routine filter and clarifier cleaning has been specifically set up to minimise downtime of key plant and limit the impact on the treatment works. This has proven a major advantage,

particularly during periods of high demand, and contributed to low rates of both planned and unplanned outage.

- Making changes to the network to “rezone” a water supply system

Demand on a particular water resource or treatment works may be reduced and reallocated to a resource/treatment works which is under less pressure. Our Strategic Networks team have developed area plans where there are options for swift changes to a local network in such circumstances. An example of this occurred in the summer of 2019 during a period of high temperature and high demand. Our system is normally managed to use water from our Tiverton treatment works to support the North Devon area, but in 2019 we reversed flows to Tiverton at a time when North Devon had surplus water available.

- Temporary booster stations

Because of experience of the 2018 prolonged dry period, we have seen how the tactical use of temporary booster pumping stations can permit improved water transfers between supply areas. We have developed a series of boosters within mobile containers (known as “Hogs”) and installed connection points at potential drought pinch points in our network across the region. They can be rapidly deployed to an area as needed. We currently have 10 such temporary booster systems available with varying pumping duties to meet a range of required flows.

- Reducing treatment works losses

We are fortunate that the majority of our treatment works experience very low works losses (or process losses) as a result of improvements in site operation. This includes the re-use of backwash water which is now a common feature of our operations.

However, during times of drought we look at opportunities to reduce losses further if feasible. We currently have a programme to identify and signal which treatment works have an above average loss of water and this allows us to target sites particularly if we see deterioration in performance during droughts.

- Tankering to service reservoirs

If necessary, we have capacity to tanker treated water from a treatment works or a service reservoir into a neighbouring network as a temporary measure. This intervention is normally only employed as a result of an unplanned outage, or significant mains burst, but it is an option should we experience unprecedented demand. Tankering is not normally considered a standard response for periods of high demand but it can be considered as an option in specific circumstances.

- Support to or from other water companies

Occupying a peninsula, our SWW supply area has only one neighbouring water company, Wessex Water. We have very limited network inter-connection but share a resource in Wimbleball Reservoir. Bournemouth WRZ has borders with both Wessex Water and Southern Water and there are some arrangements for the transferring of water with Wessex Water. In addition, Southern Water and ourselves jointly supply a large commercial customer and there is potential to reduce our supply to this customer during peak demand periods if all parties are in agreement. Further information on how we are aligning our drought responses

both in terms of water availability and communication strategies is covered in Section 5.

Whilst the measures and actions described are early actions in response to a drought, we may also need to consider accessing additional sources of water as a drought deepens.

3.3.2 Accessing additional sources of water from disused or unlicensed sources

Our priority will be to implement actions which reduce the demand for water, but at each level of drought severity we have identified specific supply-side actions that we could consider which provide access to more water.

Our Level 1 to 3 supply-side actions are listed in Table 3.5 below, along with the drought severity when each drought action is likely to be required. See Appendix A3.2 for a summary of action selection (Levels 1 to 3, “More before 4” and discounted actions) and reasons for the order of implementation.

Table 3.5: Supply-side actions

WRZ	Option Number	Option Name	Drought Severity Level	Drought return period (years)	Action Type ²⁵
Colliford	C1	Restormel licence	1	>1 in 500	Drought Permit
	C2	Stannon Lake licence	2	>1 in 500	Drought Permit
	C3	Porth Reservoir & Rialton Intake	3	>1 in 500	Disused Sources
Roadford	R1	Lyd to Roadford winter pumped storage (Jan-March)	1	1 in 200 – 1 in 500	Drought Permit
	R2	Slade Reservoir	2	1 in 200 – 1 in 500	Disused Source
	R3	Challacombe Reservoir	3	>1 in 500	Drought Permit
	R4	Meldon/Vellake to Roadford	3	>1 in 500	Drought Permit
	R5	Lee Moor unused quarries	3	>1 in 500	Drought Permit
Wimbleball	W1	Brampford Speke & Stoke Canon (North Exeter boreholes)	1	1 in 200 – 1 in 500	Disused Sources ²⁶
	W2	Hook Springs licence	2	>1 in 500	Drought Permit
	W3	Wilmington Springs licence	2	>1 in 500	Drought Permit
	W4	Wimbleball compensation	3	>1 in 500	Drought Permit
Bournemouth	B1	Wimborne borehole	2	>1 in 500	Disused Source
	B2	Stanbridge licence	3	>1 in 500	Drought Permit

We do not propose any Level 1 supply-side actions for our Bournemouth WRZ. This is because this WRZ is different from our SWW WRZs in that it is considered more at risk from short, extreme spikes in demand which would require immediate action to address. There

²⁵ Where a Drought Permit is indicated, it may be determined that a Drought Order is required.

²⁶ We are in the process of applying for a licence variation to permit abstracting the water at the downstream river intake.

are no supply-side actions available to us which are suitable for such an event. Instead we have incorporated into the Plan specific demand-side actions which are detailed in Table 3.4.

Whilst the actions vary from WRZ to WRZ, they have all been selected because:

- a) They offer the best option for providing additional water whilst having acceptably low impact on the environment
- b) They are prioritised in terms of lower to higher environmental impact risk actions with respect to the increasing level of drought severity

In this way, we will only implement supply-side actions with a risk of higher environmental impact as a drought develops after applying actions with a risk of lower environmental impact. Actions to access additional water comprise of two approaches:

- 1) The re-introduction of our own disused, but licensed sources
- 2) Drought Permits to abstract water where no current licence is held.

Each action is described in more detail in Appendix 3. As part of the included information we have assessed expected yield, the time to implement and an indication of any associated environmental risks, for example, if they are likely to adversely impact downstream river ecology.

3.3.2.1 Disused, licensed sources

Our priority is to consider bringing a disused source back into service if this is practical in terms of timescale in the context of the drought. We understand that such an action could have the potential to pose a new risk to the environment as the source may not have been in use for many years. The Environment Agency expects companies to consider a “Risk of Deterioration” from reintroducing disused sources. Those disused, licensed sources which have been flagged as requiring investigations into the environmental consequence of their use are currently subject to Water Industry National Environmental Programme (WINEP) investigations due for completion in 2022. Should any of our disused, licensed sources be deemed to be unacceptable at their current licensed rates, some or all of the water would need to be accessed through a Drought Permit or Order.

The disused sources included in the Plan have been put at a drought severity level appropriate to our current understanding of impact, adopting a conservative approach where there is less certainty.

The supply-side actions for each WRZ that are disused, licensed sources are as follows:

COLLIFORD WRZ

Porth Reservoir and Rialton Intake

We have included the potential re-commissioning of Porth Reservoir and Rialton Intake, which would be used to supply the Newquay area at times of prolonged drought. This Level 3 option would only need to be considered for implementation in extreme droughts.

ROADFORD WRZ

Slade Reservoir

Slade Reservoir is a disused source in North Devon. The Environment Agency has confirmed that it should not be subject to a WINEP investigation for risk of deterioration. If we need to abstract from Slade Reservoir in a drought, we will work with the Environment Agency to agree conditions additional to those on the licence, for example making a suitable compensation release to provide flow downstream. The reservoir would supply water to our Horedown water treatment works supplementing that from Wistlandpound Reservoir. This is a Level 2 drought action and it is likely that we would need consider implementing it in droughts with between a 1 in 200 and a 1 in 500 year return period.

WIMBELBALL WRZ

Bramford Speke & Stoke Canon

Our Level 1 action for Wimbleball WRZ would be the re-introduction of two groundwater sources north of Exeter. The boreholes would be used to retain storage in Wimbleball Reservoir by allowing us to make lower supply releases when the River Exe is naturally at low flow. Although currently under WINEP investigation, their use is highly unlikely to adversely impact on the environment because:

- a) The sources will discharge to the River Exe. They will effectively provide river flow augmentation before the water is re-abstracted downstream where river flow is naturally higher.
- b) The boreholes will only operate when SWW is making supply releases from Wimbleball Reservoir.

We are in the process of applying for a licence variation to permit abstracting the water at the downstream river intake.

It is likely that we would need to consider implementing this drought action in droughts with between a 1 in 200 and a 1 in 500 year return period.

BOURNEMOUTH WRZ

Wimborne

We would consider recommissioning our abstraction from the Wimborne source in a Level 2 severity drought. The water would be used to reduce the existing supply to Wimborne and the surrounding area, freeing up water at times of peak demand. We forecast that the option would only be needed in extreme droughts.

3.3.2.2 Drought Permits

Drought Permits are short term authorisations to abstract water from a source where no permission currently exists, or where there is an existing licence but a change to the conditions of the licence is needed to access more water.

We recognise that Drought Permits can only be granted under specific circumstances and only following a period of abnormally low rainfall, referred to as an “Exceptional Shortage of Rainfall” (ESOR).

We have developed our Plan based on minimising the need for Drought Permits unless they represent a supply-side action which has a lower environmental impact compared to alternative actions at the same Level of drought severity.

Under normal circumstances, and in accordance with the drought planning guidance, we would not expect to apply for a Drought Permit unless a Temporary Use Ban (TUB) was already in place. The exceptions to this are winter Drought Permits where it is established that no demand reduction benefit occurs when restrictions are imposed in the winter months. There is also less potential for detrimental environmental impact at times of high flows.

The principal examples of this are our Drought Permit options for

- 1) Restormel Licence (Colliford WRZ)
- 2) Lyd to Roadford winter pumped storage (January - March) (Roadford WRZ).

Both are categorised as Level 1 options as they are unlikely to be environmentally detrimental.

Nevertheless, the River Lyd winter pumped storage (January – March) option is a relatively large-scale abstraction and we have carried out an extensive environmental assessment to confirm its acceptability.

The option was considered at length with the Environment Agency as part of Drought Permit pre-application discussions following a prolonged 18-month period of below average rainfall up to the autumn of 2019. In the event, application for the Drought Permit proved unnecessary due to Roadford Reservoir substantially refilling during October to December 2019 but it did allow us to prepare fully for the application and ensure we were “permit ready”.

The Environmental Assessment Report (EAR) for the option, which is discussed and summarised in Section 6, is available on request.

Whilst the River Lyd to Roadford Reservoir Level 1 drought option is estimated to be needed for droughts of frequency between 1 in 200 and 1 in 500 years, our Colliford WRZ is

assessed as more robust than the Roadford WRZ and the Restormel option is only likely to be required in extreme droughts. Following the planning guidelines, we have therefore not made the same level of permit preparations as compared to the River Lyd to Roadford Reservoir Level 1 drought option.

All our other supply-side Drought Permit actions included in the Plan are Level 3 actions and are only likely to be needed in extreme droughts.

3.3.2.3 Water quality risk assessment, Drinking Water Inspectorate (DWI)

We will carry out a full water quality risk assessment which we will provide to the DWI prior to re-introducing any source which has not been used for a significant period of time.

As we cannot predict when any disused source may be needed, we regularly undertake water sampling and quality checks. This information will feed into the risk assessment.

3.4 Supporting private and non-public water supplies

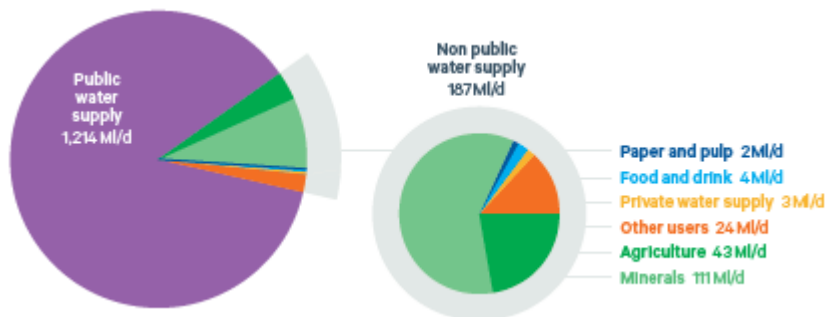
Across our operating areas there are people, businesses and farms that rely on their own water sources for essential use such as drinking and water for livestock.

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 and how reliable their sources are.

We do however know that only 1.3% of households in Devon and Cornwall have their own water supply. Unlike large agricultural abstractors in the East of England, the scale of non-public water supply is also relatively low in the West Country overall - see Figure 3.1 below from the West Country Water Resources Group.

Figure 3.1: Public and non-public water supply in the West Country (West Country Water Resources Group)



We already have practical experience of supporting non-public water supply in a drought. During the 2018 dry weather event, we had approximately 5 contacts from non-public water supply businesses who were struggling to get a reliable supply from their own sources. We

either connected them temporarily to our supply, provided bowsers or provided technical support to bring their sources back online.

During a drought, we would look to support failed private supplies where possible. Our Drought Plan tactical response is:

- We will assess each contact on a case by case basis
- We will assess the ability for SWW to either:
 - Connect a temporary supply to the SWW public water supply network, or
 - Provide Bowsers or Arlington's of potable water to their premises if the volumes needed are practical. These would be refreshed on a rolling basis depending on the need, or
 - Provide technical support to increase their raw water availability if their sources have failed due to low water levels, or
 - Provide bottled water if volumes are practical
- We will look to implement the recommended option.

The above will be subject to tests of practicality and reasonable cost. If solutions are not practical or reasonable cost, we will discuss possible options for the private supply with the owner or business.

3.4.1 Agricultural supplies

Depending on the nature of the drought, we will look to work with the National Farmers' Union (NFU) on any overall response needed for the agricultural sector.

We followed the communication, guidance and process produced by WaterUK and the NFU for the 2018 dry weather event. We would look to follow a similar co-ordinated response for agriculture if needed, within the constraints of the current public water supply system. This may include the provision of non-potable, raw water supplies for livestock if needed and practical.

3.5 Environmental droughts

Undertaking voluntary actions to help mitigate an environmental drought would be considered on a case by case basis; this will be agreed with the Environment Agency at joint Environment Agency and SWW Drought Plan meetings as set out in Section 5. If concerns regarding a particular location were raised by the Environment Agency, discussions between SWW and the Environment Agency would take place to identify and agree any appropriate actions that could be undertaken. These discussions would include evaluating the expected benefit to the environment and potential impact on SWW supply risk. For example, the Operating Agreements already allow the Environment Agency to request extra releases from specific reservoirs to benefit the environment, to be carried out at the discretion of SWW. In a scenario where local reservoir storage was sufficient to meet water supply for the rest of the reservoir drawdown period but there was low river flow downstream, it is likely that SWW would be able to agree to make additional releases from that reservoir.

We would normally expect to maximise our Lower Avon licensed abstractions before applying for Drought Permits. However, because Natural England have expressed concern over the possible environmental impacts of these licences during prolonged dry periods, we will work with them and with the Environment Agency during a developing environmental drought to consider the possibility of using alternative sources if practical to do so, for example making use of the Wessex to Bournemouth resilience transfer (if water is available) and/or bringing forward supply-side drought actions ahead of increasing Lower Avon abstraction including the Wimborne option.

The Wimborne supply-side drought option

The recommissioning of Wimborne groundwater source is a Level 2 supply-side option. However, should we identify during spring that flows in the Lower Avon are unseasonably low we will consider bringing Wimborne back into service before the Level 2 threshold in order to delay increasing abstractions under the Knapp Mill licence for as long as possible.

4. Extreme drought actions

In this section we outline:

- Our demand-side and supply-side actions in the event we are approaching a Level 4 drought.

As stated in Section 0, we define droughts that have a return period of 1 in 500 years or worse as extreme droughts.

As has been described in our Plan, the robustness of our supply system ensures that we are resilient to droughts categorised as Level 1, Level 2 or Level 3. Only for droughts with return periods beyond 1 in 200 years in our Roadford or Wimbleball WRZ do we forecast requiring any actions. Only Level 1 or Level 2 actions would be needed to make these WRZs resilient to droughts of 1 in 500 year severity (extreme droughts). Our Colliford and Bournemouth WRZs are resilient to droughts of a severity beyond a 1 in 500 year return period.

However, prudent planning requires some consideration of actions beyond Level 3 in order to ensure we would not have to resort to Level 4 measures such as rota cuts and standpipes. We consider such actions as unacceptable to our customers as stated in our Levels of Service.

Appendix 4 provides a list of potential actions we could consider after normal Level 3 actions had been implemented during an extreme drought. We have listed both demand-side and supply-side actions, but we would endeavour to pursue demand-side actions ahead of supply-side actions where it is feasible and logical to do so.

The actions selected and their management would be highly event specific. The management and communications structure has been designed to be agile and adaptable even to extreme droughts.

4.1 Demand-side actions

Appendix 4 includes a brief description of each action. As these actions are highly unusual and we do not have experience of their use, the amount of water saving they could lead to is unknown. In general, these actions are not WRZ-specific and could be employed across any or all zones.

Should conditions reach Level 4 severity, stronger messaging would most likely be the best option to produce rapid and positive changes in water use patterns.

Whilst our normal drought messaging would aim to educate customers over the need to save water and provide practical advice to help them to do so, under a more extreme drought situation we may use more aggressive messaging highlighting the risks faced. Examples of this include the Cape Town 'Day Zero' messaging used during 2017/18, and by the UK Government to highlight potential outcomes of breaking rules during the Coronavirus pandemic. This is seen in our communications plan (Section 5) where the messages become increasingly direct as the supply-demand risk increases.

4.2 Supply-side actions

Appendix 4 includes a brief description of each action, how and when it would be used, the approximate resource benefit it could yield and the lead time which would be required for it to be implemented. Information is also provided on risks, both environmental, logistical or technical, due to the nature of the works required. The actions are categorised by priority (High, Medium, Low), with those likely to present the least risk to the environment (High priority) considered ahead of other actions.

Prior to the implementation of an extreme drought supply-side action, baseline environmental monitoring and assessment will be undertaken. This will be triggered when strategic reservoir storage moves into Level 2 if the assessment indicates that supply side actions are likely to be required. The need for such actions will depend on current reservoir storage, time of year, environmental indicators and reservoir storage projections. At this point the suite of potential extreme drought supply-side actions will be reviewed to determine the most appropriate actions for the specific drought situation and the baseline monitoring and assessment associated with those particular actions will be started.

A number of these actions involve Drought Permits or Drought Orders and could pose a greater environmental risk than would normally be acceptable. In line with drought planning guidelines, only high-level assessments of environmental risk have been made at this stage. There is therefore no certainty that any of these permits would be needed or permitted. These actions are included to demonstrate that actions are available for consideration in a particularly extreme drought situation. As these will be highly specific, our Plan looks to manage these on a case by case basis.

5. Drought management structure and communications plan

In this section we describe:

- Our drought management structure and framework
- Drought management operation at each Drought Level (0-4)
- National and regional management coordination
- Our communications plan and framework
- Communication operation at each Drought Level (0-4)
- National and regional communication coordination
- Communication with specific groups and bodies including the Environment Agency
- Lessons learned from previous droughts

This section sets out the drought management structure and the communications plan.

These two elements are linked and should be read in tandem. The following flow chart provides a high-level summary of how the elements fit together. Appendix 2 gives worked examples of how the process set out below would operate in a practice.

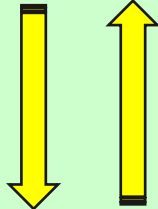
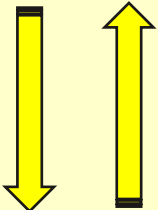
The Drought Plan is a tactical response. The following sections are written to align to this.

As droughts may cover more than our own operational area, details are given on how management and communications actions will be aligned regionally and nationally as needed.

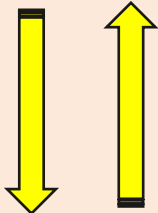
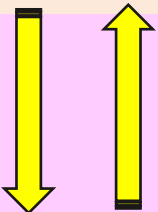
Appendix 2 gives worked examples on how the management would operate in practice.

The management process of dry weather is a continuum, but typically we would confirm the Drought Plan is fully active when Level 1 has been triggered on the strategic reservoirs in the SWW area, or for more than 1 week in Bournemouth WRZ. However, as the management process below shows, the management would have started in advance of this timeframe reflecting the lead time for actions.

Table 5.1: Summary of management structure and communications plan. The drought management process will de-escalate in the same structure

Drought Severity Stage	Level	Supply/Demand Actions	Drought Management - leading group	Communications plan (including Regional liaison)	Typical supply side actions & timelines	Typical demand measures & timelines (aim will be to remove restrictions if storage is above the drought trigger/demand is below the drought trigger for two weeks)			
						L1 Enhanced Media campaign	L2 TUBs	L3 NEUBs	Extreme Drought Actions
Normal operation stage	0	Actions as per drought triggers	<ul style="list-style-type: none"> Water Resources Group (weekly-monthly) 	<ul style="list-style-type: none"> Normal operation 	<ul style="list-style-type: none"> Typical 6-12 week lead time. Start dates worked back from need 				
	0		<ul style="list-style-type: none"> Silver Drought Group (weekly) 			<ul style="list-style-type: none"> Prep for comms (up to 8 weeks before L1) 			
	0		<ul style="list-style-type: none"> Silver Drought Group (weekly) 	<ul style="list-style-type: none"> Comms work commenced Customer research commences 	<ul style="list-style-type: none"> Apply for Drought Permits (4-6 weeks before need) 	<ul style="list-style-type: none"> Customer research on comms message (4 weeks before L1) 	<ul style="list-style-type: none"> Customer research on TUBs message (4 weeks before L1) 	<ul style="list-style-type: none"> Customer research on NEUBs message (4 weeks before L1) 	
Communications group formed									
Drought operation stage	1 (prolonged dry weather)		<ul style="list-style-type: none"> Gold Drought Group (weekly) 	<ul style="list-style-type: none"> Weekly comms group Drought liaison officer in place Regional water resource co-ordination in place 	<ul style="list-style-type: none"> Implement actions as per Drought Plan 	<ul style="list-style-type: none"> Implement comms plan For BW we may choose to implement the comms plan before entering L1 if weather forecasts suggest hot and dry conditions are expected. 	<ul style="list-style-type: none"> Prep for TUBs incl customer research (if L3 is 4-6 weeks away) Prepare to advertise TUBs (up to 3 weeks in advance) Advertise TUBs (at least 1 week ahead of need) 		

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Drought Severity Stage	Level	Supply/Demand Actions	Drought Management - leading group	Communications plan (including Regional liaison)	Typical supply side actions & timelines	Typical demand measures & timelines (aim will be to remove restrictions if storage is above the drought trigger/demand is below the drought trigger for two weeks)			
						L1 Enhanced Media campaign	L2 TUBs	L3 NEUBs	Extreme Drought Actions
	2 (drought)		<ul style="list-style-type: none"> Gold Drought Group (weekly) 	<ul style="list-style-type: none"> Daily comms group Specific team in place to deal with customer Q&As and representations LRF* liaison 	<ul style="list-style-type: none"> Implement actions as per Drought Plan 		<ul style="list-style-type: none"> Implement TUBs 	<ul style="list-style-type: none"> Prepare for NEUBs (if L3 4-6 weeks away) Prepare to advertise NEUBs (up to 3 weeks in advance) Advertise NEUBs (at least 1 week before need) 	
	3 (drought)		<ul style="list-style-type: none"> Platinum Drought Group (daily-weekly) 	<ul style="list-style-type: none"> Sub daily comms meetings Tailored comms for NEUB impacts Board level spokesperson for media 	<ul style="list-style-type: none"> Implement actions as per Drought Plan 			<ul style="list-style-type: none"> Implement NEUBs 	<ul style="list-style-type: none"> Prep for extreme drought and L4 actions (3-4 weeks away)
Emergency operation stage	4 (severe drought causing rota cuts)		<ul style="list-style-type: none"> Platinum Drought Group/ Emergency operation 	<ul style="list-style-type: none"> Emergency operation 					

* Local Resilience Forum

5.1 Management structure

This section sets out the management structure we will use during a drought.

This structure builds on experience of the hot dry weather in 2018 and during the parts of 2019 when we operated in line with our Drought Plan. It also draws on our internal procedures for incident management.

In doing so the Drought Plan structure mirrors existing operational procedures in terms of process.

5.2 Overall objectives of the management structure

The objectives of the management structure are:

- To be clear on roles and responsibilities
- To be clear on decision making routes
- To be clear on what we are doing to mitigate risks
- To ensure there is an overall co-ordinated, consistent management response to a drought
- To ensure the company can adapt as a drought develops and risks change
- To ensure actions are compliant with public health needs.

Our Plan has been structured to meet these objectives. Examples of past management activity are given in this section.

Note: whilst drought can often focus on the availability of water, the wholesomeness of water is equally important. The management structure includes Water Quality updates and expertise to ensure both quantity and quality of water is managed in our Drought Plan.

5.3 Management framework

Table 5.2 presents our overall framework for management structure for a drought event. It sets out the hierarchy and timing by which the structure will be implemented.

The management structure is structured around the phases of the drought with increasing management oversight seniority as the drought intensity increases.

This also gives a transparent process for the de-escalation of management oversight as a drought risk reduces.

The management groups are:

- **Water Resources Review Group (WRRG)** - this is the normal operational group that monitors water resources availability. This is attended by operational managers, water quality scientists and water resource planners.

- **Silver Drought Group** - this is the first specific Drought Management Group. This is comprised of department heads across all relevant functions.
- **Gold Drought Group** - this is an Executive Level group that is implemented when the first drought trigger is met.
- **Platinum Group** - this group will form if there is a potential need for Level 3 and/or Level 4 measures. The structure and attendance would be agreed with the Local Resilience Forum and other groups in affected areas as appropriate to the drought.

Appendix 5 sets out the detailed purpose and attendance of each group. The following sections set out how these will operate in this phase.

5.3.1 Isles of Scilly

The geographic location of the Isles of Scilly and their size makes water resources management distinctly different from the mainland.

Our current process is to manage these islands on the current pro-active basis. As with the other elements of drought planning for the Isles of Scilly, our communication strategy is covered in detail in our separate *draft Isles of Scilly Drought Plan* document.

Table 5.2: Management framework

Drought Severity Stage	Level	Forecast position	Reservoir control curve (as operated in 2018 & 2019)	Water Resources Review Group	Silver Drought Group	Gold Drought Group	Platinum Drought Group
Normal operation stage	0	No forecast of L1 or lower	A	✓ (lead)			
	0	Reasonable forecast of L1 or lower (within 8 weeks)	A	✓	✓ (lead)		
	0	L1 or lower forecast likely (within 4 weeks)	A		✓ (lead)		
Communication group formed							
Drought operation stage	1 (prolonged dry weather)	L1 or lower	B		✓	✓ (lead)	
	2 (drought)	L2 or lower	C		✓	✓ (lead)	
	3 (drought)	L3 or lower	D		✓	✓	✓ (lead)
Emergency operation Stage	4 (severe drought causing rota cuts)	L4	D		✓	✓	✓ (lead)

5.4 Normal Management Operation (Level 0)

Table 5.3: Normal management operation group meeting and frequency

	Management group	Meeting frequency
Water Resources Review Group	Yes	Monthly-weekly
Silver Drought Group	Yes, when forecast shows L1 likely	weekly
Gold Drought Group		
Platinum Drought Group		
Communications Group		

In this phase, no drought trigger levels have been reached and the water supply system is being operated normally.

During this phase we will operate our normal Water Resources Review Group.

The group will monitor resource and demand levels to balance the system to operating control curves, licence and system constraints.

The Group will forecast the resource position. If there is a reasonable likelihood that the first drought trigger may be reached within the forthcoming 8 weeks, the group will invoke the next phase of incident management.

This will be the formation of the Silver Drought Group.

This is a senior level Group consisting of 'Heads of Department' managers. The purpose of the Group in this phase will be to prepare the engineering, operational and organisational activities so they can commence if Level 1 is reached. This Group would meet weekly and agree the strategy and activities each week.

Liaison with the Environment Agency would commence if forecasts show that future drought triggers may be met (see Communications Plan).

Normal Operation

A range of activities carry on under normal operational processes to prepare for dry weather each summer. This includes, but is not limited to, clarifier cleans, pump refurbishment and network configuration updates.

The lead time can be months for some activities. This preparation does not form part of the formal Drought Plan, however decisions on what activities in the Drought Plan are instigated and when will be informed by this work.

For example, to enable drawdown of reservoirs to lower levels, we may need to obtain and install higher lift pumps. We may commence this work 6 months before a summer due to pump procurement times.

At this stage we may also commence activity to support future supply-side actions if we consider there may be a reasonable future risk to supply security, for example work on

preparing for a Drought Permit. This is because the lead in time for such actions may be many months. Appendix 2 gives some examples of how this would operate in practice.

5.5 Drought Management Operation Phase (L1 - Media Campaign)

Table 5.4: Drought management operation group meeting and frequency (L1)

	Management group	Meeting frequency
Water Resources Review Group		
Silver Drought Group	Yes (lead)	Weekly
Gold Drought Group		
Platinum Drought Group		
Communications Group	Yes	Weekly to twice weekly

This phase would be managed by the Silver Drought Group. The management would operate on a weekly basis. The supply-side and demand-side schemes set out in Section 3 would be managed through this process.

At this phase a specific communications group would be formed to manage the communications plan. This would meet weekly but may increase to twice weekly consistent with the communications plan timetable.

We would expect the National Drought Group activity to be more active at this stage. As mentioned in the communications plan a 'Drought Liaison Officer' would undertake the management of this activity. See communications plan for how this would operate.

At this stage we would develop a regional co-ordination group (see Appendix 5 Communications Plan for the link). Specifically, we would commence discussions with Wessex Water on joint operation of assets for the benefit of the region (see Section 5.11).

The Silver Drought Group would set out the approval process for activity needed between the SWW Executive and the SWW Board to ensure that decisions can be made quickly, for example any temporary changes to approval limits for expenditure.

If the drought looks likely to intensify, the Silver Drought Group would make recommendations for the implementation of Temporary Use Bans (TUBs).

This would be approved by the SWW Executive and the SWW Board. As the timing of the SWW Board may not formally meet in line with the need for decisions on TUBs, an exceptional meeting process would be invoked.

Note that from this stage onwards we would:

- Be communicating with the Fire Service on the actions we are taking, what they mean for water availability and water pressure. We adopted this process in 2018 and 2019 with weekly updates direct to the Fire Service. We would also provide a weekly LRF update at this stage (see Appendix 5 Communications Plan)
- Have formal liaison meetings with the Environment Agency. We would expect these to be once a week and then increase in frequency if the drought intensifies.

5.6 Drought Management Operation Phase (L2 – Temporary Use Bans)

Table 5.5: Drought management operation group meeting and frequency (L2)

	Management group	Meeting frequency
Water Resources Review Group		
Silver Drought Group	Yes	Daily
Gold Drought Group	Yes (lead)	Weekly
Platinum Drought Group		
Communications Group	Yes	Daily

In this phase demand restrictions would be required. The Silver Drought Group would move to daily operation. This process operated in 2018 and in 2020 during periods of very high temperatures and we have therefore tested this process in practice.

The Gold Drought Group would commence to oversee the strategic decision making. This reflects the intensification of the drought and the potential impact on customers and the environment. Actions in Section 3 would be followed.

The Gold Drought Group consists of SWW Board members and would therefore allow a direct communication with the Board on how the company is managing the drought.

At this stage, the communications group set up in the previous stage would move to daily meetings reflecting the increasing risk and the increased communications expected.

The communications plan detailed in this section sets out a specific team which would be set up to manage customer contact. This is the same process we adopt during other operational events.

If the drought was intensifying the Platinum Drought Group would be prepared ready for L3 operation. This would include early liaison with the Local Resilience Forum (LRF) on what the future may hold and to understand any issues that may need specific management.

Preparation for Non-Essential Use Bans, Local and National Environment Agency Liaison

During this phase the management structure would be examining future scenarios should the drought intensify. This would include the actions needed and the potential impact of further drought measures such as Non-Essential Use Bans (NEUBs).

We would expect at this stage that the Environment Agency's Drought senior management team would be in place. The Silver and Gold Groups would liaise with the relevant teams in the Environment Agency to co-ordinate any response.

We would expect at this stage that the management structure of the National Drought Group would be in place. Management attendance would be adapted for the relevant requirements, but we would expect Director or Board level attendance from L2 onwards - see also the communications plan.

5.7 Drought Management Operation Phase (L3 - Non-Essential Use Bans)

Table 5.6: Drought management operation group meeting and frequency (L3)

	Management group	Meeting frequency
Water Resources Review Group		
Silver Drought Group	Yes	Daily
Gold Drought Group	Yes	Daily
Platinum Drought Group	Yes (lead)	Daily-Weekly
Communications Group	Yes	Daily

In this phase significant reductions in water consumption are needed due to the dry weather. For this and all subsequent phases, should the drought intensify the Platinum management group would operate.

This group extends the Gold Group but to include relevant attendees from the LRF. This will enable the group to manage the impact across the different segments of service with as short and focussed a process as possible. Actions in Section 3 would be followed.

The exact attendees would be agreed depending on when and where we expect restrictions. Typically, though, this would include blue light services, health, local authorities, other utilities and any specific manufacturing businesses that may be affected. As a drought of this severity is likely to be geographically widespread this management structure would adapt to other processes that may also be put in place nationally.

Depending on the time of year and the severity of the drought this Group may meet daily or weekly. For example, the implications in school holidays or from tourism would be different from term time.

We already have experience of working with the LRF during exercises, but also more recently on the Exeter WW2 unexploded bomb in February 2021. We were also heavily engaged with the LRF G7 Summit planning.

5.8 Drought Management Operation Phase (“More before 4” / L4 - Drought Orders)

Table 5.7: Drought management operation group meeting and frequency (“More before 4”/L4)

	Management group	Meeting frequency
Water Resources Review Group		
Silver Drought Group	Yes	Sub-Daily
Gold Drought Group	Yes	Sub-Daily
Platinum Drought Group	Yes (lead)	Daily-Weekly
Communications Group	Yes	Daily

Level 4 measures would be deemed emergency operation. In this scenario bespoke management structures would be in place. We would also use this approach for the ‘more before 4’ actions set out in Section 4 as these actions will be specific to the circumstances.

We would expect the overall governance model to remain, but we would have specific cells for the areas that would be affected. The structure and attendance would be agreed for the specifics of the event and when and how emergency measures were to be put in place.

5.9 Management: National coordination: liaison with National Drought Group (and WaterUK)

Experience to date shows national co-ordination is important and we have included this in our management structure.

Liaison with the National Drought Group (and WaterUK) will be via a designated senior manager as the dry weather develops - the Drought Liaison Officer.

This would initially be via the Head of Water Resources to ensure that both operational and communications can be fed into the process. This would commence in Level 1 or as needed by the timing of the National Drought Group.

Director or Board level attendance would commence if:

- a) dry weather conditions indicate that Level 2 or higher drought actions may be needed, or
- b) there is a request for particular attendees from the National Drought Group.

5.10 Management: Regional groups: coordination

Analysis and reporting on the 2011/12 and 2018 dry weather events highlighted the success and importance of joint working between water companies and regulators. SWW is a core member of the West Country Water Resources Group, along with Wessex Water and Bristol Water. Throughout the drought we would be in regular liaison with this and neighbouring 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 (as shown in Section 5.5 above under the management actions in Level 1).

An important part of the management of the drought will be on whether there are regionally co-ordinated communication messages. This process is set out in the communications plan (Figure 5.1).

5.11 Management: Shared resources

Our operating area contains a number of shared water resources. The main ones are:

- Wimbleball Reservoir - shared with Wessex Water
- Bournemouth WRZ - Wessex Water resilience main - shared bi-directional transfer.

We are in regular contact with Wessex Water on both of these shared resources as part of the day to day operation. This is therefore well rehearsed operationally.

5.11.1 Wimbleball Reservoir

This is a joint resource on Exmoor which supplies both Wessex Water and SWW. During normal operations SWW resource modelling assumes that Wessex Water abstract their maximum licensed volume from Wimbleball.

At Level 1, we would commence discussions with Wessex Water on how the asset could be best managed across the region. This will be specific to the drought in question, but Wessex Water has confirmed that there are no Drought Permits in their Drought Plan relating to Wimbleball Reservoir.

Wimbleball Reservoir is an impounding reservoir with a pumped storage scheme. As part of our drought management response we would also look at how this is operated. This is normal business practice as each year Wessex Water and ourselves agree the pumped storage operation based on our respective resource projections.

5.11.2 Bournemouth WRZ - Wessex Water resilience main

Liaison between Wessex Water and ourselves for the preparation of this Plan has confirmed that when resource availability reaches Level 1, particularly in relation to Wessex Water's reservoir storage and annual licence trigger metrics, we would discuss relative water resource needs and availabilities for the coming months, and discuss potential operation of the bi-directional transfer to help with the regional water resource position.

Bournemouth WRZ's supply system is peak demand constrained and therefore we plan on the basis of a critical period demand, and drought triggers are demand based. These triggers are most likely to be crossed in the summer period, and so transfer availability to Wessex Water is more likely during the winter period or outside holiday periods.

Wessex Water would likely expect to take the water, if available, as the drought deepens. This would include looking at changes in the Bournemouth WRZ source mix if that could help release water to Wessex Water.

Bournemouth WRZ to Wessex Water

In terms of management, we will look to transfer up to 10 MI/d on average to Wessex Water, subject to short term peak demands and resource availability. This option will be discussed, and where possible, implemented prior to implementing Level 2 or higher drought actions. In the lifetime of this Drought Plan, we will have built a new WTW in Bournemouth. This can treat higher flows with poor raw water quality. Subject to water resource availability we will look to increase transfers above 10 MI/d to Wessex Water once the works is operational and if water quality standards and abstraction licence conditions can be met. This is likely to be outside the peak summer demand period.

Wessex Water to Bournemouth WRZ

In light of Natural England's concerns over the possible environmental impacts of the Lower Avon licensed abstractions during prolonged dry periods, they have suggested the need to consider alternative sources as opposed to increasing abstraction from the Lower Avon in an

environmental drought. This could include, for example, making use of the Wessex to Bournemouth resilience transfer ahead of increasing Lower Avon abstraction. However, use of the resilience main will depend on Wessex Water having water available to supply the transfer, which will depend on the individual drought being experienced and how it is affecting the Wessex Water supply area.

We have no direct transfer infrastructure with Southern Water, however we both have connections to supply a large industrial customer. As set out in the actions in Section 3, we would liaise with Southern Water on options to change the source mix to this customer. We would commence this at the start of Level 1 under the regional liaison.

5.12 Management: Liaison with Retailers

The management groups would include retailer attendance as needed. The communications plan sets out how retailer communications will operate.

5.13 Management: New Appointment and Variations (NAVs)

The management groups would include NAV attendance as needed. The communications plan sets out how NAV communications will operate.

5.14 Management: Lessons learned from previous droughts

Our management structure builds on experience from the dry weather events in 2018, 2019 and the hot spells during 2020.

Although we did not invoke our Drought Plan during these times, we operated to this structure as a precaution since the long-term weather patterns were signalling blocking high pressures (spring 2018) or we had atypical demand patterns (summer 2020) so we used the Drought Plan structure to formalise our response process.

Some of the learning points are:

- **Frequent, short meetings are key to give focus for decisions**
Having regular, focussed short meetings is vital for crisp decision making.
- **Data driven decisions**
The management meetings started with a situation report on resource and demand levels, weather forecasts and demand patterns. This is vital to make data based decisions.
- **Important to form the cross departmental group early**
Whilst many day to day operational decisions reside within the drinking water operational services, forming the overall management structure early was found to be highly beneficial. This is because it:
 - a) raised awareness across teams on the risks that may affect them in due course, e.g. household retail, and

b) uses skills from across the company to pool knowledge to ensure we have not missed a key element of preparation e.g. if we have a bill run, we can include communications in that at almost no cost.

- **Regular rhythm on reporting**

Unlike normal operational events, droughts develop over time. One of the key learning points from past dry weather events is to maintain the rhythm of situation reporting on weather conditions even if conditions improve temporarily. This discipline ensures the actions in the Drought Plan are tracked and delivered ahead of need.

- **Standard agenda**

We use a standard agenda for situation updates from each team. This ensures consistency of topic coverage at each meeting.

5.15 Customer Communication

The following sections set out how we will communicate in a clear and timely way with customers, partners, stakeholders and interested groups during a drought.

This communications plan builds on experience of the hot dry weather in 2018 and during the parts of 2019 when we operated in line with our Drought Plan procedure and best practice documentation.

This section includes some common text and processes developed with Wessex Water and Bristol Water relating to regional drought management.

5.16 Overall objectives of communications plan

The objectives of our communications plan are:

- To be early and proactive
- To be informative
- To be clear on what we are doing to mitigate risks
- To be clear on what is being asked of customers, retailers and stakeholders
- To link communication activities to drought triggers
- To be flexible and agile to deal with a range of drought events
- To be co-ordinated across the West Country Region or National requirements
- To treat all customers fairly and consistently.

Our plan has been structured to meet these objectives. Examples of past customer communication activity are given in Appendix 5.

All droughts are different. To reflect this our communications plan is a framework setting out how we will communicate and can adapt to the situation as it develops.

Specifically, in each phase of the communications plan, work is done to signal what may happen and develops the messages for that next phase.

This adaptive and agile communications plan can scale up or down messages depending on whether the drought is intensifying or reducing.

5.17 Overall communications framework

Table 5.8 presents our overall framework for the communications plan. It sets out a summary of the phases of communication that would be undertaken as a drought intensifies. It sets out how these link to the drought triggers and gives a summary of the frequency by which communication will be taking place.

The communications plan is structured such that as drought intensity increases, the communication:

- Increases the awareness on the severity of the position
- Increases the frequency of messaging
- Increases the communication on the formality of the measures
- Increases the co-ordination of measures across the region and nationally and with stakeholders.

A traffic light system will be used in the communications to highlight the water resource position. The steps in the communications plan are summarised in the following sections.

5.17.1 Timing of communications

In the communications plan below, we set out when we would prepare and when we would implement the communications messages around increasing supply or reducing demand. The overall approach to timing is that the messages for each drought trigger phase are prepared in the previous phase. The timings are set to give sufficient time for the work to be completed. See Table 5.8 for a summary.

For example, the customer research on communications messages would be undertaken 4 weeks before we hit the Level 1 trigger. This reflects that it takes 2 weeks for such research to be completed and therefore gives time for it to be developed and implemented.

We may flex the timings and do some activity early if there are particular issues, or to align with other company plans.

5.17.2 Use of best practice and international experience

We have structured the communications plan to be agile and embed best practice and learning from other countries.

CCWater - Understanding Drought and Resilience (2013)

The findings of this research were used to shape our communications plan. This includes:

- Customer attitudes toward drought - different customer segments have different attitudes. Prior to rollout of our communications, we test the messaging to different customer groups. We also set out that we will target specific segments e.g. specific non-household customer types. Example research from 2020 is given in Appendix 5.2.
- Restrictions and acceptability - the research showed a 'tipping point' on when demand restrictions become unacceptable. The communications plan is structured to undertake actions early to minimise the risk of severe restrictions. It also sets out why we are asking customers to undertake certain actions to avoid the more unacceptable restrictions. We have used this in communications campaigns in 2018 and 2019.
- Effective communication - a key conclusion from the report is highlighted below. In our communications plan we have built in messages at each stage on 'why' actions are needed. We set this out for each drought trigger.

There is a broad consensus on the acceptability of less extreme drought restrictions during drought periods IF customers are aware of water companies reasoning behind the restrictions

- Small and Medium Enterprises (SMEs) - the research highlighted the potential impact of demand restrictions on SMEs. In our communications plan we set out specific non-household liaison to develop the right messages for the different business sectors.

Language and terminology - droughts can invoke an emotional response and create perceptions. Our communications plan has built in this learning with a focus on facts on storage levels and information on water supply. This can be seen in the headline communications messages and approach.

UKWIR, Managing Drought - Code of Practice (2013)

This set out principles and actions for implementing drought restrictions (see below). We have included this in our communications plan principles and in the phasing and co-ordination of the communications.

For example, in our regional liaison we set out how we would look to align messages across the West Country and the South East.

Principles

Principle 1: Ensure a consistent and transparent approach

Principle 2: Ensure that water use restrictions are proportionate

Principle 3: Communicate clearly with customers and the wider public/users

Principle 4: Consider representations in a fair way

Actions

Action 1: Companies, regulators and government to work together

Action 2: Coordinate communications

Action 3: Adopt a common phased approach, considering socio-economic factors

Action 4: Adopt a common approach to exceptions

Action 5: Promote understanding and good practice

International drought experience

In developing our communications plan we have looked at international examples. We have included information from the World Meteorological Organisation (WMO) research on drought communication:

https://www.gwp.org/globalassets/global/gwp-cee_files/idmp-cee/how-to-communicate-drought-guide.pdf

Specifically:

- People respond to a good story - our communications plan tells a story as it develops
- Focus on the local and the big picture - our communications plan becomes more local and personal as a drought intensifies
- People are more likely to engage with messengers that they trust - our communications plan keeps a common spokesperson from the start
- Media interest will increase - media attention may increase rapidly, so our communications plan includes a specific team to meet the expectations and prepare activity in advance of need.

In each of the sections below we refer to where these actions have been included in the communications plan.

Table 5.8 Communications plan framework

Drought Severity Stage	Level	Forecast position	Reservoir control curve (as operated in 2018 and 2019)	Communications plan phases	Purpose	Typical comms frequency	Environment Agency Liaison frequency	Regional Liaison frequency
Normal operation stage	0	No forecast of L1 or lower	A	Normal operation	-	Monthly	-	
	0	Reasonable forecast of L1 or lower (within 8 weeks)	A	Early awareness phase	Raise awareness of dry weather	Fortnightly	Weekly written updates*	Weekly
	0	L1 or lower forecast likely (within 4 weeks)	A	Prepare for media campaign phase	Signal that we will be calling for reductions in demand	Weekly	Weekly meetings*	Weekly
Communication group formed								
Drought operation stage	1 (prolonged dry weather)	L1 or lower	B	Media campaign phase	Communicate resource position and call for restraint on demand	Weekly with messages updated every two days	Weekly updates increasing as needed	Weekly liaison
	2 (drought)	L2 or lower	C	Demand restrictions phase	Communicate formal restrictions on demand (TUBs)	Daily	Sub weekly	Sub weekly
	3 (drought)	L3 or lower	D	Severe demand restrictions phase	Communicate NEUBs and signal the possible need for emergency Drought Orders	2-3 times daily	Twice daily	Daily
Emergency operation stage	4 (severe drought causing rota cuts)	L4	D	Emergency Drought Orders phase	Communicate process for managing remaining supplies and public health needs	Bi-hourly or as needed	Bi-hourly or as needed	Bi-hourly or as needed

* We used this process during the dry weather of 2018 and 2019.

5.18 Normal communication operation (Level 0)

Table 5.9: Normal communication operation

Key messages	Raise awareness of dry weather and request customers to use water wisely to conserve stocks
Audience	Customers, no specific targeting
Geography	Whole company
Frequency	Fortnightly -> increasing to weekly
Signal demand restrictions	No
Traffic Light	Green (awareness)

In this phase, no drought trigger levels have been reached and the water supply system is being operated normally.

The communications plan adopts normal business messaging on water efficiency if there is no prospect of dry weather conditions that may cause drought triggers to be met.

Should reservoir storages start to drop significantly and should water resource projections show drought triggers may be met, the communications plan will commence activity to increase awareness of the dry weather and the potential need to save water. This will be done in two phases:

Early awareness phase –

If resource levels have a reasonable likelihood of hitting the first drought trigger in the **forthcoming 8 weeks**, the communications on dry weather will increase.

The primary communication message is to raise awareness of the dry weather and request customers use water wisely to conserve stocks for future months.

Messaging would be fortnightly.

This communication would include:

- **How the drought is developing** e.g. updates on rainfall, levels of water sources and demand
- **Information on the current drought status** - the Drought Plan and restrictions e.g. the local and national status
- **What we are doing to manage the situation** e.g. leakage reduction, treatment, resource availability
- **What we are asking customers to do and resources to achieve this** - e.g. water efficiency advice and access to discounted products
- **What their actions will help to achieve** e.g. if they save 5 l/day every day that saves enough water for another month across the region
- **Access to further information on water use and water saving** e.g. the information for schools on our websites.

Throughout the communications plan the above topics would feature in all communications. The emphasis for actions would increase as drought severity increases. For brevity the above topic headings are not repeated in the following sections.

The communication areas above build in the CCWater and international experience best practice on communications.

In this phase, communication will be done through a range of media channels including:

- Social
- TV/radio interviews
- Newspapers
- Website
- Proactive outbound media communications every week.

We will provide at least a fortnightly communications update to regulators and any National Drought Group information requirements.

We would commence weekly Environment Agency updates on our position at this stage, building on this process in the 2018 and 2019 dry weather events.

Prepare for media campaign phase –

If resource levels are likely to hit the first drought trigger in the **forthcoming 4 weeks**, the communication phase will move to signalling that a media campaign may shortly commence.

The primary communication message is to raise awareness that we have taken actions to increase resource levels and reduce demand but expect to hit a drought trigger. We will communicate that if this trigger is met, we will be asking customers to conserve water.

The frequency of messaging would increase in frequency from weekly to sub weekly as the drought trigger approached.

In addition to the above, this will include

- Paid for social media to target any particular hotspot areas
- More detailed communication to regulators on activities we are undertaking and our projections. This would include weekly Environment Agency meetings
- Deliberative research with customers to test future water saving communication messages.

We will provide a fortnightly communications update to regulators and any National Drought Group information requirements.

In this phase we would commence liaison with non-household retailers and NAVs to update them on the resource position and the next steps in managing the dry weather.

Communication focus - Deliberative Research with Customers

In preparation for a media campaign in this phase we would undertake deliberative research on:

- Information requested by household and non-household customers during dry weather
- The content and emphasis of water saving messages
- Temporary Use Bans (TUBs) and Non-Essential Use Bans (NEUBs).

In the former we will research which different behavioural change messages work best with customers. For example, loss aversion vs. halo effects. We will use this to develop the messages for the Media Campaign.

At this stage, if forecasts suggest formal restrictions on water use may be needed, we will undertake specific research on how these will be communicated and implemented. This will use our already prepared notices, exceptions and representation forms e.g. on TUBs we will test the wording of the notice and the wording on the exceptions form with customers.

We will use this to confirm our wording and process. We will do this in consultation with our neighbouring companies if they deem that they may need similar restrictions. As set out below if we consider that a shared common message will be needed then we will adopt that in our own operating area.

Typically, this research takes 2 weeks to complete. We would start this 4 weeks before the expected L1 trigger being met to give time for its implementation.

5.19 Drought communication operation phase (L1 - [enhanced] media campaign)

Table 5.10: Drought communication operation phase (L1)

Key messages	Provide information on the current and forecast resource position, what we are doing to manage resources and the importance of voluntarily conserving water to protect future supplies
Audience	Household customers update Non-household customer update Regulator update Stakeholders update Media update Start to segment users with separate communication messages for non-household and vulnerable customers
Geography	Whole company, media communication tailored to geography
Frequency	Weekly agreed communications plan with messages updated c. every 2-3 days
Signal demand restrictions	Yes, if demand restrictions look likely
Traffic Light	Yellow (early warning)

The media campaign will be implemented when the Level 1 drought trigger has been, or is about to be, crossed. Separate communication updates would be developed from this point onwards with each tailored to the audience (aligned to Section 3).

The primary communication message in this phase will be to provide information on the current and forecast resource position, what we are doing to manage resources and the importance of voluntarily conserving water to protect future supplies.

Depending on the forecast position, communication will also highlight what the future steps may be in terms of how we are managing the position and what customers, stakeholders and regulators can expect. For example, when we think TUBs may be needed and if so, in which WRZs and when.

The tone and content of the communication would reflect the findings from the customer research in the previous management phase. For example, research in 2020 showed that customers favoured messages on water saving related to the protection of key services like the NHS, ahead of protecting the environment. Our communication messages were adjusted to reflect this.

In this phase, the outbound communication would be companywide, but we would start to tailor the messages to local areas to make engagement more relevant. We would also develop specific communications for non-households and vulnerable customers.

For Bournemouth WRZ, we may choose to implement this campaign ahead of need if the weather forecasts show hot and dry weather may cause Level 1 to be crossed (see Appendix 2 for an example).

In this phase, the communications plan would operate as follows:

Management

- Communications group in place to set out weekly messaging. These will be agreed through the overall drought management structure
- Hold weekly updates with the Environment Agency communications team to agree any joint messaging and to align communication channels
- Liaise with WaterUK and the National Drought Group on joint messaging and campaigns. The Head of Water Resources role would undertake this and follow through subsequent phases of the drought - this helps give consistency of message (refer to best practice)
- Liaise with West Country Water Resources Group/neighbouring water companies to align messages as appropriate. We would form a group which would liaise on the communications and with other regions
- Brief the household retail team and call centre with a Q&A for customer contacts. Increase call centre resource levels to deal with extra contact volumes
- Engage with non-household retail partners and NAVs through a weekly liaison meeting to agree and implement a communications plan for business customers with specific focus on what different market segments may need to do. This will be done in an agile manner to reflect the potential impacts e.g. the effect on agriculture depends on the time of year
- Agree and implement a specific communications plan for vulnerable customers and what different customers need to do. This would use the priority services register as the basis for customer identification
- Hold internal weekly staff briefings on the resource position and development of drought champions in each directorate to promote internal activities to help conserve water.

Use of media channels

- Engage with the media channels on early drought messages and water efficiency e.g. information on our resource position and rainfall, offer employees for interview or site visits
- Communicate work underway on water efficiency, leakage reduction and early drought messages
- Update our website to have water saving messages on the landing page
- Update our billing landing page to direct customers to advice on water efficiency and the resource position
- Develop the communications campaign for TUBs should they be needed. This would include the Q&A, the process for exceptions and the use of the information from customer research
- Use of customer email and text messaging to outbound water saving messages
- Creation of an information hub for media to access to give the latest position and communications.

Stakeholder

- Update stakeholders on the resource position through a weekly outbound communication
- Update MPs, ministers, council CEOs and CC Water on impending drought status through one-to-one briefings. This would include detail of the next steps in our operation should the resource position deteriorate
- Work with key local and regional partners to promote the water resource position and the need for voluntary water saving messages using their channels to increase reach
- From this stage onwards we would be communicating with the Fire Service on the actions we are taking, what they mean for water availability and water pressure. We adopted this process in 2018 and 2019 with weekly updates direct to the Fire Service.

Monitoring of performance

During this stage we would monitor the weekly performance of the communications undertaken. This would include:

- Metrics on social media reach and engagement
- Metrics on website reach and engagement
- Collation and analysis of customer feedback.

This will be used to adapt the communications plan each week.

Appendix 5 includes an example of social media statistics from past dry weather events and also an example of the joint water efficiency promotion with the Royal Horticultural Society.

Communication focus - How we will communicate what we are doing during a drought

During 2018 and 2019 our dry weather messages communicated the actions we were taking - see an example in Appendix 5 in the outbound media messages.

In this phase our website, media and stakeholder engagement will all include updates on the actions we are taking to protect resources. For each channel we will include the same updates on what we are doing to:

- Reduce leakage e.g. increase in the number of gangs deployed, managing pressures
- Reduce our own water company use e.g. re-use effluent at sewage treatment works
- Increase resource availability e.g. installation of temporary pumps
- Increase network connectivity e.g. grid improvements

- Increase treatment works capacity.

Such actions will be communicated in a non-technical language that customers and stakeholders can relate to. For example, we have saved enough water to supply a [local town] with water for [number] days. Our experience from 2018 and 2019 dry weather events is such that examples are more helpful in the media than statistics about expenditure or job volumes.

As set out in the early communication phase, these messages would be used along with other information on what we are asking customers to do, within the context of the dry weather.

Water efficiency activity

During this phase, the communication will strongly promote water saving devices and measures to encourage customers to be more water efficient. This will include, but is not limited to, low flow showers, tap inserts and a programme of water audits to reduce water wastage. Further details on the actions are given in Section 3.

Customer communication and Temporary Use Bans (TUBs)

As highlighted above, in this phase if demand restrictions are looking likely we will develop the detailed communications plan for the implementation of TUBs. We would prepare if Level 2 looked like it would be crossed in c4-6 weeks to give time to prepare. We will look to advertise that a TUB may be needed up to 3 weeks before its implementation. Formal notice will be given 1 week ahead of implementation.

This communication will set out, for both households and non-households:

- Context - information on the weather to date and the resource position
- What a TUB is, why we may need it and where
- Who would be affected by a TUB
- How long we think TUBs will need to be in place for and how much water we hope they will save
- How we will communicate their implementation and the legal standing of TUBs
- What happens if it rains
- Where customers can get more information
- Treatment of exceptions.

Specific liaison and communication meetings with retailers would be undertaken at this stage. This would be used to develop a Q&A for non-household users who would be affected. During this phase we would also liaise directly with neighbouring companies and

at a national level to align any regional or national wording, processes and timings for implementation and following UKWIR guidance (14/WR/33/6)²⁷.

This communication would be the first step in the escalation of demand restrictions and increase focus on the specific actions to be taken by which individuals.

De-escalating communication messages

If forecasts show an improvement in the water resource position, the communication messages would adapt to the changing position. This would also occur, for example, as one is moving out of a drought.

5.20 Drought communication operation phase (L2 – Temporary Use Bans)

Table 5.11: Drought communication operation phase (L2)

Key messages	Customers must act now to conserve water due to the severe dry weather
Audience	Household customers update Non-household customer update Regulator update Stakeholders update Media update Public Services update
Geography	All company + targeted area
Frequency	Daily - weekly
Signal demand restrictions	Yes, formal restrictions in place
Traffic Light	Amber (act now)

The main communication message in this phase is customers must act now to conserve water due to the severe dry weather. Communications updates will move to a daily briefing and their tone will focus on specific conditions and actions needed.

In this phase formal demand restrictions on customer use will be implemented. When TUBs are introduced, statutory public notices will be included in the London Gazette and at least two regional newspapers giving at least seven days' notice. It will also be advertised on our websites (www.southwestwater.co.uk and www.bournemouthwater.co.uk).

Depending on the nature of the drought, this will be a company-wide communication or will be tailored to be specific to the area affected. Communication will increase to include letters and emails to all customers (household and non-household). It will also be advertised on our website and other media channels.

All communications in this phase will be reviewed sub weekly with neighbouring companies and / or national groups to use a consistent message and language as needed.

In this phase, the communications plan would continue the Level 1 process with the following changes, aligned to Section 3 actions:

²⁷ Ibid 19

Management

- Daily communication management meetings and outbound communication messages
- Specific full-time external media spokesperson
- Hold sub-weekly updates with the Environment Agency communications team for joint messaging and to align messages and communication channels
- Sub weekly liaison with neighbouring water companies to align messages as appropriate
- Daily communication briefing notes for the household retail team. Further increase call centre resource levels to deal with extra contact volumes. Specific communications teams set up for key work areas e.g. Priority Services, TUBs. Put in place dedicated call numbers for drought communication
- Daily communication meetings for non-household retailers
- Letters and emails to all customers setting out the position and actions taken and needed
- Prepare next communication messages for NEUBs.

Use of media channels

- Daily media updates communicating the position and work we are undertaking
- Use of wider advertising e.g. buses, television
- Use of 'social influencers' to promote water saving
- Update media messages based on feedback on what people are doing to save water. Use this to develop a halo effect.

Stakeholder

- Director or Board level attendance at the National Drought Group
- Update stakeholders on the resource position through a sub-weekly outbound communication
- Press conferences will be held
- Update MPs, ministers, council CEOs and CC Water on impending drought status through one-to-one briefings on the next phase of demand restrictions and company actions
- Commence detailed discussions with the LRFs on the water resource position and the next steps with a specific public services update
- Work with local organisations and stakeholders to help promote and enhance water efficiency in key target areas.

Monitoring of performance

- During this stage we would monitor the weekly performance of the communications undertaken. This will specifically focus on the implementation of the TUB and customer feedback.

Appendix A3 Table A3.7 includes an example notification of a TUB, which includes the agreed exceptions in line with UKWIR guidance²⁸, detailed in Table A3.8.

Customer communication and Non-Essential Use Bans (NEUBs)

In this phase if further demand restrictions are looking likely in 4-6 weeks, we will develop the detailed communications plan for the implementation of NEUBs that may need to follow. We will advertise that a NEUB may be needed up to 3 weeks before its implementation. Formal notice will be given at least 1 week ahead of implementation.

This communication will set out, for both households and non-households:

- Context - information on the weather to date and the resource position
- What a NEUB is, why we need it and where
- Who would be affected by a NEUB
- How long we think NEUBs will need to be in place for and how much water we hope they will save
- How we will communicate their implementation and the legal standing of NEUBs
- What happens if it rains
- Where customers can get more information
- Treatment of exceptions and how to make representations.

Communication focus - Non-Essential Use Ban (NEUB)

In preparation for a NEUB, customer research will be undertaken to review the work undertaken in the Level 0/1 phase. This will research:

- Customer messaging on what a NEUB is and why it is needed
- Who will be affected by a NEUB
- Q&A for NEUBs

The communications plan in this area will be developed in conjunction with non-household retailers.

This will be commenced at the start of the L2 process, or 4 to 6 weeks prior to need, depending on which is earlier. This will allow the information to feed into future outbound

²⁸ Ibid 19

communication. Typically, this research takes 2-3 weeks to complete and the start date will be set on this basis working back from when NEUBs may be needed.

De-escalating communication messages

If forecasts show an improvement in the water resource position, the communication messages would adapt to the changing position. This would also occur for example, as one is moving out of a drought. As set out in Section 3, notice will be given in the London Gazette and at least two local newspapers of the rescinding of the TUB. Typically, we would expect to do this once storage levels are above (or in the case of Bournemouth WRZ, demand levels are below) the L2 trigger for two weeks.

5.21 Drought communication operation phase (L3 - Non-Essential Use Bans)

Table 5.12: Drought communication operation phase (L3)

Key messages	The dry weather is exceptional requiring significant cuts in water consumption
Audience	Household customers update Non-household customer update - specific business update Regulator update Stakeholders update Public Services update
Geography	All company + targeted area
Frequency	Daily - weekly
Signal demand restrictions	Yes, formal restrictions in place
Traffic Light	Red (urgent)

The main communication message in this phase is that significant cuts in water consumption are needed due to the exceptionally dry weather. Communications updates will move to a sub-weekly briefing and their tone will focus on specific conditions and actions needed.

In this phase formal NEUBs will be implemented. Statutory public notices will be placed in the London Gazette and at least two regional newspapers, giving at least seven days' notice.

A drought of this nature is likely to be affecting the region and liaison with neighbouring companies will move to a daily briefing. We will look to share messages and use common information to customers.

This will be a severe event and communications with regulators would be expected to move to a twice daily communications briefing.

In this phase we would implement a specific media team to manage outbound communications. A Board Level spokesperson would be in post to undertake the external interviews that might be expected.

Highly tailored communications would be in place for non-households affected by the NEUBs. Site specific communications arrangements would be put in place.

This process would follow the actions in Level 2, but with the following additions:

Management

- Specific communications team to manage media liaison
- Board Level spokesperson for media interviews
- Standalone team for managing customer queries, exceptions and feedback on NEUBs
- Liaison and co-ordination of communication messages with the National Drought Group as per any requirements at that time.

This process would follow through into the Extreme Level 3 ('More before 4') and Level 4 activities. These would be prepared typically 3-4 weeks before Level 4 triggers may be hit.

De-escalating communication messages

If forecasts show an improvement in the water resource position, the communication messages would adapt to the changing position. This would also occur for example, as one is moving out of a drought. As set out in Section 3, notice will be given in the London Gazette and at least two local newspapers of the rescinding of the NEUB or other actions. Typically, we would expect to do this once storage levels are above (or in the case of Bournemouth WRZ, demand levels are below) the L3 trigger for two weeks.

5.22 Drought communication operation phase ("More before 4" / L4 - Drought Orders)

Table 5.13: Drought communication operation phase ("More before 4" / L4)

Key messages	Society-wide action needed to conserve water stocks
Audience	Household customers update Non-household customer update - specific business update Regulator update Stakeholders update Public Services update
Geography	Whole company + targeted area
Frequency	Sub-daily
Signal demand restrictions	Yes, formal restrictions in place
Traffic Light	Black (severe)

"More before 4" / Level 4 measures would be deemed emergency operation. In this scenario bespoke communications plans and structures specific to the circumstance would be put in place.

It will be highly localised and will need to be co-ordinated with care and precision with other organisations.

The management structure above shows that at this stage the LRF will already have been brought together to give a co-ordinated response against all services.

Examples of the options are given in Appendix 4.

5.23 National communication coordination: National Drought Group (and WaterUK)

Liaison with the National Drought Group (and WaterUK) will be via a designated senior manager as the dry weather develops. This would initially be via the Head of Water Resources to ensure that both operational and communications can be fed into the process.

The drought status and communications would be shared with the National Drought Group to the timings they need. Any additional information requests would be provided as requested. Where National Messaging is to be used this would be incorporated into the local communication, for example using the headlines from any national campaign to link local communication messages.

Director or Board level attendance would commence if:

- a) Dry weather conditions indicate that L2 or higher drought actions may be needed, or
- b) There is a request for particular attendees from the National Drought Group.

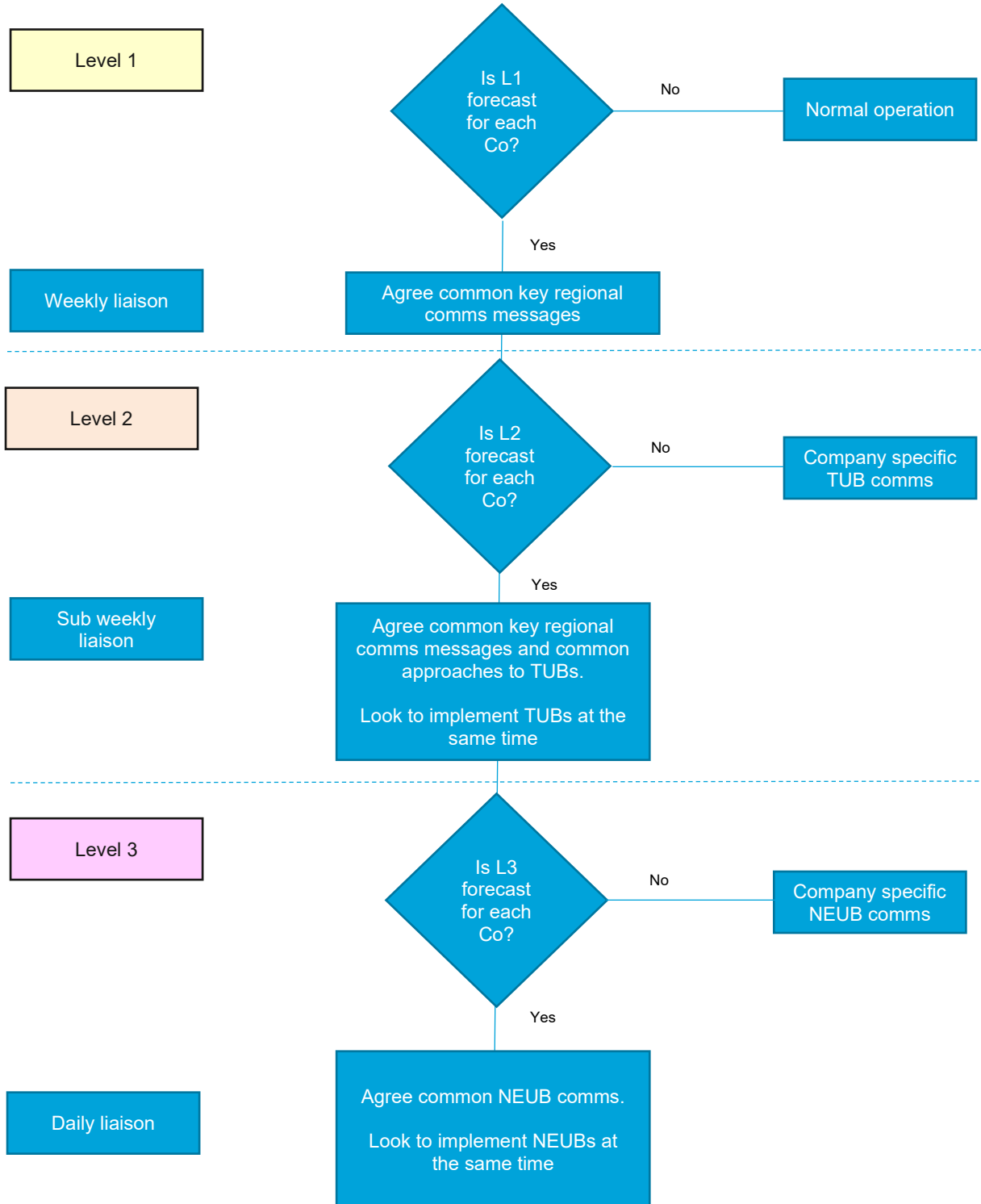
5.24 Regional communication coordination: liaison with Regional Groups

Analysis and reporting on the 2011/12 and 2018 dry weather events highlighted the success and importance of joint working between water companies and regulators. SWW is a core member of the West Country Water Resources Group, along with Wessex Water and Bristol Water. 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 (as shown above under the management actions in Level 1).

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 drought 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. Figure 5.1 shows the proposed approach for the West Country Water Resources Group.

As each system is likely to respond differently coming out of a drought, we would look to relax demand restrictions on a per company basis in order that customers only receive restrictions for the shortest possible time.

Figure 5.1: Aligning customer messages across West Country Water Resources Group



5.25 Regional communication coordination: links with Southern Water and Wessex Water

The Bournemouth WRZ receives sewerage services from both Southern Water and Wessex Water. In this region, customers can also receive TV channels or other media that may be either for the West Country or the South East.

During dry weather Bournemouth WRZ customers could therefore experience messages from up to three different water companies via the media due to the geographic location.

During a dry weather event we would work with Wessex Water and Southern Water as part of the Regional Planning groups (see Section 5.10 and Figure 5.1) to agree overall messaging in this area.

This may be to align messages in Bournemouth WRZ to those of Wessex Water or Southern Water, or, as has happened in 2018, we would contact our customers with a specific update on what they may be seeing in other regions and what it does, or does not, mean for them. For example, if Southern Water had implemented a TUB but one was not needed in the Bournemouth WRZ.

As a drought develops, this invariably leads to increased communication with our customers. The measures described in Sections 5.26 to 5.33 demonstrate our capacity for dealing with the additional customer contacts.

5.26 Communication: liaison with Retailers

In each of the phases highlighted above, we would liaise with the non-household retailers in the region on the dry weather position.

This would commence in the lead up to L1 and the media campaign to raise awareness and set out our plan. In L1 we would have weekly meetings with the retailers to agree the communications plan. Specifically, this will tailor messages to their specific market segments and would be organised with our wholesale service desk operation.

For example, in 2018 we had specific advice for farmers who may be on public water supply and their own supplies.

The communications would be developed with and sent out to all Retailers so that there was a level playing field, in that all Retailers are being communicated with and treated in the same way.

5.27 Communication: New Appointment and Variations (NAVs)

At the time of this final Drought Plan, we have 4 waste water new appointment and variations in our operating areas. During dry weather we would liaise directly with the service provider on the actions needed.

5.28 Communication: informing special needs and vulnerable customers

The process outlined above brings in specific communications to support special needs and vulnerable customers from L1. This would give tailored communications and support to these customers. This would cover:

- Customers on our register of Priority Services customers in our region
- Customers with medical conditions requiring a constant supply of water would be prioritised
- Specific contact with hospitals, nursing and care homes and special schools in the region to offer support for our most vulnerable customers.

As a drought intensifies, the communications will adapt to become more specific on what is needed for different customer segments.

A specific team will form at the onset of L2 restrictions to cope with the increased likely contact as demand restrictions increase. This team will develop the specific communications plans needed for local needs such as hospitals.

5.29 Communication: Contact Centre management

As a drought intensifies, we would expect increased call volumes from customers. In each of the phases above, call centre resource would be increased and structured to deal with each escalation of the dry weather. Specifically:

- Our Customer Contact Centre is required to be able to respond to increases in contacts due to issues such as operational emergencies
- There is capacity within the Exeter site to handle increases in calls from customers
- We have dedicated teams for both SWW and BW areas that would deal with contacts from each area
- Any further customer contact demand can be managed through the Water Force industry arrangement which provides offsite overflow call handling capability
- We have capacity to support an increase in written contacts as a result of any restrictions.

5.30 Communication: information available for press and media

It is imperative that communications in dry weather are informative. To aid this process at L1 we will create a media hub to give access to the latest information on the drought.

This will include information in each of the topic areas set out at the start of this section. For example:

- **How the drought is developing**
e.g. updates on rainfall, levels of water sources and water demand

- **Information on the current drought status**
e.g. current status in our Drought Plan, images on current reservoir levels, Environment Agency drought status, simple reservoir graphs, what the next steps would be
- **What we are doing to manage the situation**
e.g. information on work on leakage reduction activity, new water resources, reducing our own water use, work with other companies, increasing treatment capacity
- **What we are asking customers to do and resources to achieve this**
e.g. copies of the communications to customers, what the 'ask' is of customers
- **What their actions will help to achieve**
e.g. communications on how savings will affect the future water resource position
- **Access to further information on water use and water saving**
e.g. the information for schools on our website, information on work with stakeholders

5.31 Communication: data and information sharing with the Environment Agency

Our communications plan includes regular liaison with the Environment Agency. This would be at both local and national level, and with the technical and communications teams. The frequency of communication will increase as the drought intensifies. As we come out of the dry weather, we will gradually reduce the liaison as the dry weather risk reduces.

We will provide pro-active updates on the position and what our plans are during the dry weather. This builds on learning from 2018 and 2019 where we provided weekly updates on work done and next steps.

We will provide more technical detail on our activities and plans than we would include in the outbound customer or stakeholder communication. This will enable the Environment Agency to have greater understanding of what we are doing.

We would expect this to include, but not be limited to, data on:

- Current resource position and current water demand
- Forecast resource position based on rainfall and demand scenarios
- Information on activities to reduce leakage and increase resource availability
- Information on past and planned communications
- Information on regional co-ordination
- Specific information on any Drought Permits and/or Drought Orders.

As highlighted in the process above we would look to align communications messages with the Environment Agency during the process so that a common, outbound message is given to the media.

5.32 Communication: compensation - process and communication

People who suffer loss or damage as a result of a Drought Order are entitled to compensation subject to certain qualification criteria. 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
- 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 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. Other compensation would be paid in line with existing guaranteed standard schemes. This is available on the SWW website.

As part of our communications plan, this information would be sent to those affected in advance of any Drought Orders (by email and mail). It would also be communicated on our website. The customer communications team would process any replies to keep a consistent and common approach to all those affected.

5.33 Communication: lessons learned from previous droughts

In building the communications plan we have taken learning from past events and used the findings from the Consumer Council for Water and UKWIR reports on past events.

We saw prolonged hot and dry periods in spring and early summer 2018 and into 2019. We also saw hot weather events in 2020 in May and August. This has given us practical insight to shape this communications plan on what works well and where to focus messages and attention.

Lessons learned from our experience are:

- **Importance of early forecasting of water resource position**

Early forecasting of the supply demand position is vital. Our experience shows that we need to start the communications plan process around 8 weeks before we may hit drought triggers. This is to give sufficient time to prepare work in advance of need.

- **Importance of implementing the management structure and enhanced reporting**

Our experience of 2018 and 2019 was that the management structure is vital to be in place as per the Drought Plan process or earlier. This is both to ensure a rhythm in the communications and ensuring consistency of messaging.

- **Communication with other stakeholders**

As a drought begins to develop, making early contact with stakeholders such as the Environment Agency or local media ensures that communication channels are opened for constructive dialogue. We have built this into our timing and communications process.

- **Learning from other companies**

In recent dry weather events, we have worked with other companies to share our respective communications approaches. For example, in 2018 we worked with United Utilities on their TUB communications to understand what they learnt in order to incorporate this into our preparations at that time. We have built this into our communications plan with the regular contact with neighbouring companies and WaterUK.

- **Media understanding of dry weather**

We undertook a wide range of media interviews during 2018, 2019 and 2020 related to dry and hot weather. A key learning was that the media works best when the communications messages and interviews focus on how the water supply works and why we are asking for restraints on water use. Another key learning point was the use of interesting facts to place the problem in context e.g. Roadford Reservoir contains the equivalent of 3 billion cups of tea, or we saw a demand increase equivalent to two cities the size of Exeter. This is because it allows a more informative use of infographics for their stories.

- **Single spokesperson with the media**

A single spokesperson with the media allows the communications to be consistent in terms of style and also develops familiarity with the public as they see the situation develop.

5.34 Testing our Drought Plan

This Drought Plan is a tactical plan on how we will manage a drought. Testing how it operates in practice is important to ensure it is fit for purpose.

We have implemented our previous plan structure in 2018 and in 2019 due to the dry weather. This completed up to Level 2 operation, but we did not need to implement TUBs, however all information and process was completed. We are therefore confident the overall structure works in practice.

We have built the learning from those events into this Plan.

The summer of 2021 saw high demand due to Covid restrictions resulting in high tourist numbers (from increases in staycations). We will use this experience to test our Plan up to

Level 3 including role playing for aspects not covered operationally. We will update the Environment Agency on the progress of this test and any changes to this Plan that may be required as a result.

We do not intend to test Level 4. We already role-played with LRFs in 2020 on a national emergency simulated event in Devon and also in day-to-day event management we work with the LRFs (e.g. Exeter WW2 unexploded bomb in March 2021).

6. Environmental assessment

In this section we:

- Give an overview of the environmental assessment process
- Describe environmental assessments of Drought Permit schemes

6.1 Environmental overview

Section 6 considers the potential environmental impacts of our Plan and any proposed supply-side drought management actions. It is not intended to address “natural” environmental effects of the drought itself.

This section has made use of several key documents provided by the Environment Agency as follows:

- Environment Agency Water Company Drought Plan guideline December 2020 UPDATE_FINAL
- Drought permits and orders guidelines_2020draft final_OCT 2020 (supplementary guidance from the Environment Agency and Department of Environment, Food and Rural Affairs).
- Environmental assessment for water company drought planning supplementary guidance (July 2020) - External guidance: LIT 55303.

Within a Drought Plan, water companies must include an environmental assessment of the effects that planned actions will have on the environment. Companies must also consider whether the Plan or individual drought actions require a Strategic Environmental Assessment (SEA) or Habitats Regulations Assessment (HRA).

Under normal or non-drought conditions, the SWW and BW areas are robust and operated with sufficient supply-side surplus that some licensed abstractions are required only infrequently or at a lower capacity than permitted. In the event of a drought, we will make fuller use of available, permitted resources but still remain within the acceptable environmental limits already prescribed under the permitting regime.

The SWW and BW areas contain a range of designated sites with illustrative WRZ maps included within Appendix 6.

Strategic Environmental Assessment (SEA)

Whilst a SEA is not automatically required, Drought Plans are a statutory requirement. SWW must therefore undertake SEA Screening and consult with SEA Statutory Bodies to determine whether further assessment is required.

A SEA Screening exercise and determination has been produced taking a proportional approach to the Plan and the 15 Level 1 to 3 supply-side drought actions contained within it. The report, available upon request, provides further detail and has been updated after consultation and feedback from the regulators – the Environment Agency, Natural England and Historic England. It has determined that a full SEA is not required for the Drought Plan.

Habitats Directive and Water Framework Directive sites

During the SEA Screening process, a subsequent Habitat Regulations Assessment (HRA) was identified under Article 6(3) of the *Habitats Directive (Council Directive 92/43/EEC)*.

An initial HRA Screening exercise and determination was, taking a proportional approach and providing further detail for consultation produced. The assessment and production of Screening Assessment tables determined no Likely Significant Effects (LSEs) present within the Colliford, Roadford and Wimbleball WRZs from the Drought Plan (see summary in Table 6.1).

Table 6.1: HRA Screening Determination summary

WRZ	No.	Drought action	Screening Determination
Colliford	C1	Restormel licence	No LSEs
	C2	Stannon Lake licence	No LSEs
	C3	Porth Reservoir & Rialton Intake	No LSEs
Roadford	R1	Lyd to Roadford winter pumped storage (Jan - March)	No LSEs
	R2	Slade Reservoir	No LSEs
	R3	Challacombe Reservoir	No LSEs
	R4	Meldon/Vellake to Roadford	No LSEs
	R5	Lee Moor unused quarries	No LSEs
Wimbleball	W1	Brampford Speke & Stoke Canon (North Exeter boreholes)	No LSEs
	W2	Hook Springs licence	No LSEs
	W3	Wilmington Springs licence	No LSEs
	W4	Wimbleball compensation	No LSEs
Bournemouth	B1	Wimborne borehole	No LSEs
	B2	Stanbridge licence	No LSEs

In Bournemouth WRZ, the assessment and production of Screening Assessment tables for Wimborne and Stanbridge drought actions has determined no LSEs. Natural England has raised concerns that there may be environmental impacts from the licensed abstractions in the Lower Avon due to environmental flow indicator (EFI) failures. We have therefore agreed with Natural England to undertake an Appropriate Assessment for the Lower Avon, which will be completed in Autumn 2022. A timeline for the completion of the Appropriate Assessment is given below in Table 6.2. The results and conclusions of the Appropriate

Assessment will be discussed with Natural England and the Environment Agency and will lead to a refresh of our Final Drought Plan. We will not use the supply-side extreme drought actions related to the Lower River Avon until we have completed the Lower Avon HRA Appropriate Assessment and the conclusions have been agreed with the regulators

Table 6.2: Lower Avon Appropriate Assessment timeline

Activity	Date	Comments
Submit revised Draft Drought Plan	08/04/2022	No change to use of Knapp Mill licence - COMPLETE
Initial consultation with key stakeholders to agree HRA AA proposals	26 April 2022	Natural England - COMPLETE
Arrange land access for habitat assessment	April 2022	Prerequisite for habitat assessment - COMPLETE
Carry out environmental and hydrological survey work	May 2022	As required to support Appropriate Assessment - COMPLETE
Complete Appropriate Assessment	June 2022	
Share the results and conclusions of the Appropriate Assessment	July 2022	Key stakeholders - COMPLETE
Update Drought Plan	July 2022	As per DEFRA feedback completed 2 nd September
Further consultation with key stakeholders	Autumn 2022	Including Environment Agency, Defra, Natural England, Historic England
Update Drought Plan	2023	In line with consultation feedback

Water Framework Directive

Most river abstraction licences have prescribed flows and reservoir licences have permitted conditions such as compensation flows to protect the environment. All abstraction licences have been or are being reviewed by the Environment Agency to ensure avoidance of deterioration in the environment and to ensure that their use is unlikely to result in adverse impacts to WFD receptors. We understand our responsibility to prevent deterioration when using all of our licences.

During a drought, demand will largely be met through increased use of strategic reservoir storage rather than from river abstractions, further minimising any impact.

6.2 Environmental impacts of supply side drought actions

Extreme drought actions do not require a high level of environmental assessment in the Drought Plan, so the supply-side drought actions covered in this Section are just those that would be utilised in a 1 in 200 to 1 in 500 year return period drought, i.e. the Lyd to Roadford Reservoir (January – March) Level 1, Brampford Speke and Stoke Canon Level 1 and Slade Reservoir Level 2 drought actions (see Table 3.5).

Disused, licensed source - R2 Slade Reservoir

Slade Reservoir is a small reservoir in North Devon. It has not been used for a number of years. West Wilder Brook, which Slade Reservoir impounds, is not a WFD waterbody. There is no compensation release requirement on the abstraction licence. In dry summers, even without any abstraction, Slade Reservoir does not spill.

To mitigate any potential downstream impacts from our abstraction, if we need to use this source we will agree an appropriate compensation release with the Environment Agency, which will reflect the river flows in the area at the time (e.g. Q95, Q99). We will make this compensation release when we are abstracting and until the reservoir has refilled and has started spilling again after abstraction ceases.

Disused, licensed sources - W1 Brampford Speke and Stoke Canon

These boreholes, north of Exeter, are licensed abstractions, but have not been used for supply for a number of years following the construction of Wimbleball Reservoir. A WINEP investigation is currently in progress to assess Risk of Deterioration, should these sources be used.

As part of this study, we have agreed that these boreholes would only be used when we are making supply releases from Wimbleball Reservoir. Thus, any local impacts on the River Exe from these groundwater abstractions would be more than compensated for by the high flows occurring at the time from the supply releases, other than downstream of the river abstraction point. However, as the river abstraction point is close to the tidal limit, downstream environmental impacts are likely to be minimal. Impacts on the nearby River Culm are determined to be minimal.

Drought Permit – R1 Lyd to Roadford winter pumped storage Level 1 drought action (January – March)

Drought Plans are expected to cover Drought Permits and Drought Orders. In order to meet Environment Agency expectations SWW is expected to have reached an appropriate level of preparedness in anticipation of application (be “permit ready”). With regards to the environment this refers to:

- Discussing impacts/risks of your permits with stakeholders
- Identifying where further assessments may be required
- Carrying out all appropriate environmental assessment before application.

The River Lyd to Roadford Reservoir winter pumped storage scheme (January to March) was identified as a Level 1 drought action that requires a Drought Permit and therefore needs to be “application-ready” because it is likely to be needed in a drought with a return period of between 1 in 200 and 1 in 500 years. This drought action therefore needs full environmental assessment (contained in the Lyd EAR). The following sections provide a high-level, non-technical summary of this EAR. Further supporting information is provided in Appendix 6. The EAR is available on request and includes detailed monitoring and mitigation plans.

Environmental Assessment: Lyd to Roadford winter pumped storage Level 1 drought action (January – March)

A baseline understanding of sites was produced using historic datasets and information and supplemented with monitoring where required to address gaps. A range of receptors were assessed:

- Designations based on International and National legislation with indicators including:
 - Areas of Outstanding Natural Beauty (AONB)
 - Local nature reserves (LNR)
 - National nature reserves (NNR)
 - National parks
 - Ramsar sites
 - Sites of Special Scientific Interest (SSSI)
 - Special Areas of Conservation (SAC)
 - Special Protection Areas (SPA).
- Physical environment with indicators including:
 - Habitats
 - Geomorphology
 - Hydrology
 - Water quality.
- Ecology with indicators including:
 - Macroinvertebrates
 - Macrophytes
 - Fisheries (salmonids and eels)
 - Protected/priority species
 - Invasive non-native species (INNS).
- Other receptors
 - A range of local and relevant stakeholders were approached and communicated with on a collaborative and ongoing basis. For example, Premier Foods, Lifton Creamery was engaged to better understand any in combination effects of abstraction activities
 - The Arundell Arms in Lifton is one of the country's premier fishing hotels closely affiliated with the local Tamar Tributaries Fishing Association (TTFA). SWW has developed collaborative working relationships over the past three

years. This has facilitated our monitoring and surveys whilst ensuring our options are developed to account for economic and recreational interests.

Using established methodologies, we assessed the impact based on sensitivity, likelihood and magnitude of impact. This assessment is summarised in Appendix 6 with the full technical report available on request.

Our assessment work determined no significant impacts on the environment from this supply-side drought action.

Environmental monitoring and mitigation: Lyd to Roadford winter pumped storage Level 1 drought action (January - March)

A monitoring and mitigation plan for this drought action is provided in Appendix 6 outlining SWW's approach pre, during and post drought to natural assets / environmental receptors.

SWW will contact the Environment Agency and Natural England on an annual basis to discuss their routine monitoring programme and to ensure our approaches benefit from most recent data. If any monitoring sites are to be removed from their programme, or frequency of monitoring reduced, SWW will amend our monitoring programme to collect this data.

SWW will undertake annual review of the physical assets to ensure they are maintained at the appropriate level of preparedness in anticipation of application.

During a drought event, SWW will engage with the Environment Agency if required to discuss any further potential actions that could be considered to alleviate environmental stress. This will be considered on an individual basis. As set out in Section 5, we would plan for this Environment Agency and SWW process to become a formal meeting from the commencement of Level 1 triggers, or if there is a reasonable risk in the future of severe supply-demand problems.

6.3 Date Exchange

With regards to baseline, in-drought and post-drought monitoring data, we will ensure data exchange with relevant authorities (including Environment Agency and Natural England). This will identify agreed monitoring sites for the supply-side drought actions and relevant receptors and take the appropriate form (e.g. spreadsheet, Word document, shapefile, etc.). Data should be exchanged electronically and subject to appropriate quality assurance checks.

Outside of drought events, we will ensure that monitoring data relevant to the Plan will be shared with the relevant authorities (including Environment Agency and Natural England) on a regular basis.

7. Post-drought actions

In this section we describe:

- How the end of a drought is identified
- How the drought response is reviewed
- How drought measures are relaxed

7.1 Identifying the end of a drought

The Environment Agency provides the following definition for the end of a drought: *“when the risk of impacts from drought is no greater than during a normal year and where normal conditions have continued for a period of time”*.

As a drought takes place it will deepen and increase in severity until weather patterns change. As the weather “breaks” so the abnormal dry conditions give way to wet weather and the natural hydrological cycles starts to rebalance.

Whilst a region may start to experience a return to typical, or even above average, rainfall conditions, it may take some time to redress the deficit in water in the environment and for “normal” water supply system conditions to return.

This means that, when considering water resources, we need to take into account a number of environmental and water supply factors before being able to confirm that the water supply system drought has ended.

Whilst our typical peak period for water consumption is in June and July, with a possible further spike in demand later in the summer, we also need to be sure that we have sufficient reservoir storage to meet demand through autumn until reservoirs refill.

This is particularly important from the perspective of the customer as whilst we would seek to lift restrictions at the earliest opportunity, the occurrence of rainfall, or even a prolonged heavy period of rain, may not lead to an immediate ending of any restrictions in place. This phase of a drought is therefore particularly important in relation to communications (Section 5) and appropriate messages and explanations are required to avoid misunderstanding of, and potential dissatisfaction with, the company’s approach.

7.1.1 End of drought environmental/hydrological triggers

We would use the same environmental and water resource triggers that we use to identify the commencement of a drought, in addition to other local factors, to identify a return to “normal” conditions in relation to supply and the environment (Table 7.1).

Table 7.1: End of drought triggers

Hydrological parameter	Trigger level
Reservoir storage (primary criteria)	Above or approaching Level 1 trigger curves
Rainfall	Rainfall total “Normal” ²⁹ or above average for an appropriate time period
River flows	Underlying flows significantly above Q95 ³⁰ conditions and recovering
Groundwater levels	Recovering and returning towards normal for time of year
Soil moisture deficit	Deficit returning towards normal for time of year

Each WRZ would be considered individually using the same monitoring locations used to monitor the onset and development of the drought (Appendix 2.5).

7.1.2 End of drought - demand for water

The current and expected demand for water needs to be taken into account when considering the impact on water resources. We would need to be sure that further peaks in demand were unlikely to occur before winter by assessing the potential for surges in demand occurring due to factors including:

- Sudden improvements in weather conditions
- The potential for an influx of tourists, for example a bank holiday weekend
- Changes to local population water use patterns, for example an increase in garden watering.

Taking a precautionary approach, only if the risk of an upsurge in demand was unlikely to pose any supply concerns would we be able to declare an end to the drought.

In this way, we would establish an overall picture of the water supply and environmental situation to conclude if the drought had ended or if underlying risks remained.

7.2 Drought Management Team Review

As the occurrence of droughts is highly variable and unpredictable, experiencing a severe drought does not mean an equally severe or even worse drought could not occur soon after. It is therefore important to act on the experience gained from a drought as quickly as possible and to ensure all lessons learnt are implemented.

At the time all indicators suggest that normal conditions are again prevailing and that the drought is clearly at an end, the Drought Management Team will undertake a review of our drought management processes within the Drought Plan to identify how well we were able to respond to the circumstances of the drought.

The team will evaluate the actions taken leading up to the drought and during the drought itself. It will seek to identify where the process and responses can be improved in a “lessons

²⁹ “Normal” rainfall is defined as 128-72% of LTA in Environment Agency regular reporting

³⁰ The flow which was equalled or exceeded for 95% of the flow record.

learned” exercise which we will use to update the Drought Plan in preparation for future drought situations.

During the review, we will work with the Environment Agency to consider how the drought impacted on the environment and assess the consequences of our actions. This may point to actions we could take, in agreement with the Environment Agency, to reduce environmental impacts in future droughts. For example, we might consider where we could improve fish passage if this had been a particular issue.

Similarly, we will want to identify if we could have responded in an alternative way which would have provided the same supply benefit, but which might have reduced environmental impact.

The post-drought review, which we will produce within six months of the end of the drought, will include specific considerations:

- An assessment of how well our supply system coped and where particular stresses occurred, which will include:
 - Recommendations for investments required to improve the security of supply in future droughts
 - Consideration of our assumptions around demand forecasting and resource availability to determine if our Drought Plan should be revised to reflect any increased risks identified
- An assessment of the impact of any demand restrictions and other demand-side management actions
- A detailed appraisal of any Drought Permits and/or Drought Order applications
- An environmental review describing how the drought developed and its consequences for the environment which will include:
 - Feedback from the Environment Agency on how we managed the drought from an environmental perspective
 - Assessment of whether the environmental monitoring before, during and after the drought was appropriate to measure the impact of any actions
 - A review of the effectiveness of any mitigation measures that were implemented during the drought and consideration of ways which could reduce the impact of our actions in the future
- A communications review to assess the effectiveness of our approach.

After a further 12 months we would assess whether recommendations from the Drought Management Team Review had been incorporated into our drought planning or if further assessments or information is available which needs to be reflected in a revised Drought Plan.

In building this Plan we have included learning from the 2018 and 2019 dry weather events. Details are provided in Section 5.

7.3 Relaxation of measures

As set out in Sections 3 and 5, we would look to de-escalate measures as we begin to come out of a drought. Typically, we would look to do this when reservoir storages are above their drought triggers (for Colliford, Roadford, and Wimbleball WRZs) or when demand is below its drought triggers (for Bournemouth WRZ), for approximately two weeks.

Appendix 1: Introduction

A1.1 WRZ schematics showing sources, water treatment works, indicative pipelines

Schematics for Colliford, Roadford, Wimbleball and Bournemouth WRZs are shown below. Schematics for the Isles of Scilly are in the separate *Isles of Scilly Drought Plan* document.

Figure A1.1: Colliford WRZ

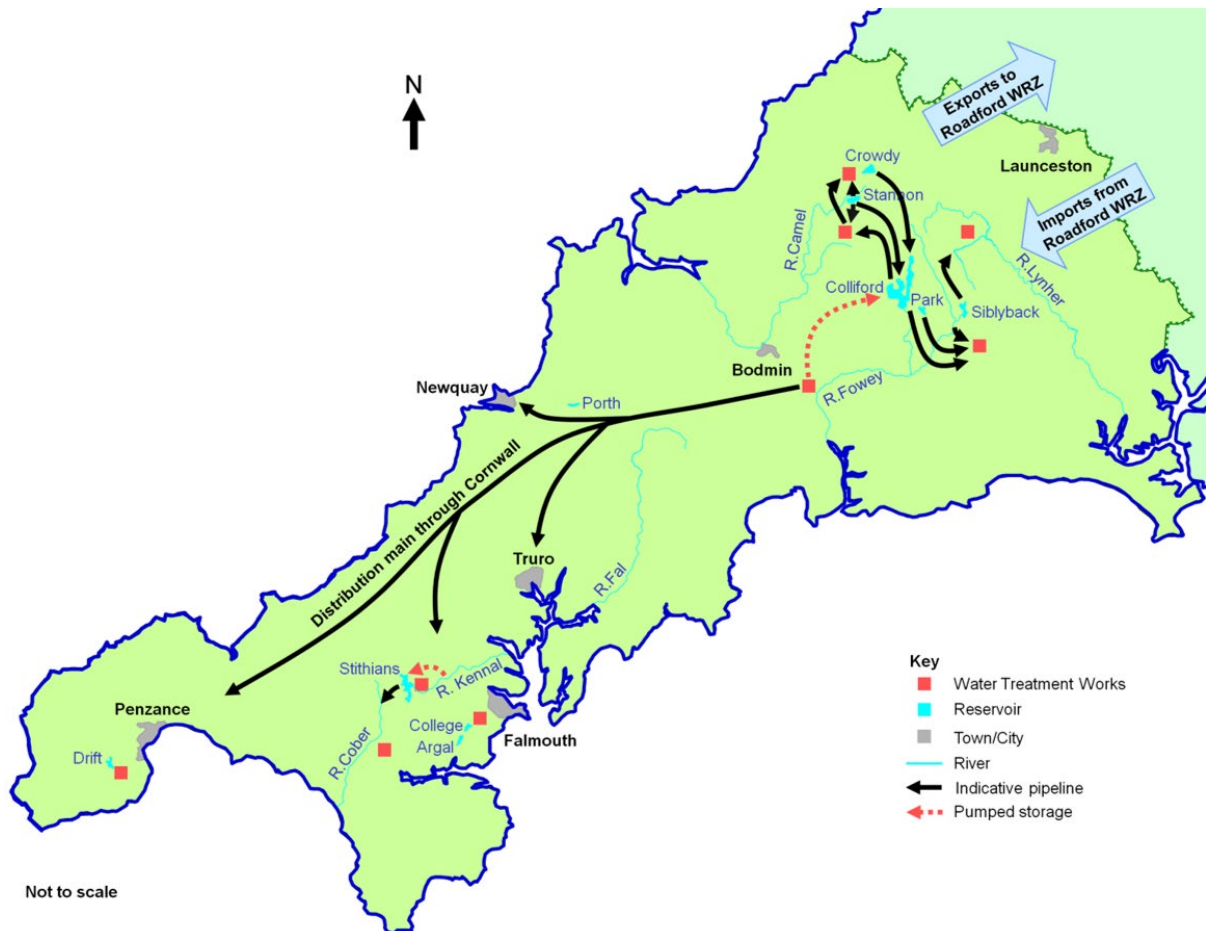


Figure A1.2: Roadford WRZ

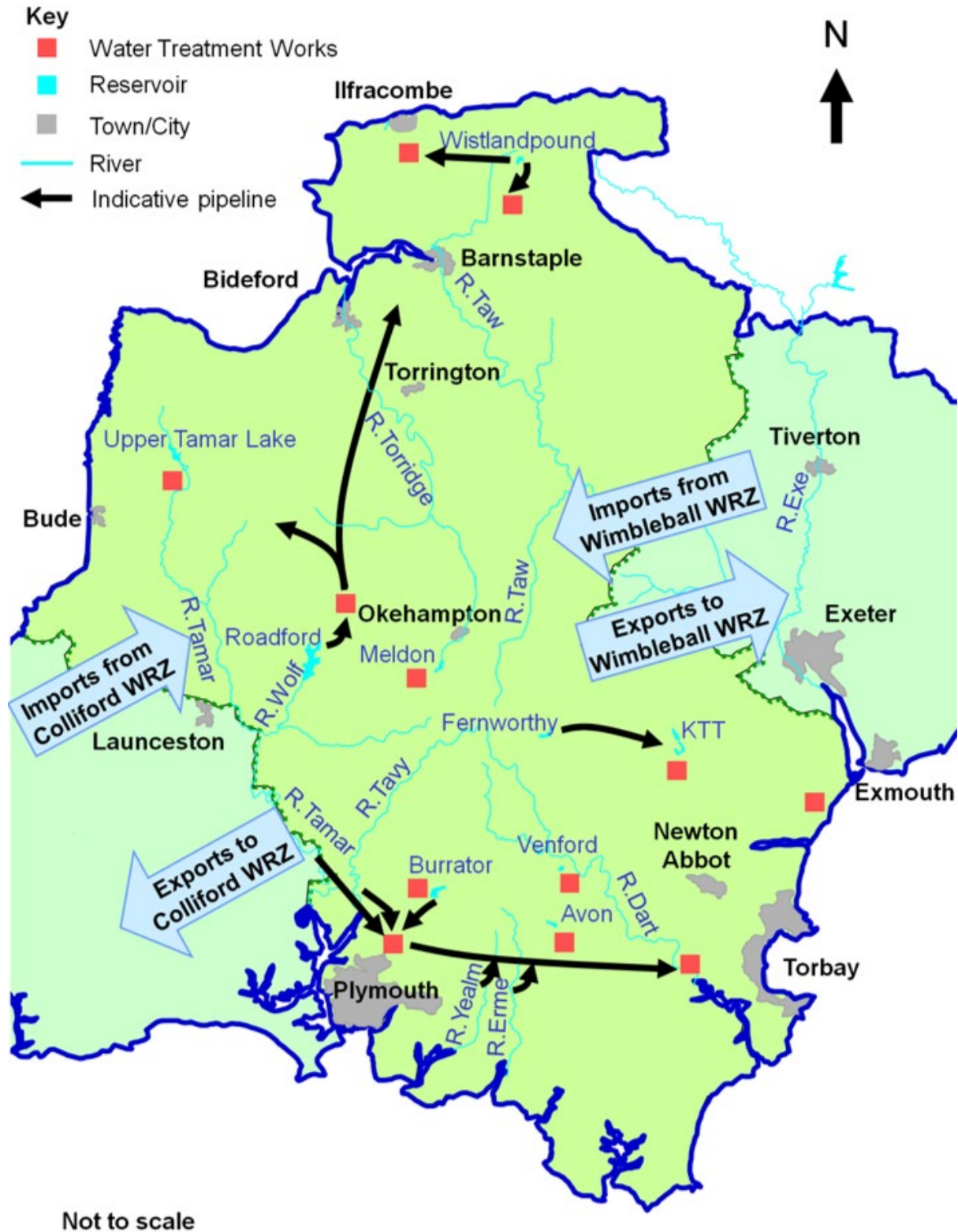


Figure A1.3: Wimbleball WRZ

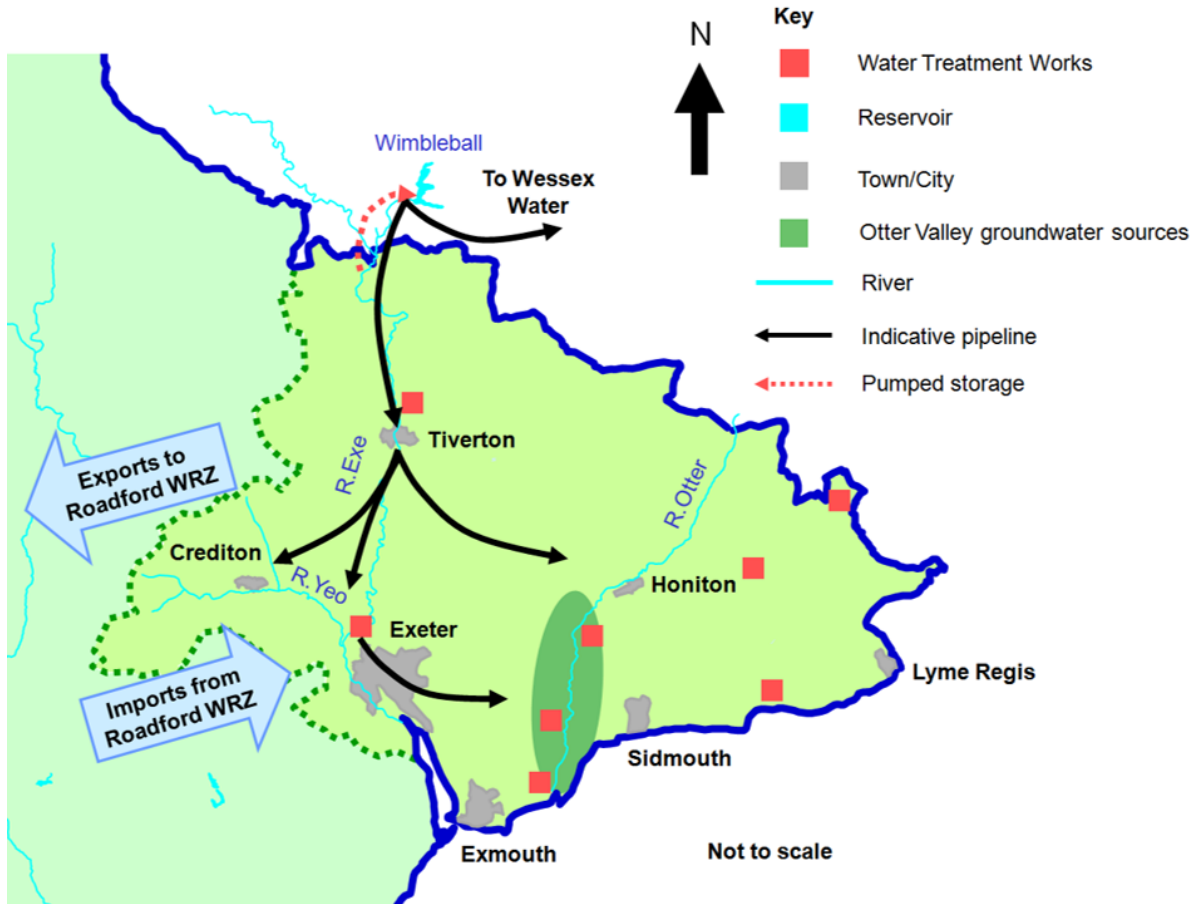
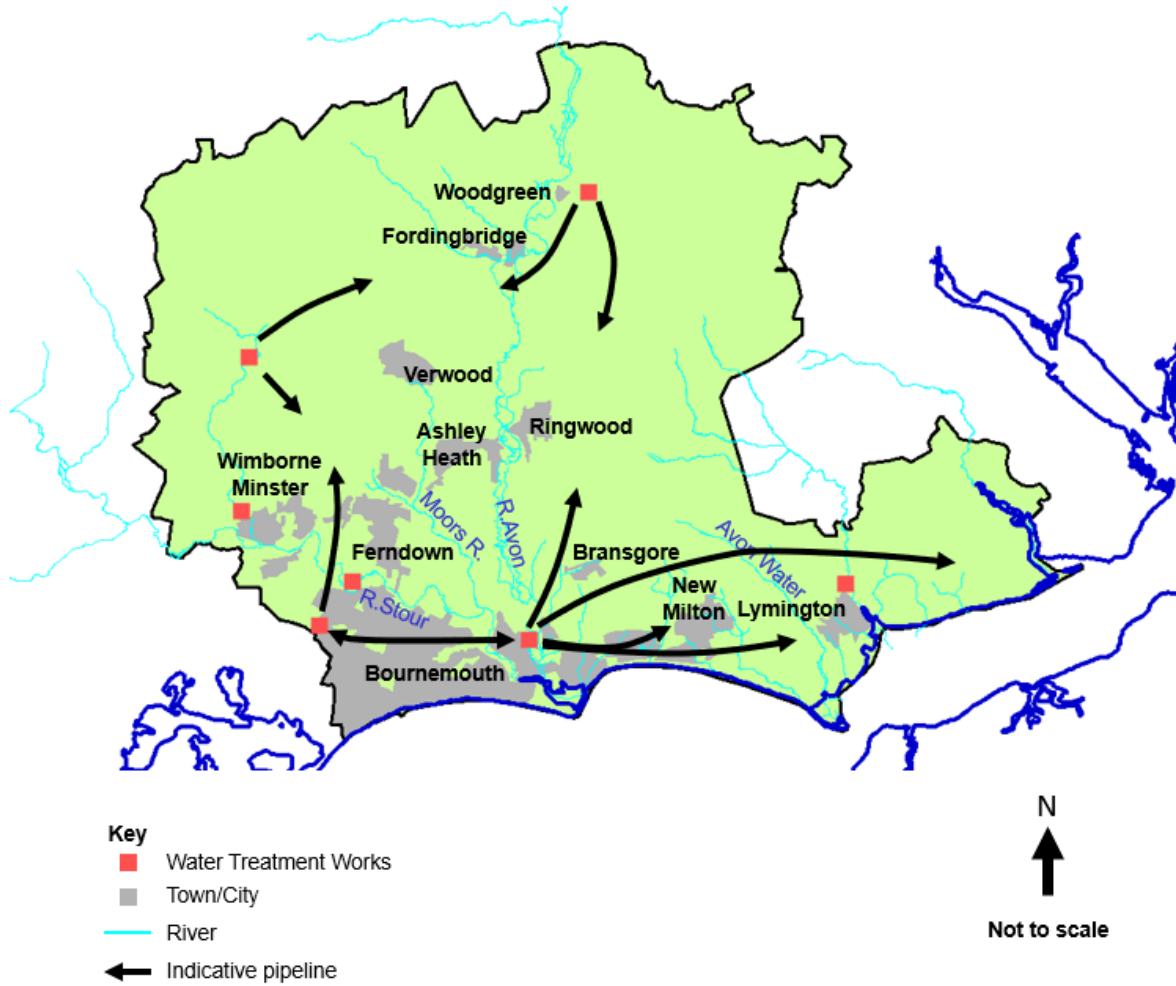


Figure A1.4: Bournemouth WRZ



A1.2 Pre-consultation meetings held with the Environment Agency

Table A1.1: Pre-consultation meetings with the Environment Agency

Date of meeting	Presentations / Main topics covered	Other topics covered and feedback
24/11/20	<p>Opening/introductory meeting</p> <p>Presentation of example scenario for Roadford.</p> <p>Discussion about drought permit readiness and extreme drought options.</p> <p>Discussion about Communications section.</p>	<p>Drought Permits – confirmed that SWW only needs to be permit ready for Drought Permits that may be required in a drought less severe than a 1 in 500 year return period, hence SWW only needs to be permit ready for the Lyd to Roadford winter pumped storage Level 1 (January – March) Drought Permit. SWW confirmed that other options are only likely to be needed in a drought that is more severe than a 1 in 500 year return period.</p> <p>Extreme drought supply side options - not expected to be permit ready for these. In SWW extreme drought is 1 in 500 year return period or worse.</p> <p>Isles of Scilly – agreed to be included in final plan.</p>
12/01/21	<p>Low Flow Protection</p> <p>Detailed presentation given on the WRZs, including how SWW operates sources conjunctively in each WRZ and how reducing abstraction and/or increasing compensation flows to alleviate environmental pressures would negatively impact on water supply availability and increase the risk of needing Drought Permits.</p>	<p>SWW agreed to add wording to the Drought Plan to note that during low flow periods the Environment Agency would approach SWW on a site by site basis to discuss the possibility of amending abstraction regimes to aid the environment, but that options will be limited by time of year, water demand, likelihood of a drought developing, etc. For example, in May/June it would not be possible to increase compensation flows from reservoirs because at this stage in the year we do not know if this water will be needed for water supply, whereas in September if reservoirs storages are healthy it may be possible to make higher releases to the environment without risk to water supply.</p>
25/02/21	<p>Plausible droughts, drought triggers, environmental assessment, monitoring and mitigation</p> <p>Update presentation given on environmental assessment, monitoring and mitigation.</p>	<p>Environment Agency agreed that SWW should include summary tables of Drought Permit environmental assessments in Drought Plan but that the full environmental assessments would only be available on request and would</p>

A1.3 Notices issued by the Isles of Scilly relating to water resources concerns from the summer of 2018

Help us avoid a water shortage

Drinking water supplies across the UK are under pressure as a result of the heat wave we are currently enjoying. On the Isles of Scilly this is even more critical as we have VERY limited supplies and must retain capacity to respond to surges in demand from incidents such as fires or travel disruption.

The Council of the Isles of Scilly is asking everyone – visitors, residents and businesses – to make every effort to conserve water by reducing the amount used. If everyone takes some small steps to reduce consumption we hope that we can avoid interruptions to the supply.

What can you do?

- Avoid non-essential washing of cars and boats.
- Resist the temptation to water lawns and gardens using the mains supply.
- Check for leaks, drips or trickling water and make sure repairs are made quickly.
- Re-use 'grey water' where you can – such as to water your garden.
- Run your washing machine and dishwasher with FULL loads. This will save money on your electricity bill too.
- Install a water butt to collect rainwater for your garden or allotment, or for washing your car. These are inexpensive and can be purchased locally or from online retailers.
- Don't leave the tap running when you brush your teeth.
- Use a save-a-flush bag in your toilet to reduce the amount of water used each time you flush. Available **free of charge** to everyone (see below).
- Take shorter showers.
- Every time you use drinking water for something, take moment to consider if you really need to.

The Council has free save-a-flush bags which reduce the amount of water used each time you flush the toilet – these are easy to install and available free of charge to everyone. We also have leaflets that can be displayed (eg in bathrooms, holiday lets and noticeboards) to help remind everyone of the importance of water conservation. These are available from the Library, Carn Gwaval Wellbeing Centre and the self Service Desk at the Town Hall. Alternatively contact the Infrastructure team by telephone 0300 1234 105 or email infrastructure@scilly.gov.uk.

Publishing date: Tuesday, 3 July, 2018

Water shortage on St Mary's

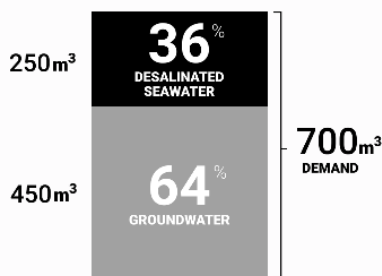
Notice to all residents, businesses and visitors

Issued: 30 July 2018

Water usage has reached an unsustainable level on St Mary's and the Council is unable to meet demand without seriously damaging our wells and boreholes. The extreme dry period this summer is set to continue so we must ask all of our customers to take significant steps to decrease their water usage before it is too late. Please read and share this notice.

Desalination isn't enough

Contrary to what you may have heard, the desalination plant cannot meet all our water needs alone. The plant only provides around a third of demand.



Furthermore, running the equipment at maximum rate, as we are now doing, greatly increases the risk of a breakdown. There is no backup desalination plant.

Groundwater depletion

Most of our supply comes from groundwater. This is the subsurface water accessed by drilling boreholes into the granite bedrock. Unlike surface reservoirs, these sources are extremely difficult to monitor. However, all of our tests indicate that the groundwater supply is at an historic low and is being extracted at an unsustainable rate. This creates 3 problems:

1. We may run out of groundwater.
2. The groundwater contaminant concentration may become too high to be treated.
3. The low pressure and reduced levels in the groundwater could result in seawater getting into the wells and boreholes and contaminating the water, causing the source to be unusable for a generation.

We need to reduce our reliance on groundwater by decreasing our water consumption.

What about the reservoirs?

There are no reservoirs on the Isles of Scilly. St Mary's has 3 water tanks that continually fill with drinking water. They replenish at night when usage is low but are often empty by the end of each day.

What happens if we run out of water?

The Council has emergency plans in place should the islands run out of water. In short, this would involve shipping water to the islands with a ration per head each day. Clearly we need to avoid this situation.

A1.4 Drought Plan guideline checklist

Table A1.2: Drought plan guideline checklist

Section	Key elements in text	Location in plan	Page
2.1	Hold discussions		
	Have you held timely and appropriate discussions with regulators and has the feedback been used to develop the plan (section 2.2 provides a list of potential areas for discussion)?	Section 1.2 Appendix A1.2	17
	You must consult with bodies listed in Section 2.1 as a minimum and the Natural England or Natural Resources Wales (NRW) if your plan is likely to affect a designated site.	Section 1.2	17
2.3	Send you draft drought plan		
	Your submission should include:		
	Statement from your security manager	Separate document	
	Highlight any information that you propose to redact or edit	None at this stage	
3.1	Drought vulnerability of your system		
	Have you carried this out using UKWIR methodology? Signpost	Section 0	10
	How have you used it to help plan triggers and actions?	Section 0	10
3.2	Decide on your drought triggers		
	Your drought plan must:		
	Include your chosen drought triggers and the actions you will take if you cross a trigger	Section 2 Appendix 2	26
	Include triggers for the start and end of a drought event	Section 2 Appendix 2	26
	Explain why you've chosen your drought triggers	Section 2.3.2 and 2.4	29
	Have you considered environmental stress triggers?	Section 2.5 and Appendix 2.5	30
	Have you considered other appropriate measures such as other sectors under stress?	Section 3.4	64

Section	Key elements in text	Location in plan	Page
	Have you included control diagrams to show your chosen triggers and actions you will take?	Appendix 2.2	
	In developing your drought triggers have you allowed enough time to both prepare and carry out the actions associated with each trigger?	Section 2	26
		Appendix 2 Section 3 Section 5	45 69
	Does the drought plan focus on the triggers and the actions and are these clear?	Section 2	26
3.3	Test drought triggers		
	You must provide worked examples to show how you have tested your chosen triggers and that they are appropriate to a range of droughts. This information should be an appendix to your drought plan.	Section 2.7 Appendix 2	36
	You should include as a minimum testing your plan against:		
	The same severity of drought used in your baseline planning assumptions for your WRMP	Section 2.7 Appendix 2.3	36
	A plausible more extreme drought	Section 2.7.2 Appendix 2	37
	Have you tested your plan against high demand, heatwaves, outage events?	Section 2.9 Appendix 2	41
	How planning to test plan? Drought exercise?	Section 5.34	105
4	Drought actions		
	You must clearly and concisely set out everything that you plan to do during the onset, duration and abatement of a drought.	Section 3.1	45
	You must implement your demand saving actions first and prioritise the use of those supply actions where you have high	Section 3.1	45

Section	Key elements in text	Location in plan	Page
	confidence, they are the least damaging options to the environment		
	Your drought plan must include details of all the permits, orders and other authorisations (for example discharge permits) needed in order to implement the drought management measures including monitoring, mitigation and prevention measures.	Section 6 Appendix 6	107
	Have you considered if there are actions that you could implement to mitigate an environmental drought or support other sectors in a drought?	Section 3.4 - 3.5	63
	Is your drought plan an operational tactical manual that focusses on the actions you will take in a drought?	Yes - throughout	Through out
4.1	Demand side actions		
	Your drought plan must set out what you will do to reduce the demand for water during a drought	Section 3.2	50
	The trigger for the action and the action level (1 to 3). Your plan should also include information on the trigger for level 4 actions (such as rota cuts and standpipes)	Section 2 Appendix 2 Section 4, Appendix 4	26 67
	Estimate the impact on peak demand	Appendix 3.1	
	The location – the area affected, for example at a company, zonal or regional level	Appendix 3.1	
	The implementation timetable such as time from trigger to implementation and the duration of the actions	Appendix 3.1	
	The permissions you need or constraints that apply (include details of any contact you will have with bodies responsible for giving permits or approvals)	Appendix 3.1	
	The risks associated with this action, for instance, social and economic factors and uncertainties associated with timings and water savings	Appendix 3.1	

Section	Key elements in text	Location in plan	Page
	Have you considered the most effective way to reduce demand and whether it is best to carry out your actions across regional water resources groups?	Appendix 3.1	
	Have you included in your drought plan the information you need to demonstrate and justify your actions along with how they fit in with your communication plan (section 5)?	Appendix 3.1, Section 5	69
4.1.1	Temporary Use Bans (TuBs)		
	Your drought plan must explain how you will impose TuBs and should explain: See bulleted list:		
	The temporary restrictions you plan to carry out such as temporary use bans or drought orders to restrict non-essential use. This should include the order in which you will implement these measures	Section 3.2.2.1	52
	How you will comply with legislation on temporary use bans	Section 3.2.2.1	52
	Potential exceptions and concessions	Section 3.2.2.1	52
	How you will balance water savings against adverse effects on customers and businesses	Section 3.2.2.1	52
	How much time you will set aside for comment during the consultation period before using a restriction and how you'll deal with an unexpectedly large response. You should build in flexibility to the length of your consultation period to take into account different types of drought and your specific situation	Section 3.2.2.1	52
	How you will tell customers, neighbouring companies, NAVs, water retailers for business and interest groups about the introduction, phasing in and lifting of temporary restrictions. You should also include information in your plan about how you'll keep this information up to date	Section 5.27	101
	How you will prove to customers, partners and the government that you've acted in a proportionate and reasonable way	Section 3.2.2.1	52

Section	Key elements in text	Location in plan	Page
	How you will work with other companies, water retailers and regional water resources groups to align your approach and reduce demand	Section 5.23 - 5.26	99-101
	Have you consulted the UKWIR report 'Code of Practice and Guidance on Water Use Restrictions' when considering how to impose TUBs?	Section 3.2.2.1	52
4.2	Supply side drought actions		
	Your drought plan must set out what you will do to maintain water supply during a drought	Section 3.3	58
	You must prioritise your supply actions that have the least environmental impact (and for which you have high confidence in that assessment).	Section 3.3 Appendix 3.2	58
	In order to demonstrate that your actions are appropriate have you;		
	Included estimate how much each of your actions will contribute to maintaining water supply and say how you arrived at this estimate	Appendix 3.2	
	Made sure your actions align with the drought plans of other water companies they affect and where appropriate your regional water resources groups.	Section 5.10	79
	Set out the limits to the amount of water you can transfer from and to other companies and how this will change under different stages of a drought	Section 5.11.2	80
	Carried out the required environmental assessments, where possible you should carry out as much of this work at the planning stage so that you are application ready in a drought	Section 6	107
	Have you included the following info for each of your supply side actions:		
	The trigger for this action and the action level (1 to 3) (or the preceding action that leads to this action)	Appendix 3.2	
	The deployable output or yield of the action (in megalitres per day), plus how you	Appendix 3.2	

Section	Key elements in text	Location in plan	Page
	calculated it and any uncertainty in the estimate		
	The location (area affected or the whole supply zone)	Appendix 3.2	
	The implementation timetable (time from trigger to implementation and duration)	Appendix 3.2	
	The permissions you need or constraints that apply (include details of any contact you will have with bodies responsible for giving permits or approvals)	Appendix 3.2	
	The risks associated with this action, for instance, effects on the environment, social and economic factors and uncertainties associated with timings and water provided	Appendix 3.2	
	Have you included in your plan if and how you will supply people, businesses and farms that rely on their own water sources for essential use such as drinking and watering livestock, should their own supplies fail?	Section 3.4	64
4.2.1	Include details of DPs and DOs		
	Your drought plan must include details of all the permits, orders and other authorisations you might apply for under the full range of droughts that you've planned for.	Section 3, Appendix 3, Section 6.2	45 109
	You must be clear on whether you are applying for a drought permit or order in your plan.	Section 6.2	109
	Must make use of other available licences first before DP or DO? See additional text about sustainability and Env impact.	Section 3.3.1	58
	Your plan must demonstrate that you will have reduced demand through voluntary savings, TuBs and leakage reduction before you apply for a drought permit or order to take more water out of the environment.	Section 3	45
	Does your drought plan demonstrate that you are being pro-active in implementing your drought actions to reduce demand?	Section 3.2	50
	Have you assessed the required likelihood for each drought permit and order in your plan and categorised them into the level 1	Section 3.3, Appendix 3	58

Section	Key elements in text	Location in plan	Page
	to 3 actions as detailed in section 4.4 of the guideline?		
	You must carry out as much preparation work as possible in advance of a drought event. Applications for drought permits and orders should, in the majority of cases, be ready to submit prior to being needed. Environmental assessment requirements for your drought permit and orders sites should be discussed/ agreed during the pre-consultation stage of the plan development.	Section 1.2 Section 3.3.2.2 Section 6	17 63 107
4.3	Extreme droughts		
	Have you included information on actions that you could implement in the event of an extreme drought, and just after your level 3 restriction? A template is available in appendix G.	Section 4, Appendix 4	67
	Have you discussed these options during pre- consultation?	Appendix 1	
4.4	Categorise your DP actions		
	Have you categorised each of your of drought plan actions using the level 1 to 4 definitions?	Section 3, Section 4, Appendix 3, Appendix 4	45 67
	Level 4 actions are outside the drought plan but have you included information on the likely triggers for these actions?	Appendix 4	
5	Say how you will communicate during a drought		
	Have you included a plan on how you will communicate in a clear and timely way with your customer, partners and other interested groups during a drought?	Section 5	69
	Have you included joint Regional communications?	Section 5.25	101
	Have you included proactive communications with customers to help inform and mitigate the impacts of prolonged dry weather and drought on the environment and/ or other water users?	Section 5	69
	Does your communication plan identify how you will:		

Section	Key elements in text	Location in plan	Page
	Keep customers (both household and non-household), regulators and relevant organisations (such as local resilience forums, fire and rescue services and power plant operators) informed. You should provide information about how a drought is developing, what you're doing to manage it, how it might affect their supply and the actions they can take to help	Section 5	69
	Consider the different information requirements of household and non-household customers including vulnerable customers	Section 5.28	102
	How you will work with water retailers regarding business customers during a drought	Section 5.26	101
	Scale up your customer campaigns appropriately as dry weather takes hold. You should plan pre-emptive campaigns and plan to engage as early as possible with your customers	Section 5	69
	Increase customer awareness of the limited availability of water during a drought or prolonged dry weather and the impact of water use on the environment	Section 5	69
	Encourage customers to help during a drought by being more water efficient	Section 5	69
	Work with interested groups and partners to reduce demand for water during a drought	Section 5	69
	Work with other organisations and local stakeholders to enhance your messages	Section 5	69
	Include how you'll work with the National Drought Group in order to contribute to the cross-sector coordination of drought issues	Section 5.23	99
	Work with other water companies and regional water resources groups to communicate and operate consistently and effectively and provide joint regional messaging	Section 5.24 – 5.25	99-101
	Include how you will engage with NAVs, water retailers for business and your expectations of them regarding water efficiency messages and restrictions including non-essential use bans?	Section 5.27	101

Section	Key elements in text	Location in plan	Page
	Have you considered best practice and international examples?	Section 5.17.2	83
	Have you considered the conclusions of the Consumer Council for Water's report 'Understanding drought and resilience' as well as the findings of the UKWIR report 'Drought and demand: potential for improving the management of future drought' when developing your communications plan?	Section 5.17.2	83
	Does your plan set out:		
	How your proposed communications activities are linked to drought triggers	Section 5	69
	How you'll communicate to your customers the actions you're doing to manage the drought	Section 5	69
	What information you've agreed to exchange with the Environment Agency or Natural Resources Wales where appropriate during a drought - you should agree this during preliminary discussions before preparing your draft drought plan	Section 5.31	103
	The different audiences that specific communications apply to, the main messages for these audiences and how you'll tailor and communicate your activities to each audience	Section 5	69
	How you will communicate and consult with customers about temporary water use restrictions or bans on non-essential use	Section 5.6 -5.7	77-78
	How much time you'll need to carry out communications around increasing supply or controlling demand including your response to consultation with customers?	Section 5	69
	Have you developed joint communication plans with Retailers, other affected water companies or NAVS?	Section 5.25, 5.26, 5.27	101
	Have you planned monitoring arrangements to evaluate the effectiveness of your communication activities such as through a change in demand for water, customer feedback, website traffic, or social media?	Section 5	69

Section	Key elements in text	Location in plan	Page
6	Environmental assessment, monitoring, mitigation		
	You must carry out an environmental assessment and produce an environmental monitoring plan for each of your supply side actions in your drought plan – have you done this?	Section 6	107
	You must ensure that your environmental assessments meet all the expectations set out in the relevant environmental legislation – have you done this?	Section 6	107
	Does your environmental assessment also include mitigation measures?	Section 6	107
	Have you followed the advice in the Environmental Supplementary guidance?	Section 6	107
	Have you discussed your environmental assessment requirements, monitoring plans and mitigation measures as part of your pre-consultation? These discussions should include which drought permit or order sites you need to be application ready for.	Section 1.2 Appendix 1	17
	Have you included your environmental assessments (including mitigation measures) and monitoring plans as technical appendices or signposted where this information is available from?	Section 6.1, Appendix 6.3 EARs available on request	107
	Have you included a high-level summary of your environmental assessments in your main drought plan?	Section 6.1	107
7	End of drought		
	Your drought plan must set out: Have you done these?		
	your process for stopping your drought management actions	Section 5, Section 7	69 113
	how you'll communicate this information to customers	Section 5, Section 7	69 113
	Have you used several indicators to determine the end of a drought?	Section 7.1 Section 7.1.1	113
	Have you included the triggers you will use to identify the end of a drought?	Section 7.1.1	113
	Have you included how you will review the processes you've followed during a drought?	Section 7.2	114

Section	Key elements in text	Location in plan	Page
7.1	Reviewing your plan performance after drought		
	Your drought plan must set out what you will do to review your performance during and directly after a drought – have you done this?	Section 7.2	114
	Have you identified what information you will release as a result of the review (such as a 'lessons identified' report) and given a clear timetable for the completion of these?	Section 5.33 Section 7.2	104 114
	Have you planned to continue to carry out environmental monitoring and assessment for sufficiently long after hydrological triggers have recovered to understand how the environment is recovering?	Section 7.2	114
8	Non-Technical summary		
	Have you included a non-technical summary?	Separate document	-
8.2	Drought management structure		
	Your drought plan must set out the management structure you will put in place during a drought indicating who has responsibility for what – have you done this?	Section 5	69
	Have you included details of the individual roles and responsibilities?	Section 5.3 Appendix 5	72
	Have you included any changes to the structure that may happen as a result of a worsening drought and the triggers for those changes?	Section 5.3 Appendix 5	72
	Have you included a description of your management structure actions that are linked to drought triggers, such as how often the drought management team meets?	Section 5.1-5.3 Appendix 5	72
8.3	Maps		
	Have you included appropriate maps and highlighted those you propose to redact?	Section 1.3 Appendix 1, Appendix 6	19- 20
8.4	Agreements and arrangements		
	Does your drought plan include the following?		

Section	Key elements in text	Location in plan	Page
	Any data exchange arrangements you have with the Environment Agency or Natural Resources Wales	Section 5.31	103
	Any consultations you've carried out with other water companies, NAVs and water retailers and a statement of how you've taken these into account	Section 1.2	17
	Agreements you have with other water companies about how you will manage bulk supplies, transfers of water or division of shared resources as drought escalates	Section 1.4 Section 5.11.2	21 80
	Information on how you'll mitigate any reductions in supply for firefighting as a result of your actions as required by Part 5 of the 2004 Fire and Rescue Services Act	Section 5.5, Appendix 5	76
8.5	Check your plan is linked to other plans and can be published		
	You must make sure that your drought plan is consistent with your:		
	Regional water resources plans	Section 1.5-1.6	21-22
	WRMPs	Section 1.6	22
	Your plan should also be aligned with other plans, including:		
	National framework	Section 1.6	22
	Business plans	Section 1.6	22
	Emergency plans	Section 1.6	22
	Any drought plans produced by the Environment Agency or Natural Resources Wales	Section 1.6	22
	River basin management plans	Section 1.6	22
	Other water companies' plans if your plan involves transfers or bulk supply agreements with them	Section 1.4	21
8.6	Compensation arrangements for drought measures		
	Your plan must set out the compensation you may need to make in the event of losses/damages to source owners/affected parties as a result of implementing a drought management measure. ('Compensation' is within the meaning of Schedule 9 to the Water Resources Act 1991). This includes compensation for compulsory purchase and also	Section 5.32	104

Section	Key elements in text	Location in plan	Page
	compensation for those that have suffered loss as a result of a drought order or permit overriding their rights to the water. Please refer to the Environment Agency's guidance on 'Drought permits and drought orders' for more details.		
	Have you considered including the compensation arrangements, if any, that may occur if you implement as a TUBs and NEUBs.	Section 3.2.3.1	56

Appendix 2: Monitoring, forecasting, drought management zones, worked examples

A2.1 Routine monitoring and forecasting tools

A2.1.1 SWW Water Situation Report

Routine water demand, water resources and environmental situation are monitored and reported on weekly in our Water Situation Report which is circulated internally and to external stakeholders including the Environment Agency.

Example extracts from the weekly Water Situation Report (from the prolonged dry period in 2018 for some locations within Roadford WRZ) are given below.

Figure A2.1: Water Situation Report - average daily distribution input Roadford WRZ

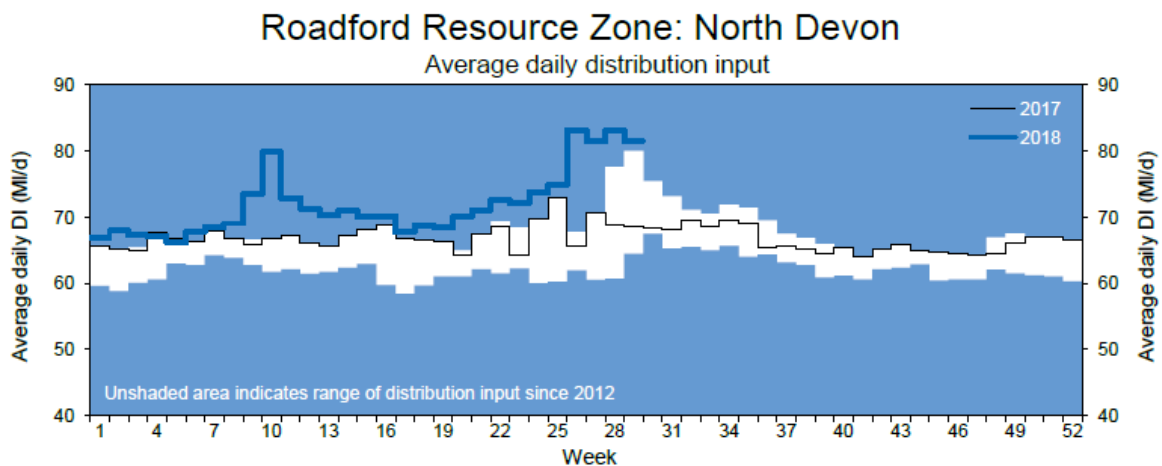


Figure A2.2: Water Situation Report - rainfall situation¹

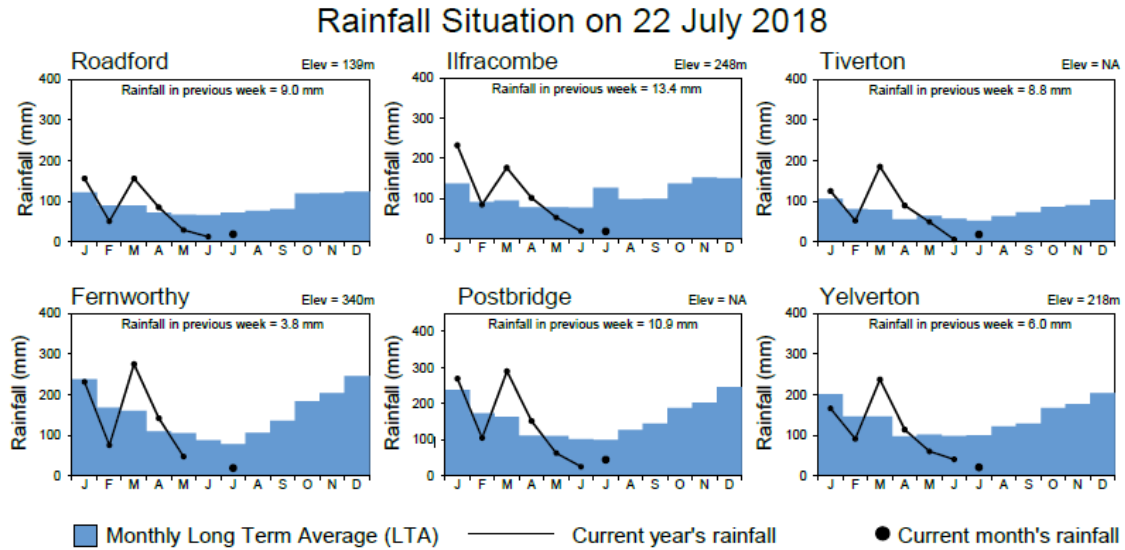
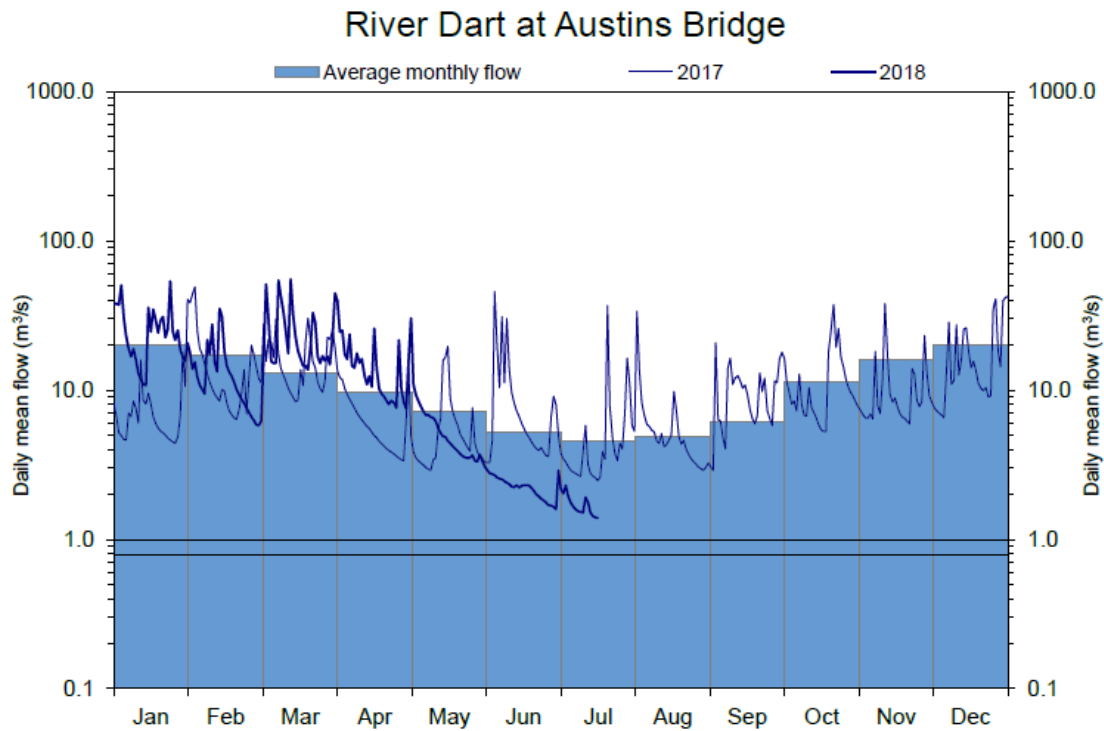


Figure A2.3: Water Situation Report - River Dart hydrograph²



¹ Monthly rainfall totals are generated from 15 minute rainfall data obtained from the Environment Agency Rainfall API: <https://environment.data.gov.uk/flood-monitoring/doc/rainfall>

² Daily mean flow and 15 minute flow data are obtained from the Environment Agency Hydrology Data Explorer: <https://environment.data.gov.uk/hydrology/explore>

Figure A2.4: Water Situation Report - reservoir storages for Burrator and Roadford

Cornwall / Devon Border Reservoir Storage on 22 July 2018

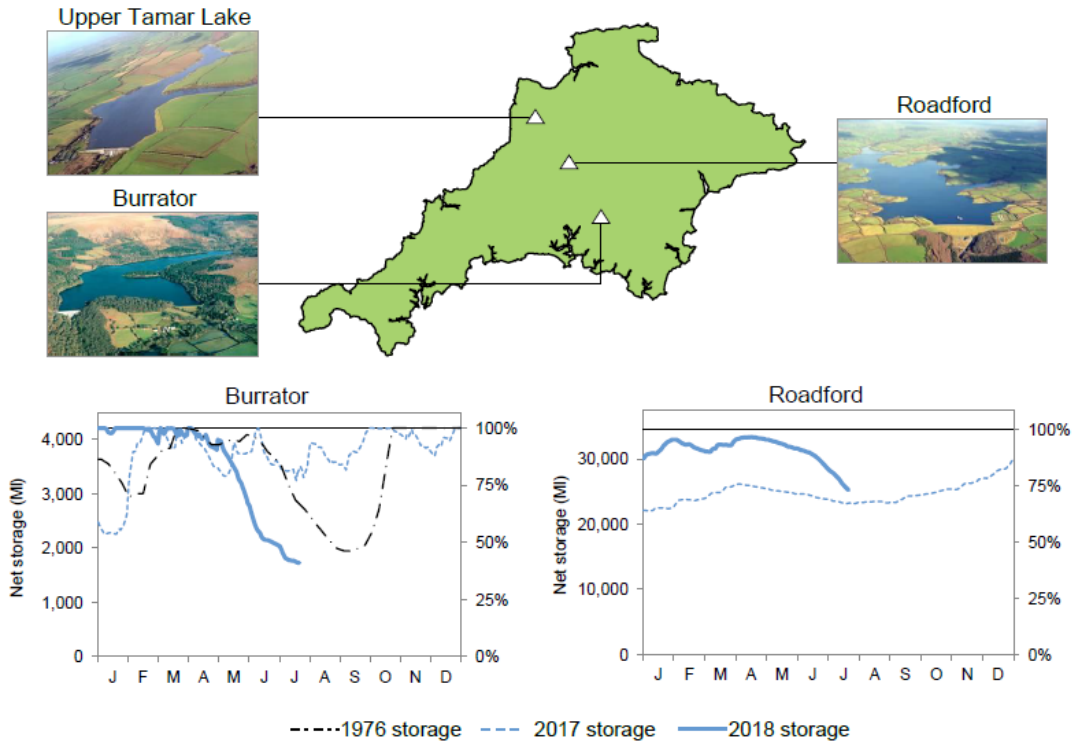
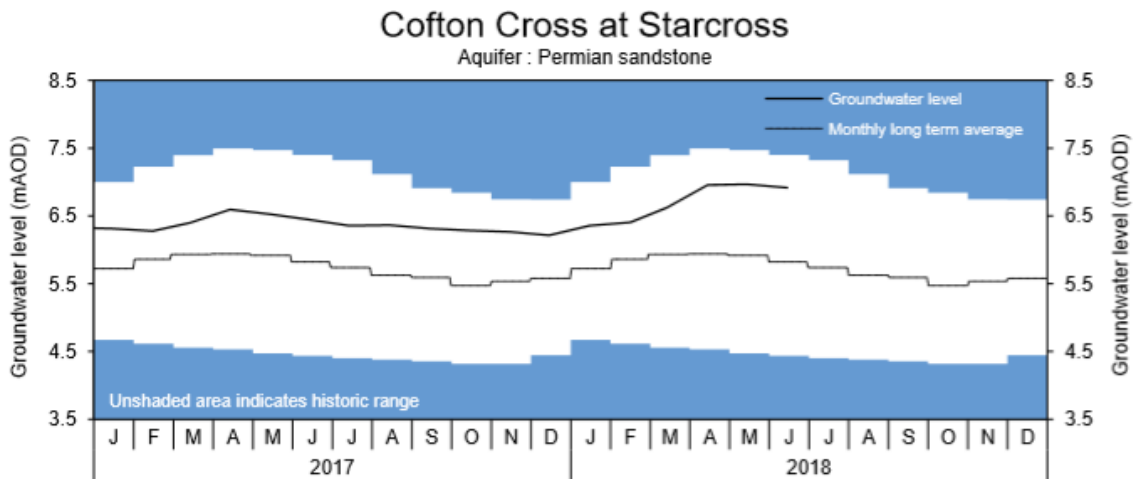


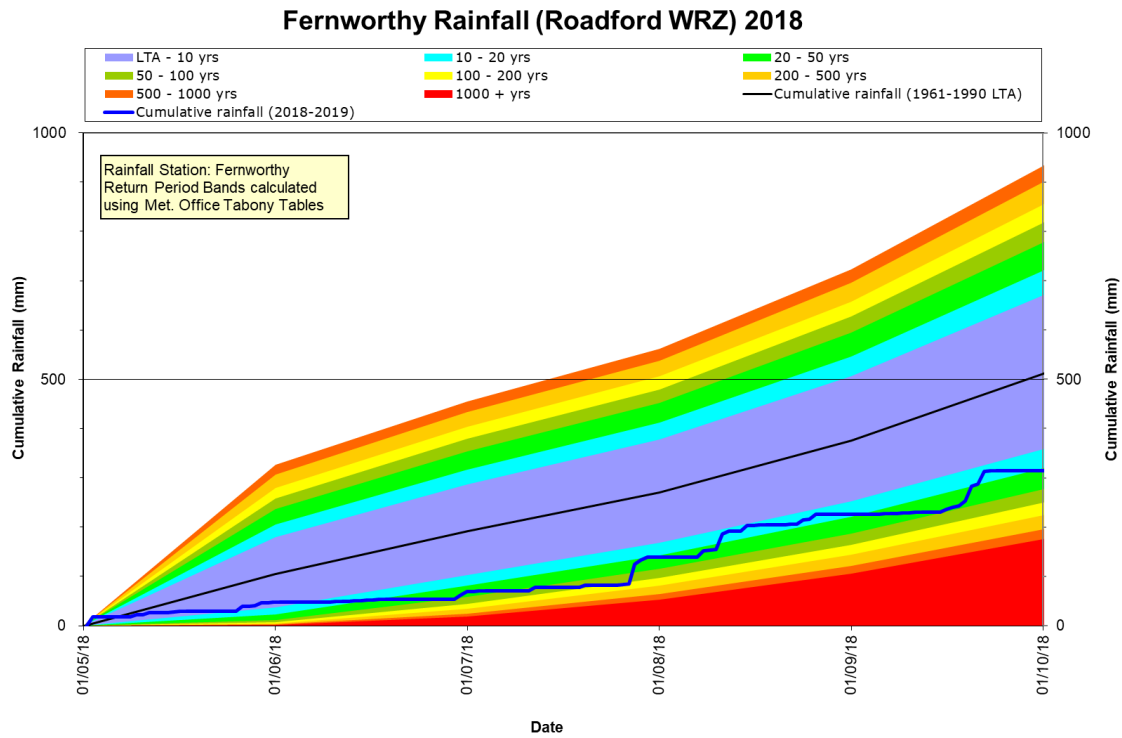
Figure A2.5: Water Situation Report - groundwater levels for Cofton Cross at Starcross



A2.1.2 Example assessment of rainfall return period

Figure A2.6 sets out an example of the assessment we undertake on rainfall return period in routine monitoring. This helps us understand the severity of any dry period as it develops.

Figure A2.6: Example assessment of cumulative rainfall – Fernworthy 2018³

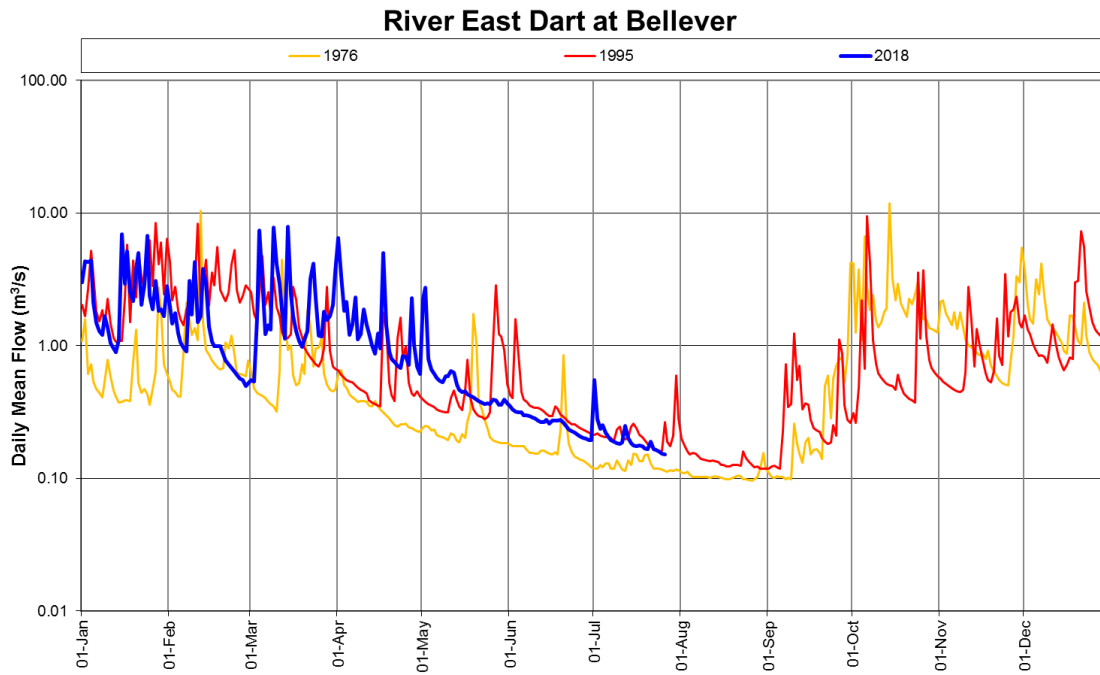


³ Daily rainfall totals for Fernworthy rain gauge were supplied by the Environment Agency

A2.1.3 Example assessment of river flow

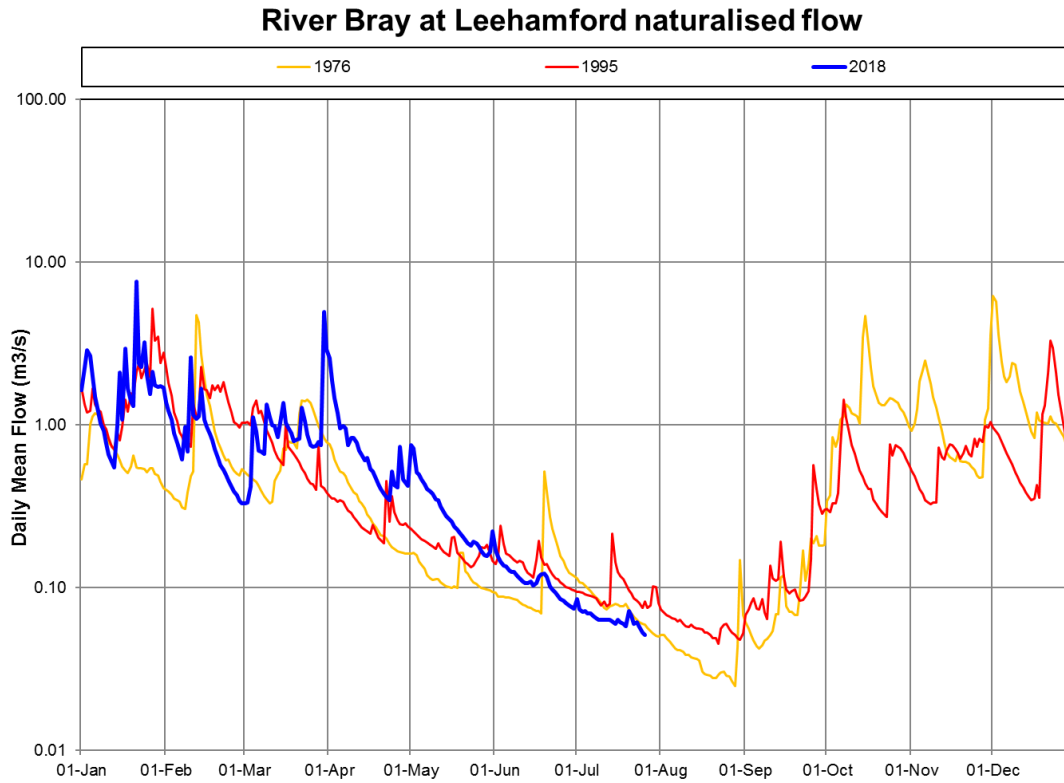
Figures A2.7 to A2.9 present examples of the routine monitoring of river flows compared to historic droughts. This helps us understand the relative severity of any dry period.

Figure A2.7: Example assessment of river flow – River East Dart at Bellever⁴



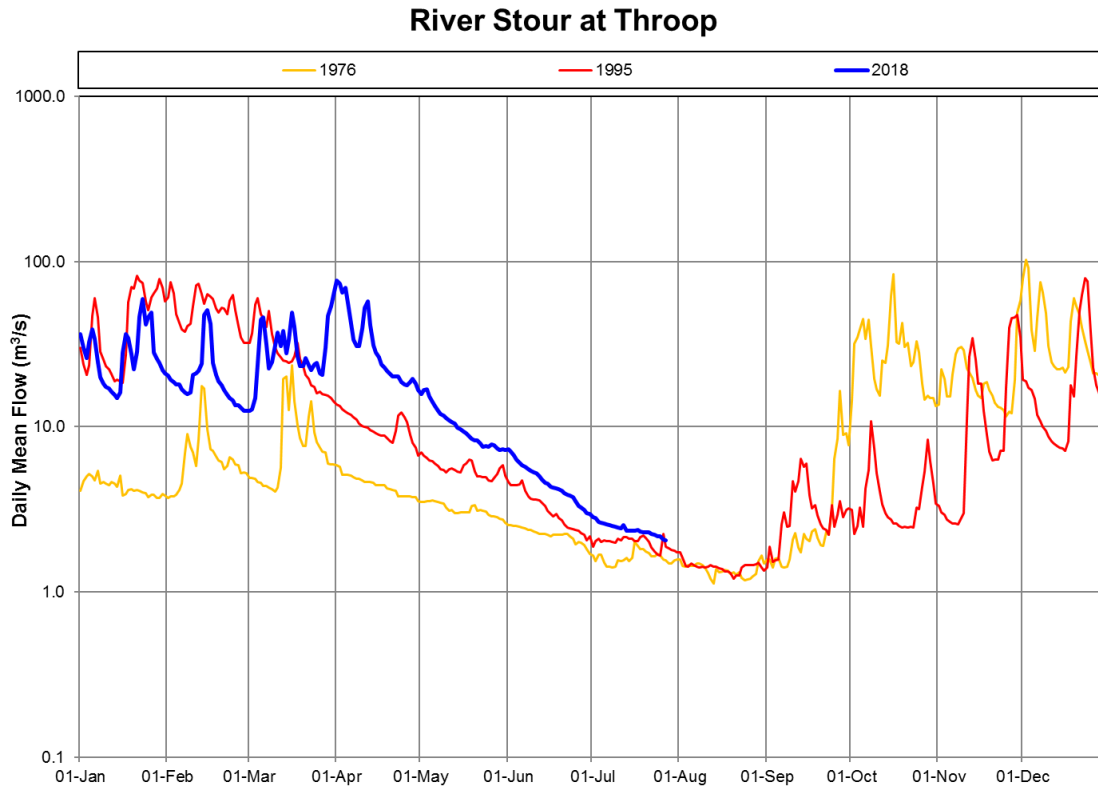
⁴ Ibid. 2

Figure A2.8: Example assessment of river flow – River Bray at Leehamford⁵



⁵ *Ibid.* 2

Figure A2.9: Example assessment of river flow – River Stour at Throop⁶



⁶ *Ibid.* 2

A2.1.4 Example strategic reservoir projections

We routinely monitor reservoir levels and forecast future levels using historic data. This helps us understand the relative severity of current storage levels and also forecasts as to whether any drought actions may be needed and when.

The primary purpose of Figures A2.10 and A2.11 are to give examples of how the Company undertakes reservoir projections as part of our water resources monitoring work.

Figure A2.10: Example Roadford Reservoir projection showing a range of flow years

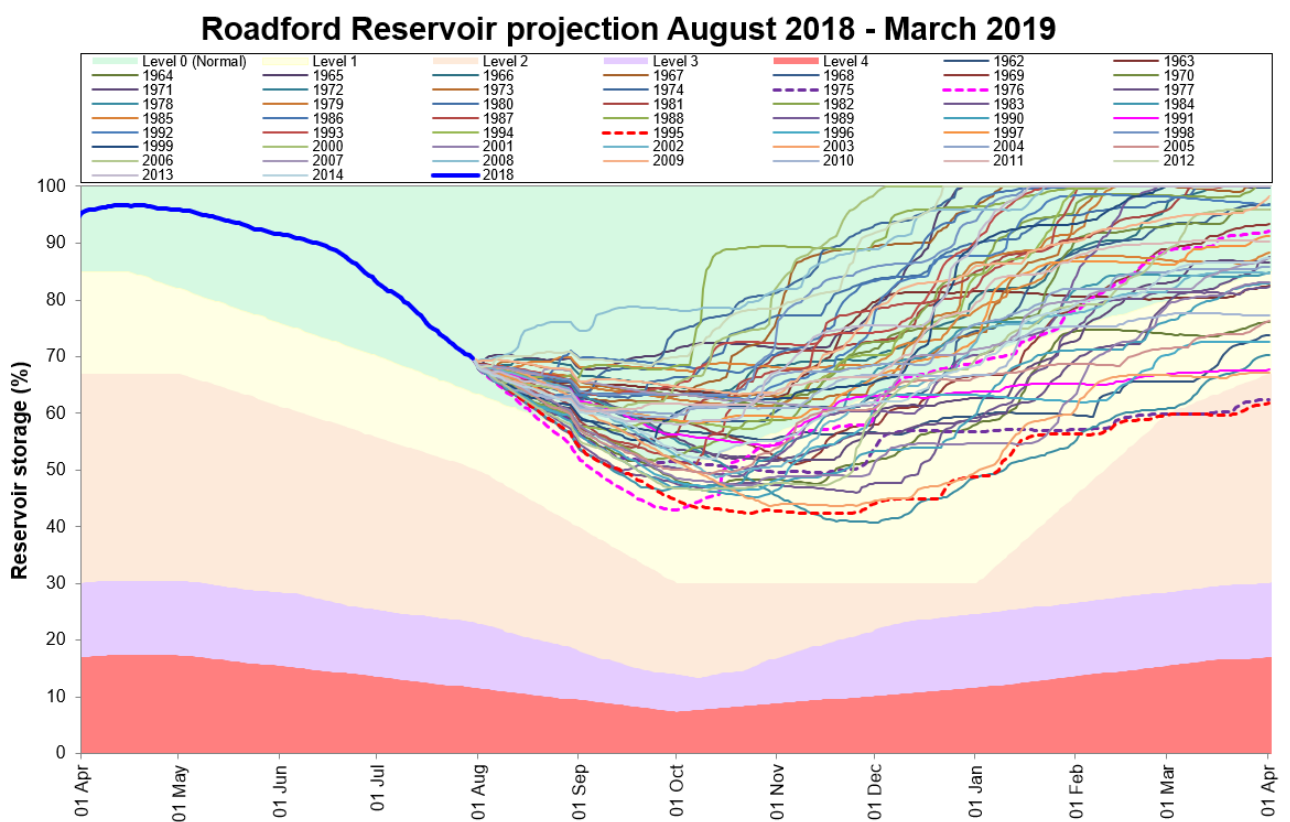
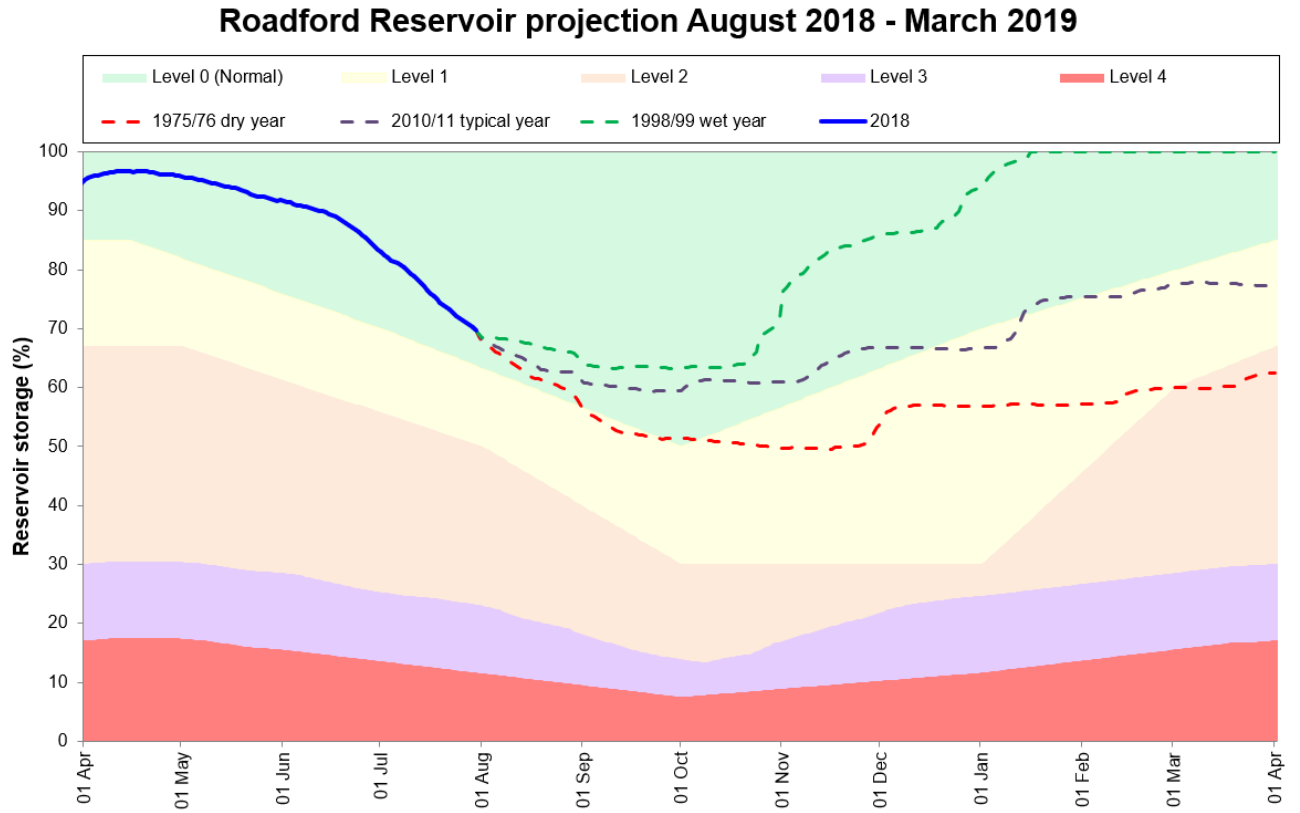
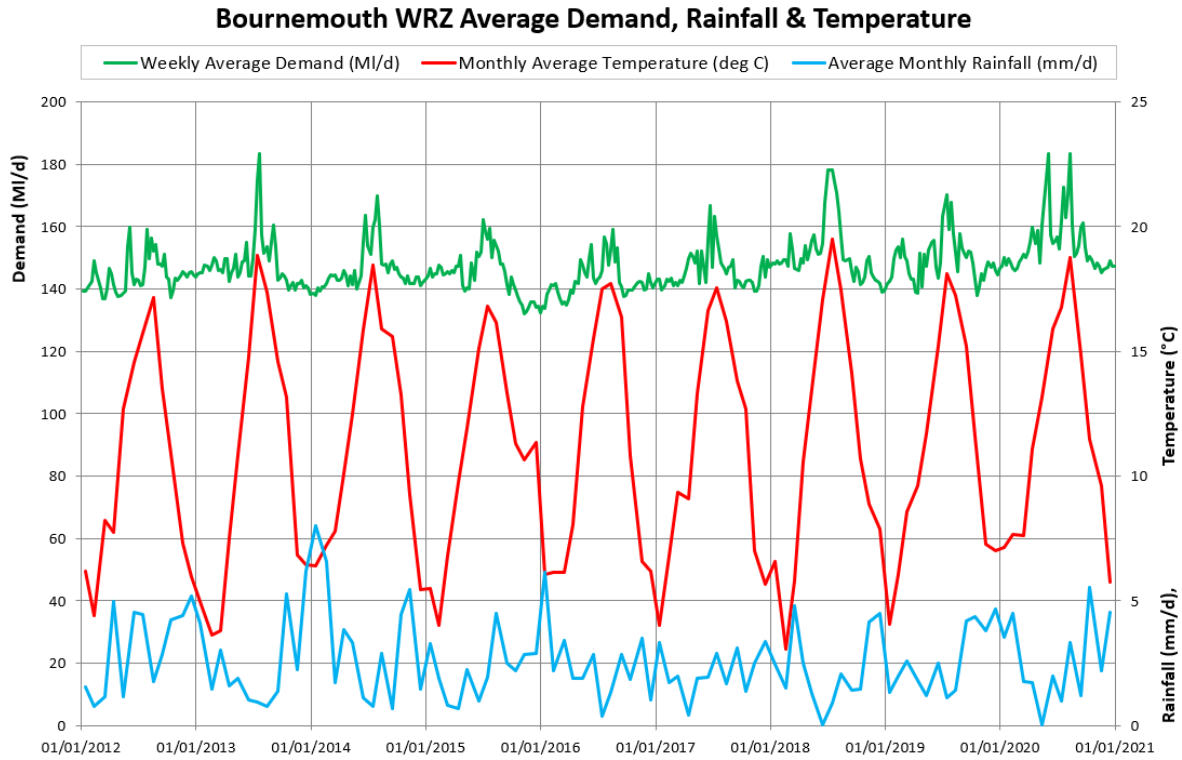


Figure A2.11: Example Roadford Reservoir projection showing a dry, a wet and a typical year



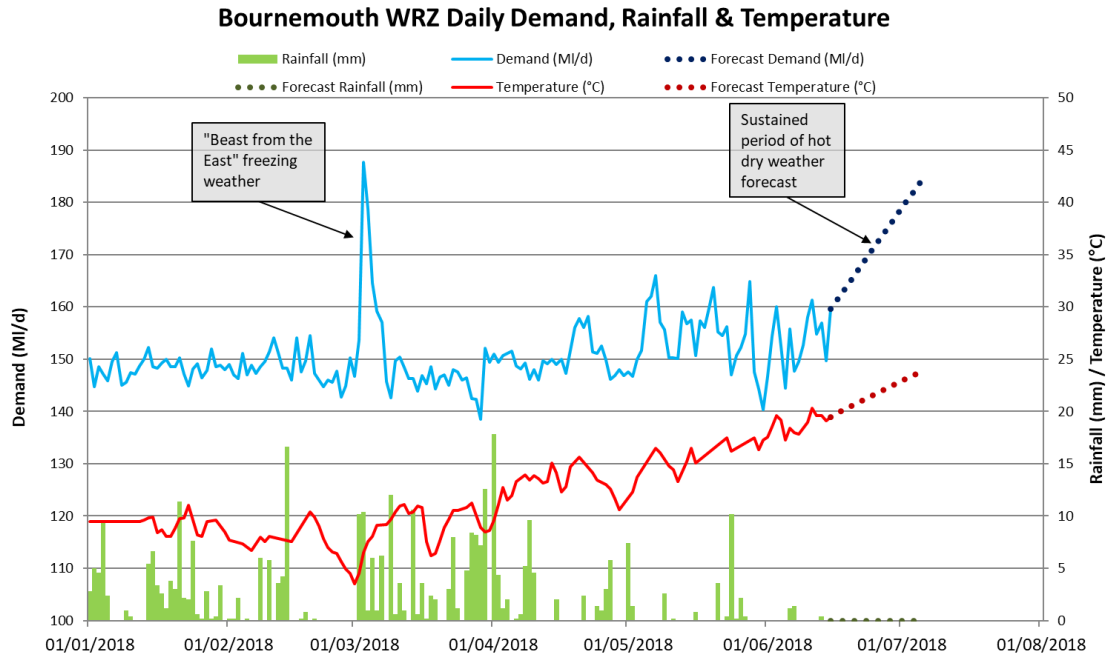
A2.1.5 Example demand-temperature-rainfall charts

Figure A2.12: A long term profile of weekly average demand, monthly average rainfall and monthly average temperature in Bournemouth WRZ (2012-2020)⁷



⁷ Daily rainfall totals for Alderney rain gauge were supplied by the Environment Agency. Monthly minimum and maximum temperature data for Hurn was obtained from the Met Office <https://www.metoffice.gov.uk/research/climate/maps-and-data/historic-station-data#?tab=climateHistoric>

Figure A2.13: Example demand-temperature-rainfall profile and forecast in Bournemouth WRZ⁸



⁸ Daily rainfall totals for Alderney rain gauge were supplied by the Environment Agency. Daily temperature of River Avon measured at Matchams intake

A2.1.6 Environment Agency monthly Water Situation Report

Figures A2.14 to A2.21 are examples of the information published by the Environment Agency in the monthly England, Devon & Cornwall area and Wessex area Water Situation Reports, and in the weekly Rainfall & River Flow Summary for England report. These reports are available here: <https://www.gov.uk/government/collections/water-situation-reports-for-england>

Figure A2.14: Example soil moisture deficit in Environment Agency Water Situation Report

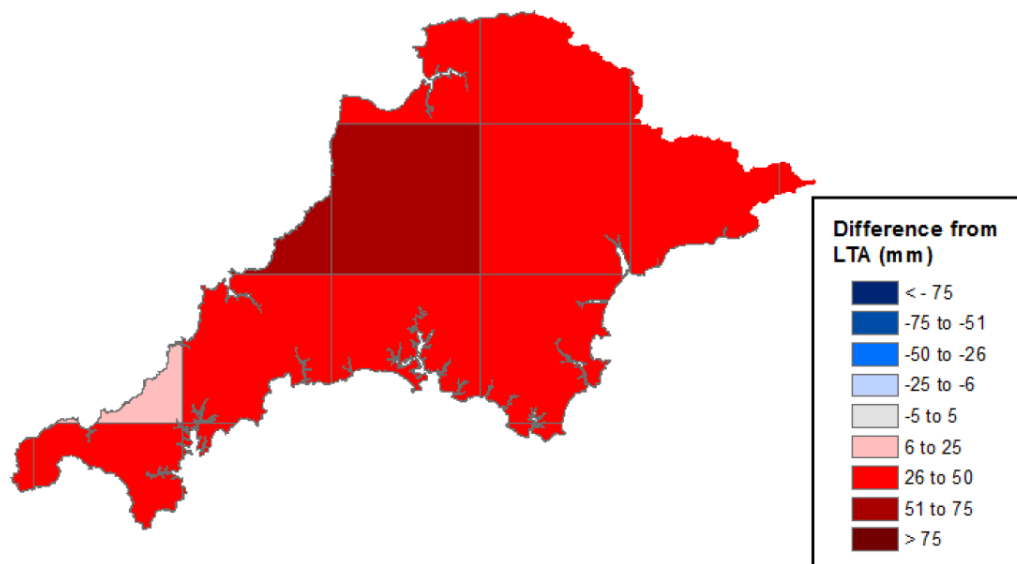


Figure 2.2: Soil moisture deficits for week ending 31 July 2018. MORECS data for real land use (Source: Met Office © Crown Copyright, 2018). Crown copyright. All rights reserved. Environment Agency, 100026380, 2018.

Figure A2.15: Example rainfall information in Environment Agency Water Situation Report

Rainfall

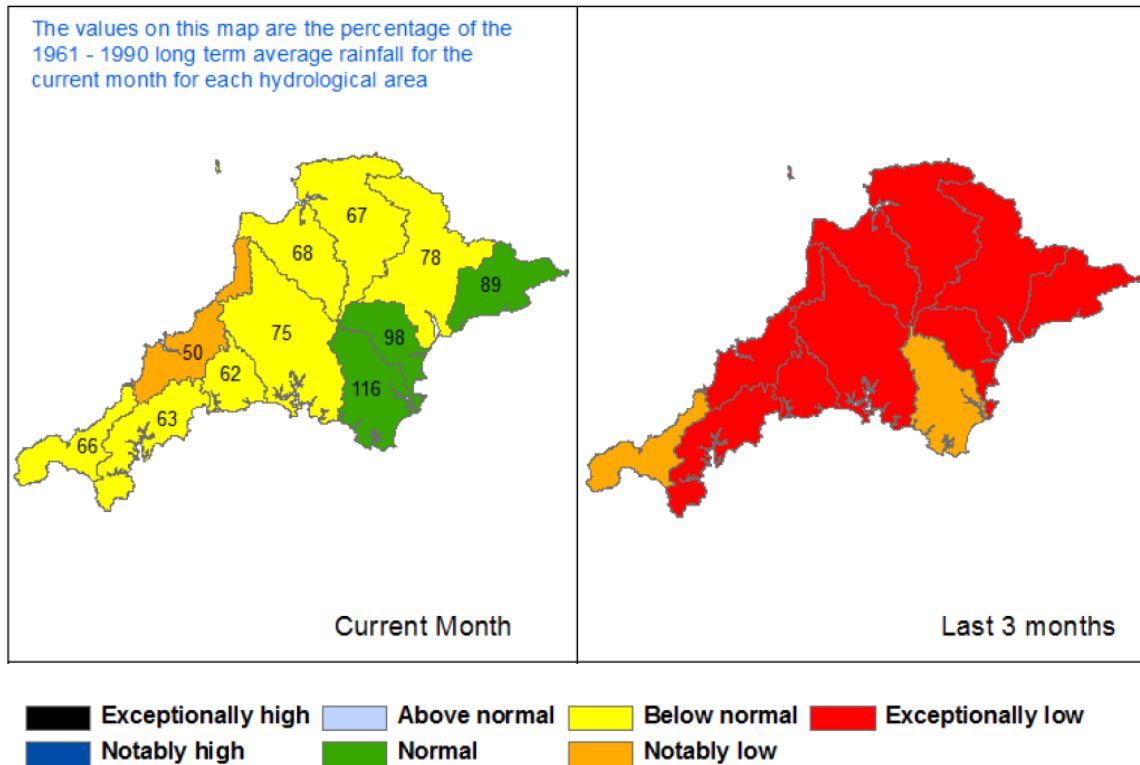


Figure 1.1: Total rainfall for hydrological areas across Devon and Cornwall for the current month, the last three months, the last six months and the last 12 months, classed relative to an analysis of respective historic totals. Final NCIC (National Climate Information Centre) data based on the Met Office 5km gridded rainfall dataset derived from rain gauges (Source: Met Office © Crown Copyright, 2018). Provisional data based on Environment Agency 1km gridded rainfall dataset derived from Environment Agency intensity rain gauges. Crown copyright. All rights reserved. Environment Agency, 100026380, 2018.

Figure A2.16: Example current river flow information in Environment Agency Water Situation Report

River Flow

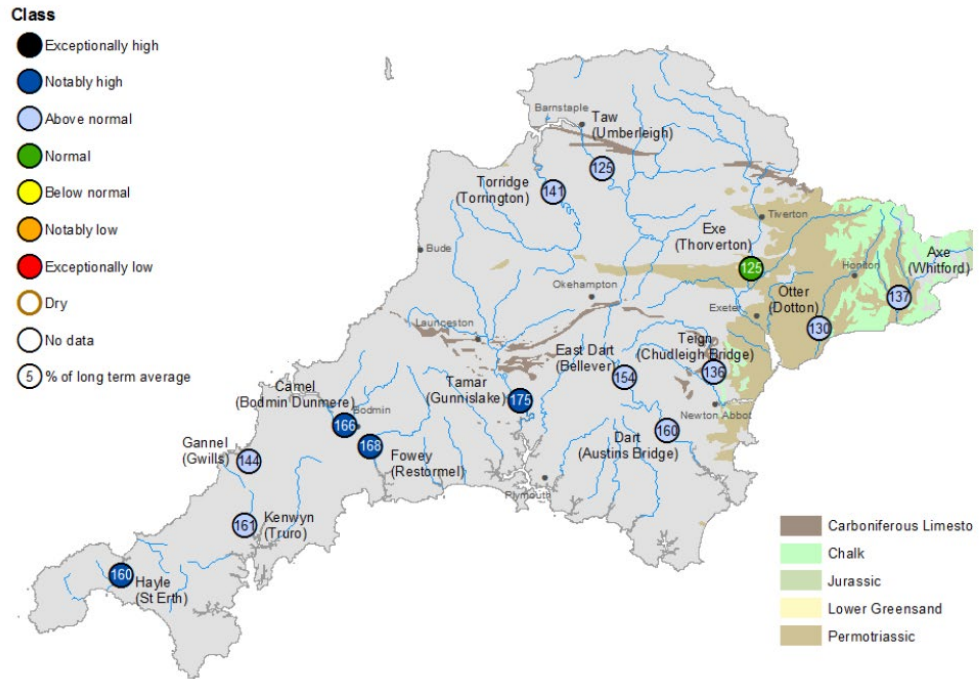


Figure 3.1: Monthly mean river flows at indicator sites for February 2021, expressed as a percentage of the respective long term average and classed relative to an analysis of historic February monthly means (Source: Environment Agency). Crown copyright. All rights reserved. Environment Agency, 100026380, 2021.

Figure A2.17: Example current groundwater level information in Environment Agency Water Situation Report

Groundwater Levels

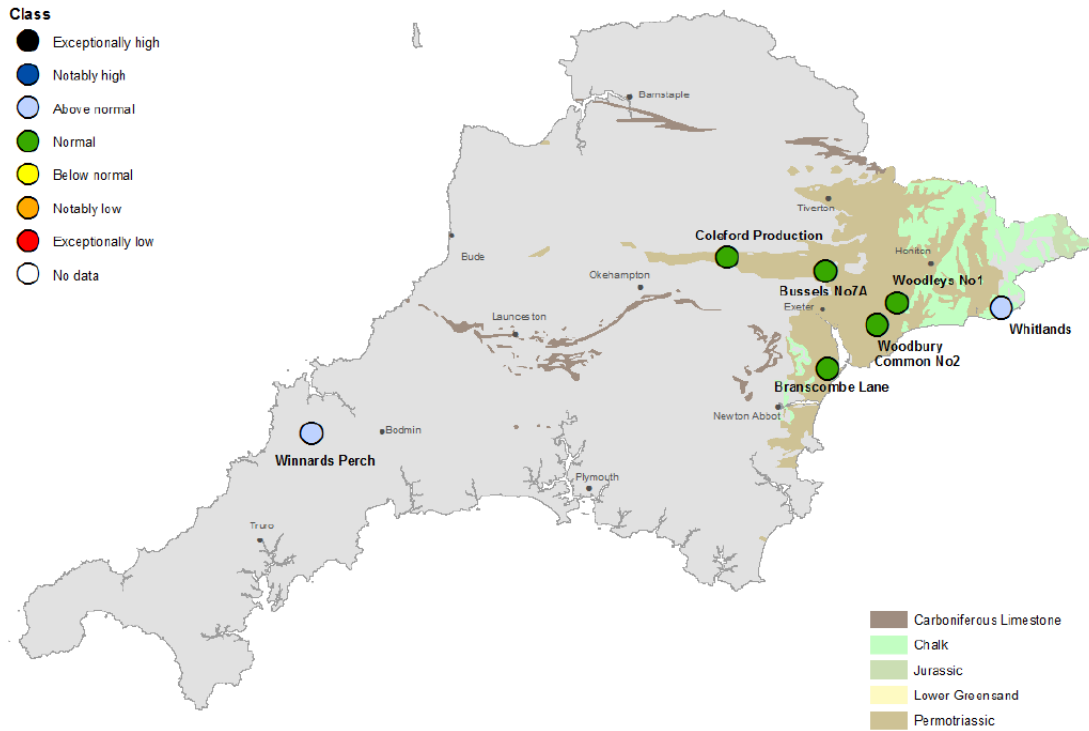


Figure 4.1: Groundwater levels for indicator sites at the end of February 2021, classed relative to an analysis of respective historic February levels (Source: Environment Agency). Geological map reproduced with permission from UK Groundwater Forum, BGS © NERC. Note: groundwater levels are reported at different times during the month and therefore may not be fully representative of levels at the month end. Crown copyright. All rights reserved. Environment Agency, 100026380, 2021.

Figure A2.18: Example river flow projections in Environment Agency Water Situation Report

Forward look: river flow

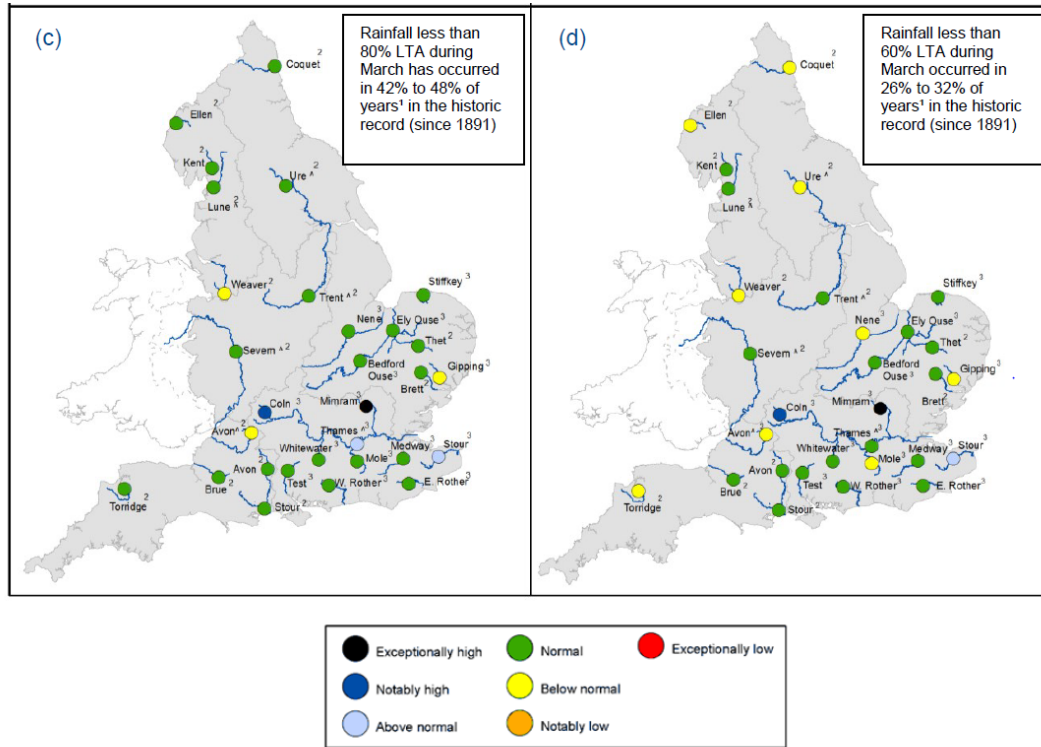
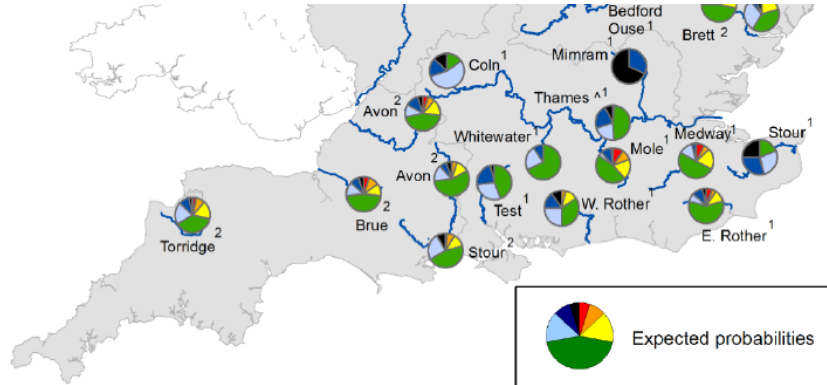


Figure 6.1: Projected river flows at key indicator sites up until the end of March 2021. Projections based on four scenarios: 120% (a), 100% (b), 80% (c) and 60% (d) of long term average rainfall between February 2021 and September 2021 (Source: Centre for Ecology and Hydrology, Environment Agency)

Figure A2.19: Example river flow probabilistic projections in Environment Agency Water Situation Report



Exceptionally high or low levels are those which would typically occur 5% of the time within the historic record. Notably high or low levels are those which would typically occur 8% of the time. Above normal or below normal levels are those which would typically occur 15% of the time. Normal levels are those which would typically occur 44% of the time within the historic record.

Figure 6.4: Probabilistic ensemble projections of river flows at key indicator sites up until the end of September 2021. Pie charts indicate probability, based on climatology, of the surface water flow at each site being e.g. exceptionally low for the time of year. (Source: Centre for Ecology and Hydrology, Environment Agency).

Figure A2.20: Example groundwater projections in Environment Agency Water Situation Report

Forward look: groundwater

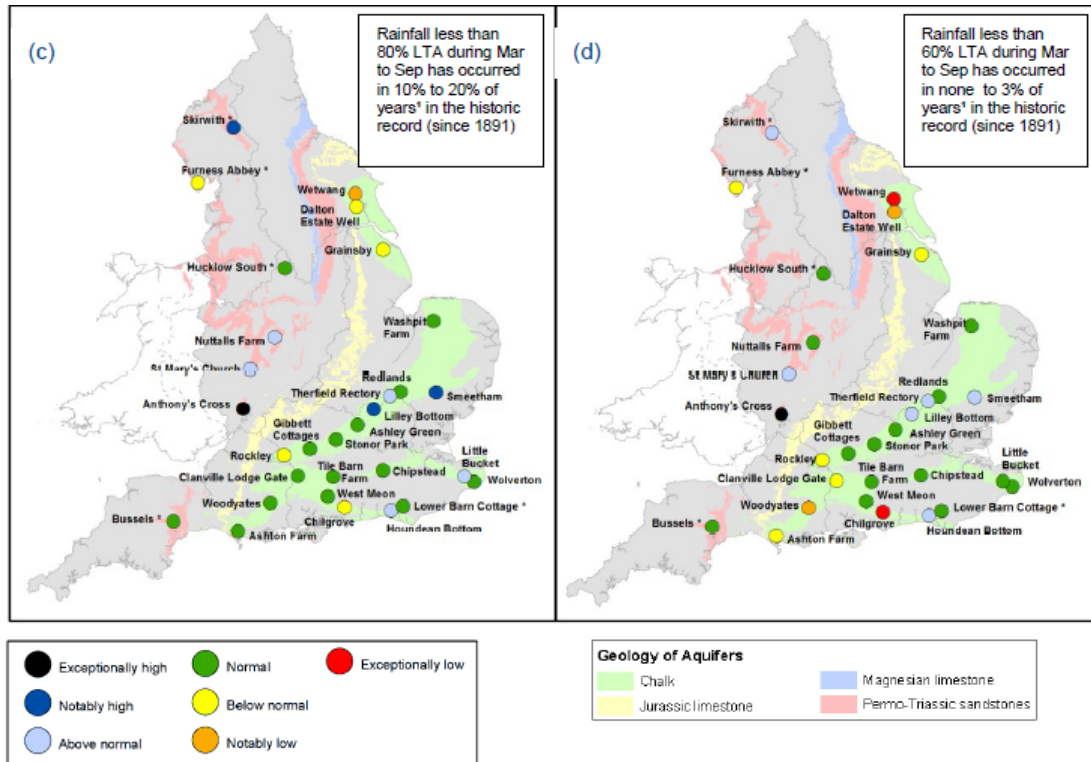
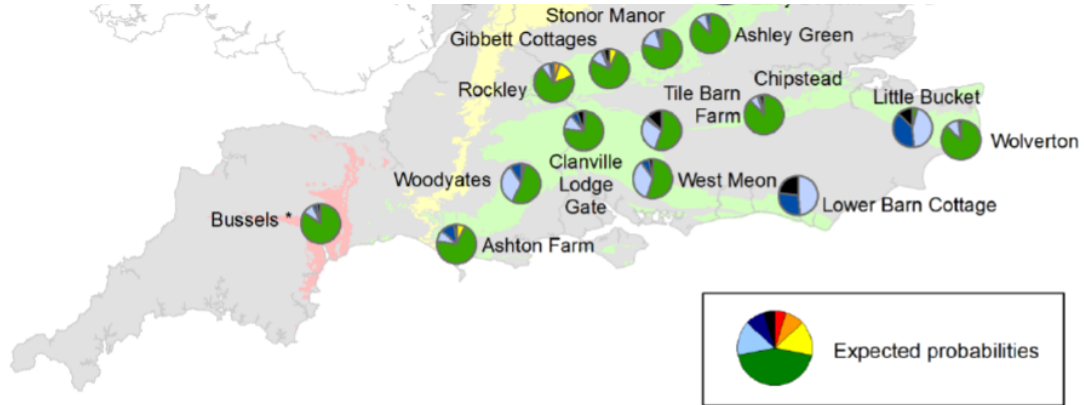


Figure 6.6: Projected groundwater levels at key indicator sites at the end of September 2021. Projections based on four scenarios: 120% (a), 100% (b), 80% (c) and 60% (d) of long term average rainfall between February 2021 and September 2021 (Source: Environment Agency) Geological map reproduced with kind permission from UK Groundwater Forum BGS © NERC Crown copyright. All rights reserved. Environment Agency 100024198 2020.

Figure A2.21: Example groundwater probabilistic projections in Environment Agency Water Situation Report



Exceptionally high or low levels are those which would typically occur 5% of the time within the historic record. Notably high or low levels are those which would typically occur 8% of the time. Above normal or below normal levels are those which would typically occur 15% of the time. Normal levels are those which would typically occur 44% of the time within the historic record.

Figure 6.8: Probabilistic ensemble projections of groundwater levels at key indicator sites at the end of September 2021. Pie charts indicate probability, based on climatology, of the groundwater level at each site being e.g. exceptionally low for the time of year. (Source: Environment Agency) Geological map reproduced with kind permission from UK Groundwater Forum, BGS © NERC. Crown copyright. All rights reserved. Environment Agency, 100024198, 2020.

* Projections for these sites are produced by BGS

A2.2 Drought management zones

As described in Section 2, due to the different characteristics of the water resources systems in our WRZs, in Colliford, Roadford and Wimbleball WRZs the drought management zones are defined against reservoir storages whereas in Bournemouth WRZ they are defined against peak demand.

The three strategic reservoirs (Colliford, Roadford and Wimbleball) have four drought management zones as they are the most critical. All local reservoirs have three drought management zones.

A2.2.1 Colliford WRZ

Figure A2.22: Drought management zones - Colliford Reservoir

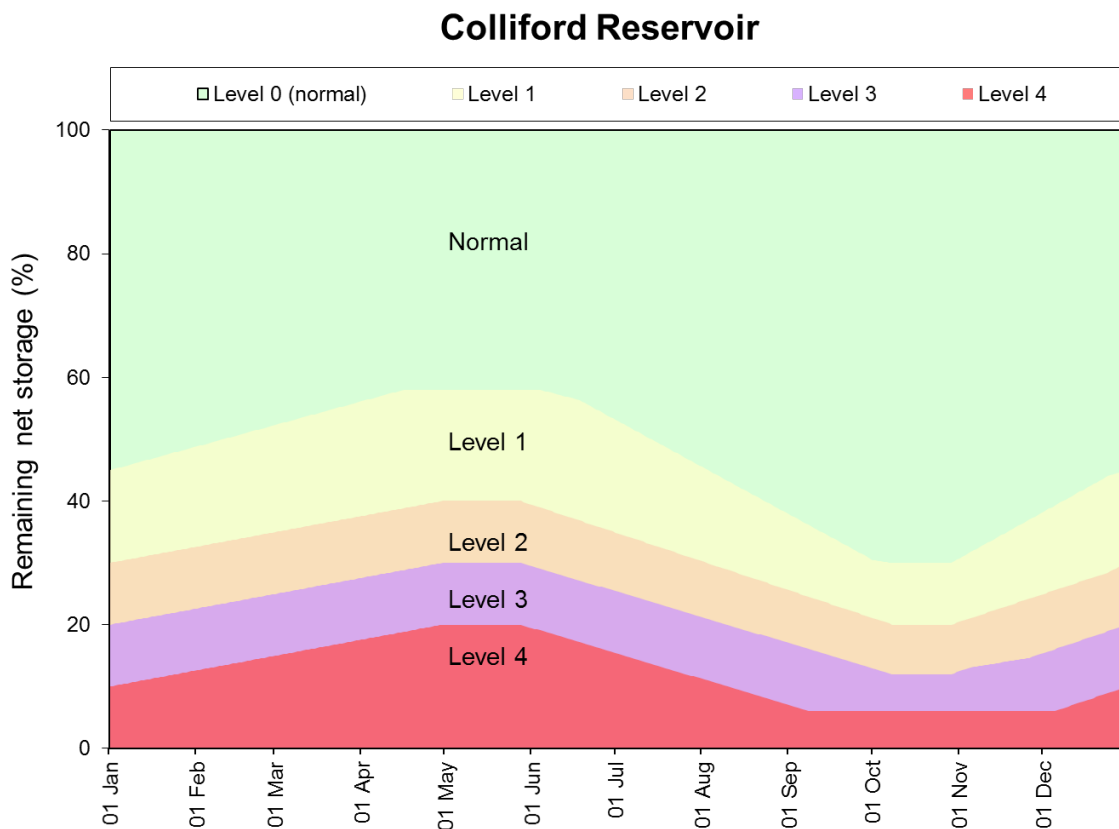


Figure A2.23: Drought management zones - Argal & College Reservoirs

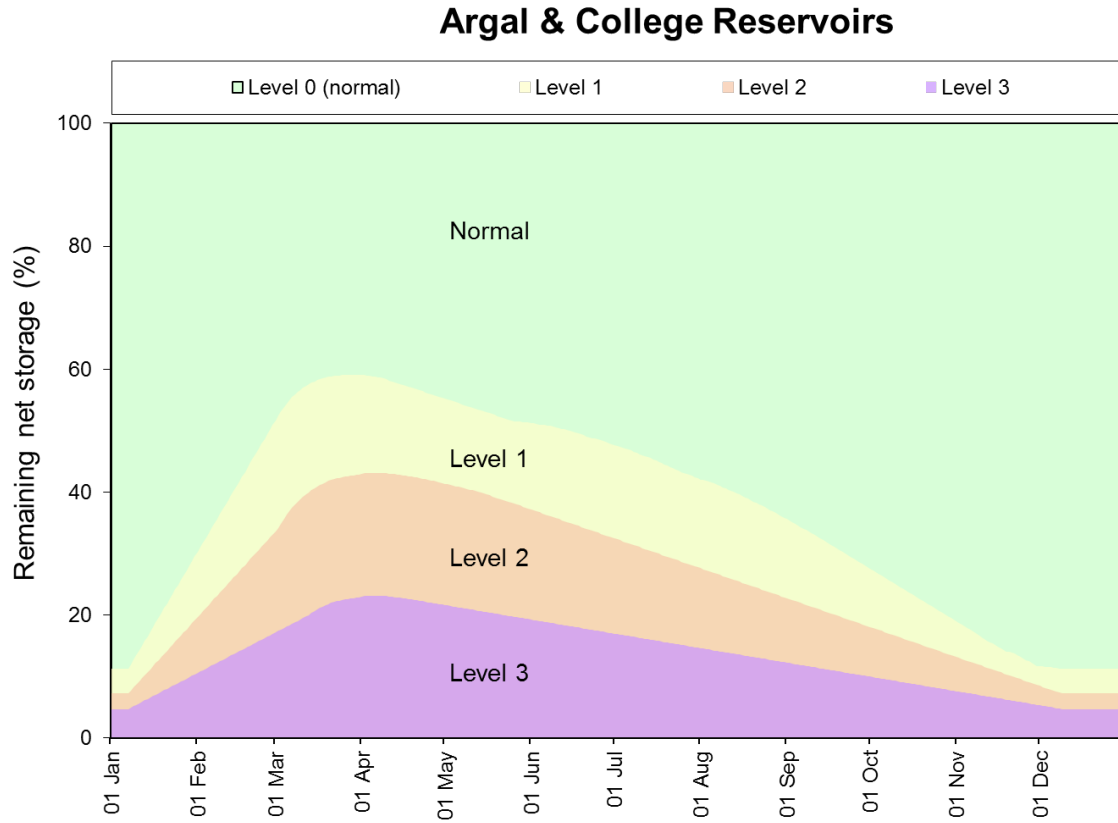


Figure A2.24: Drought management zones - Crowdy Reservoir

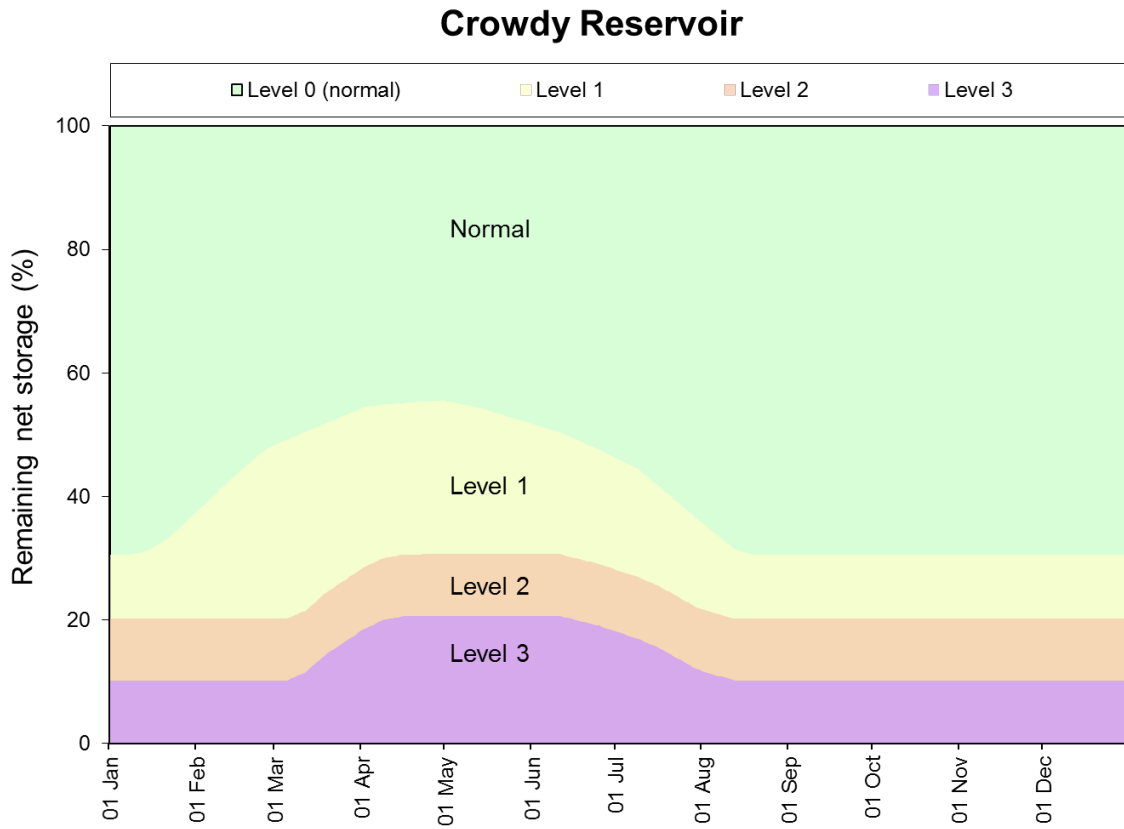


Figure A2.25: Drought management zones - Drift Reservoir

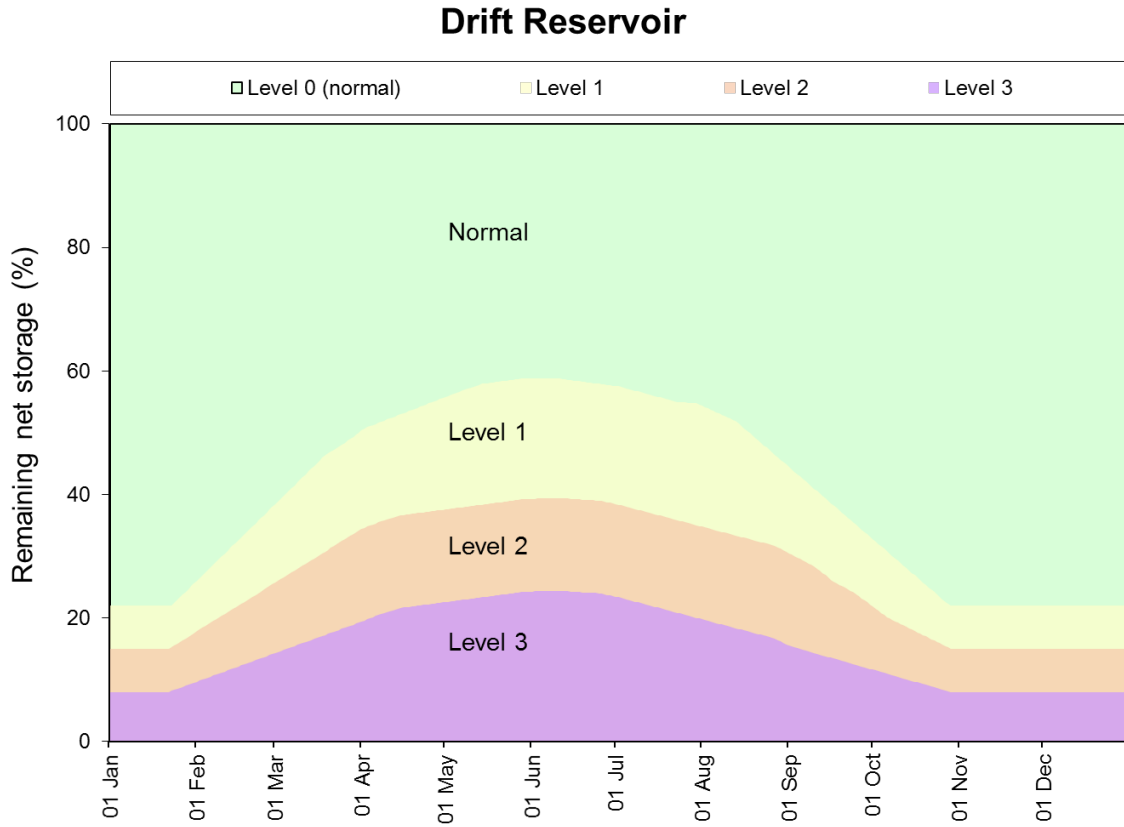


Figure A2.26: Drought management zones - Siblyback Reservoir

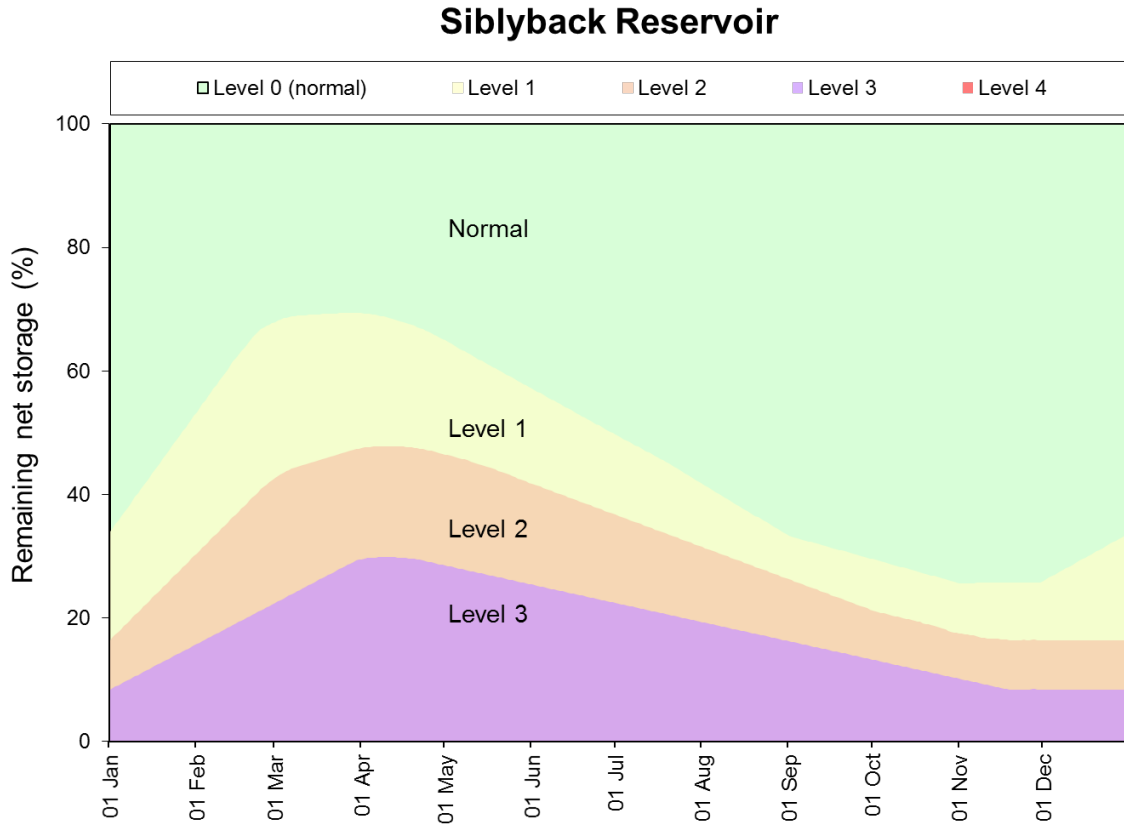


Figure A2.27: Drought management zones - Stithians Reservoir

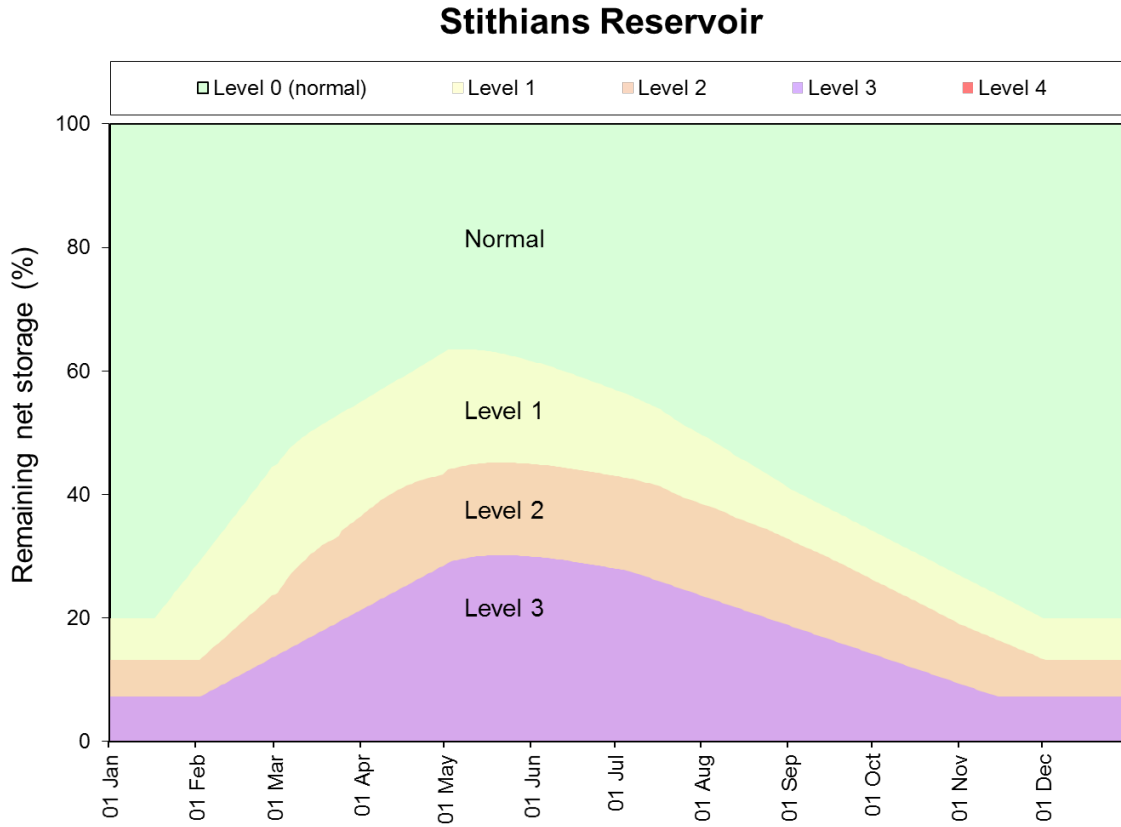


Figure A2.28: Drought management zones - Park Lake

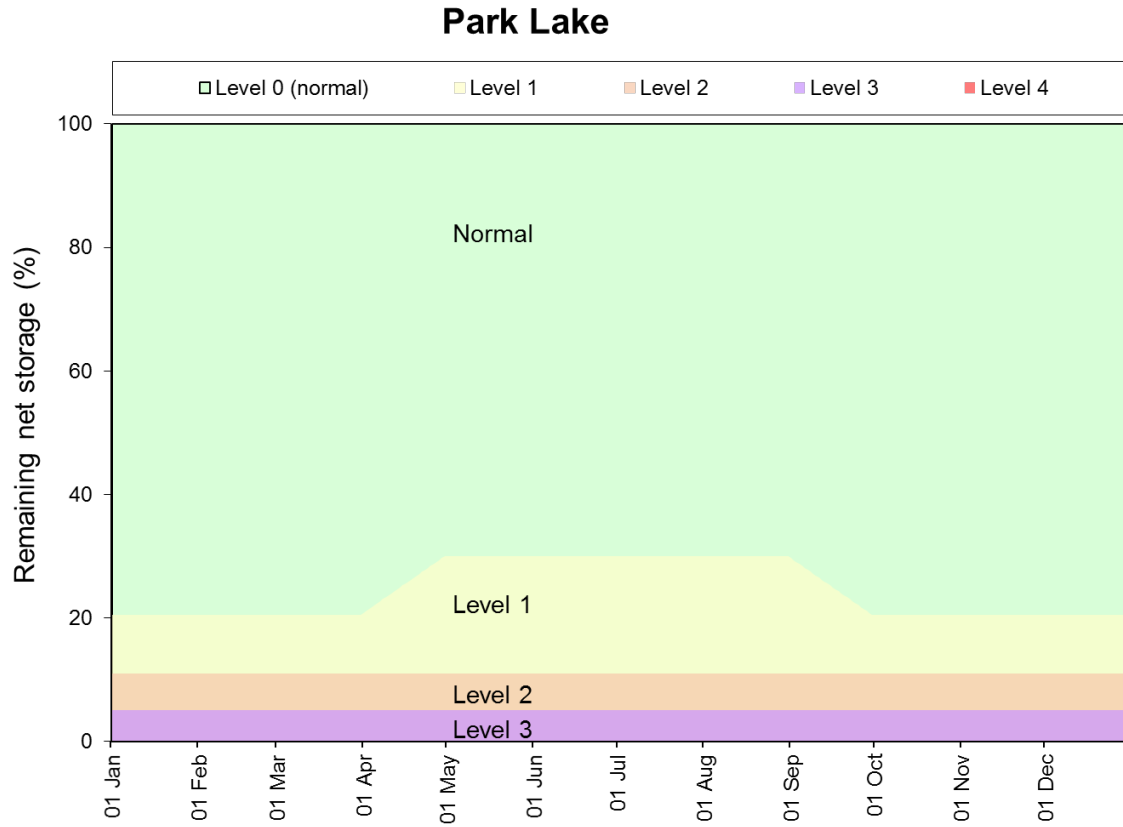
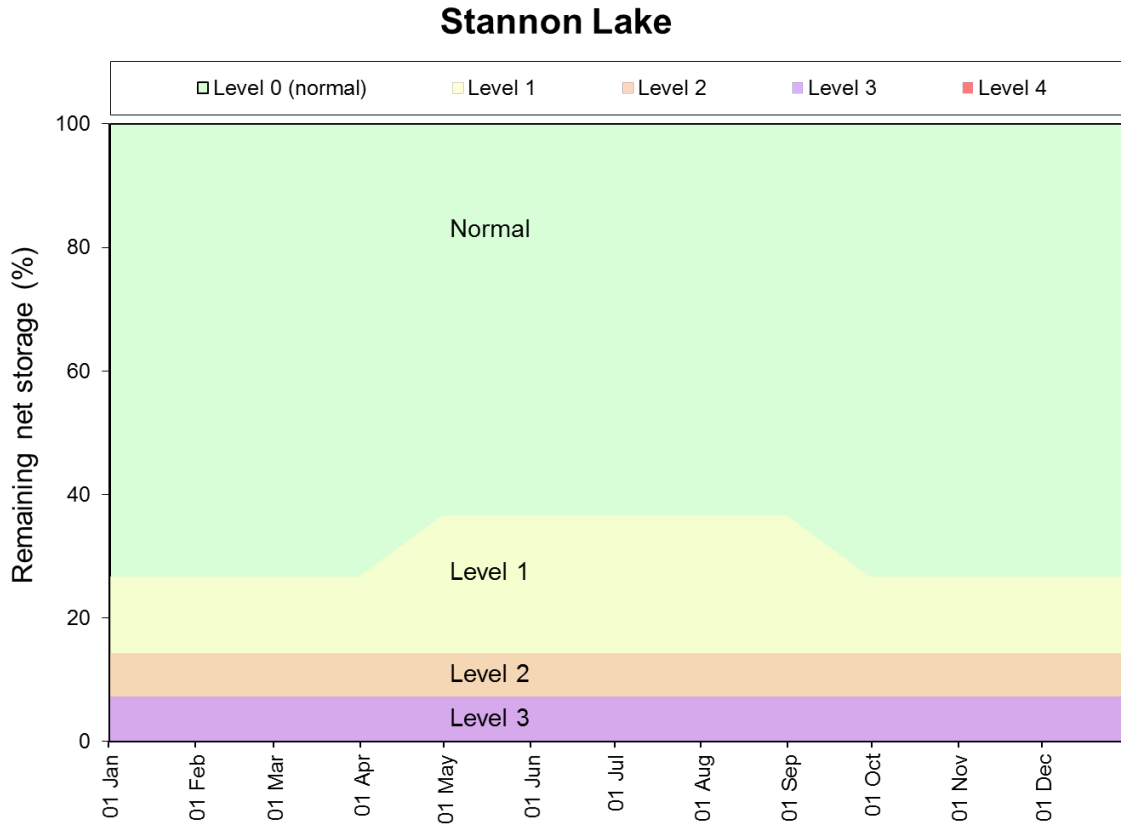


Figure A2.29: Drought management zones - Stannon Lake



A2.2.2 Roadford WRZ

Figure A2.30: Drought management zones - Roadford Reservoir

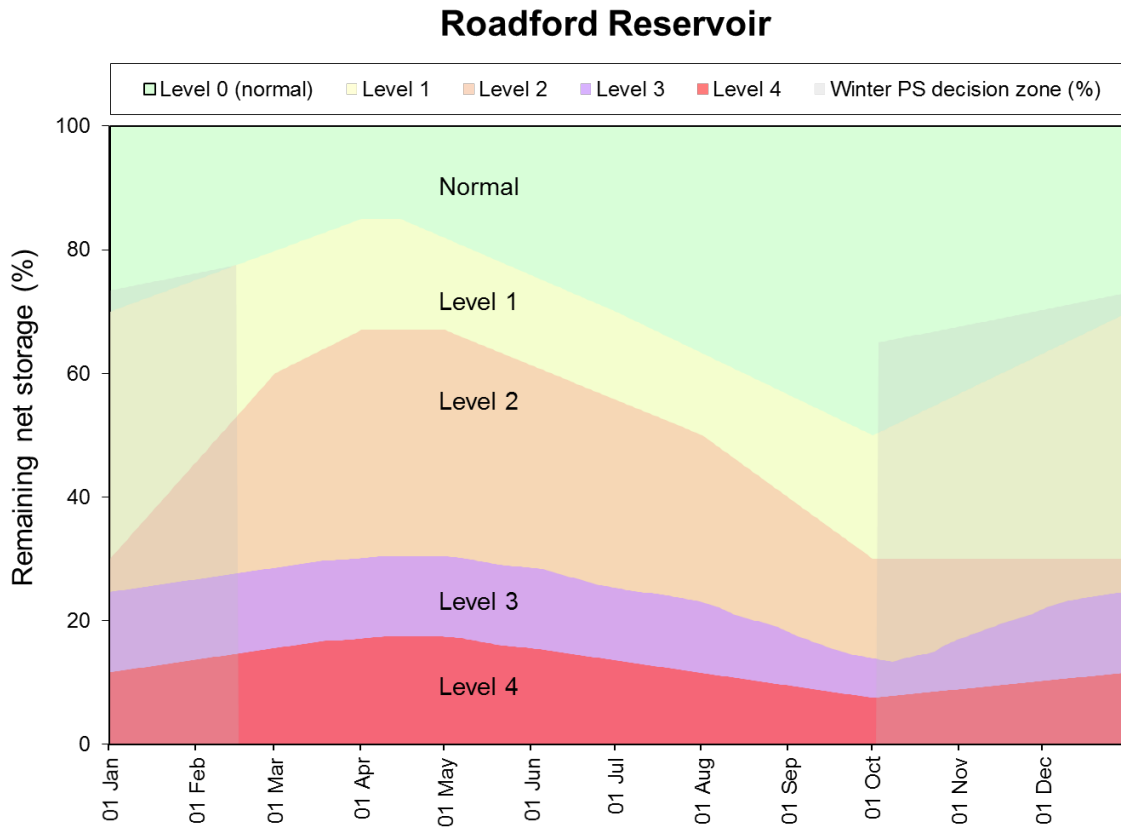


Figure A2.31: Drought management zones - Avon Reservoir

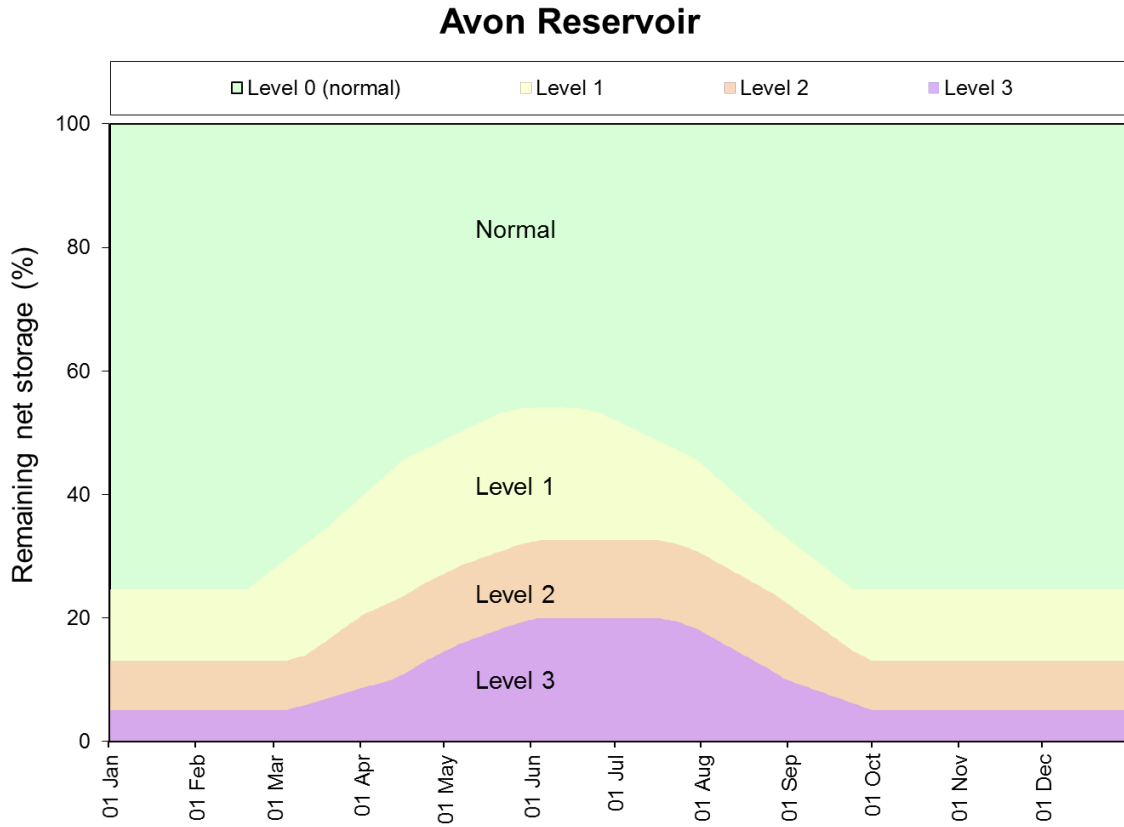


Figure A2.32: Drought management zones - Fernworthy Reservoir

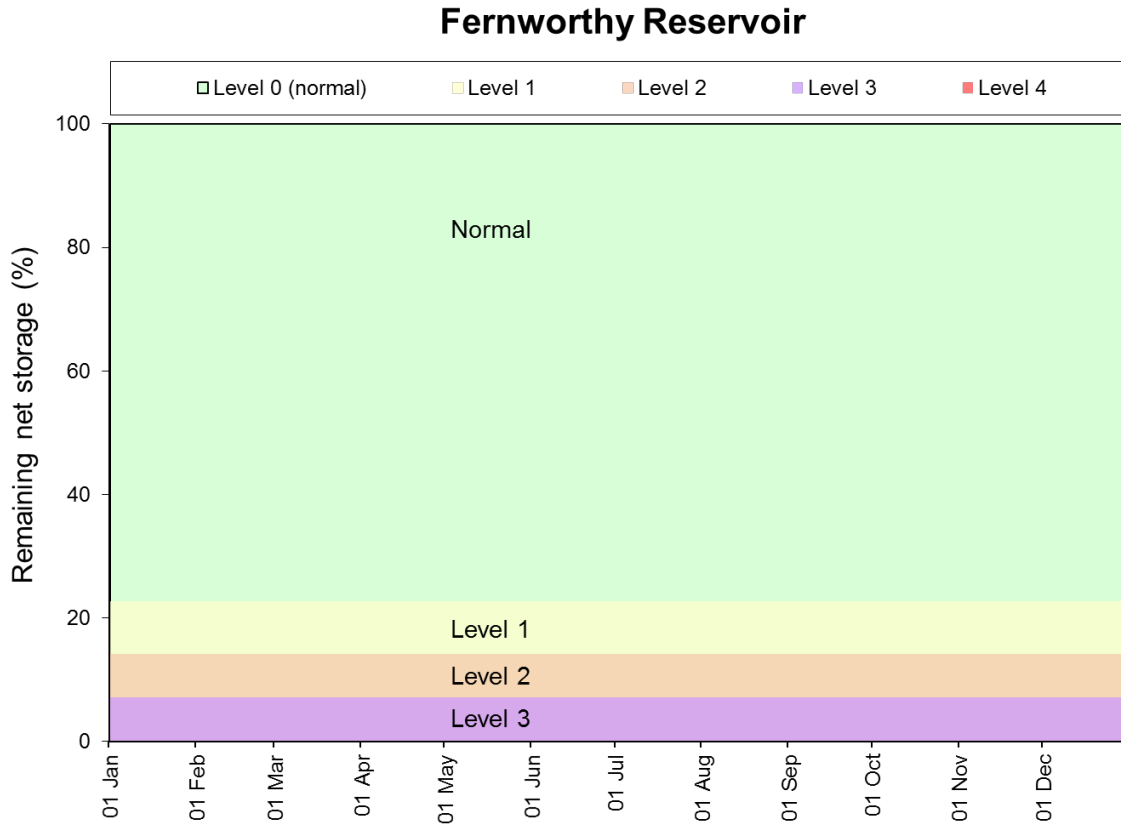


Figure A2.33: Drought management zones - Burrator Reservoir

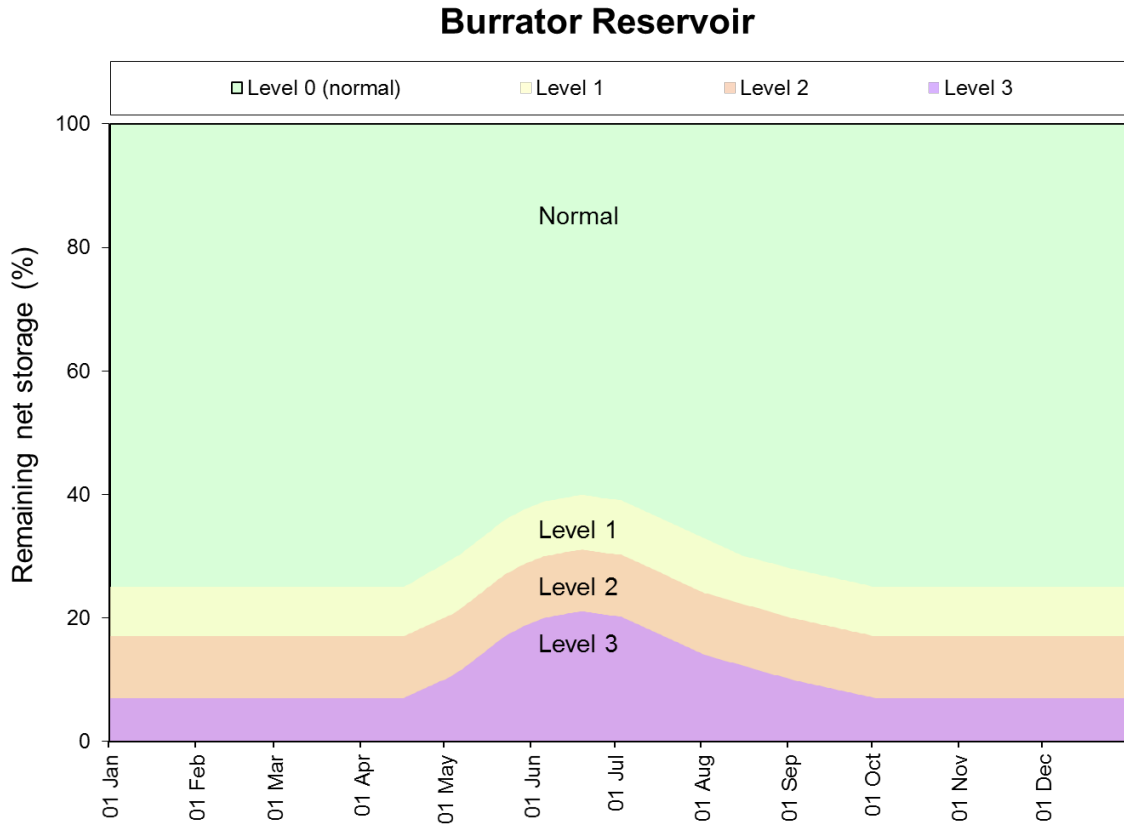


Figure A2.34: Drought management zones - KTT Reservoir

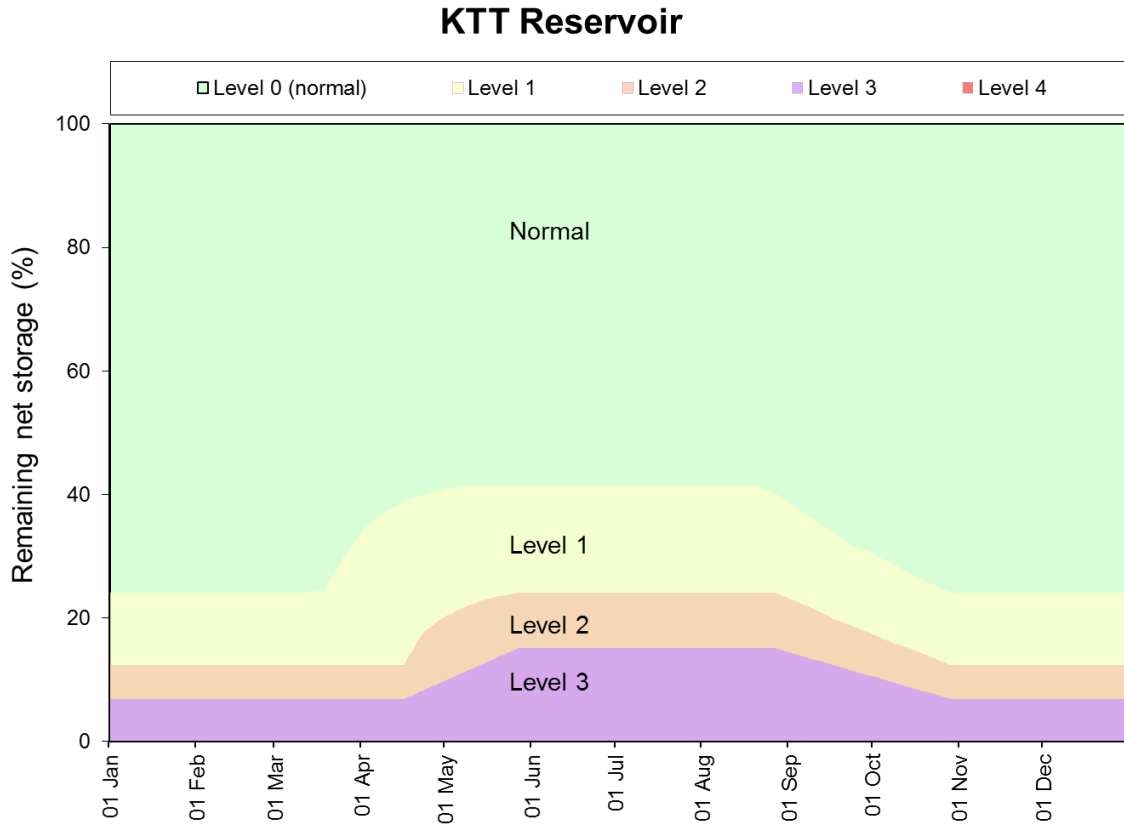


Figure A2.35: Drought management zones - Meldon Reservoir

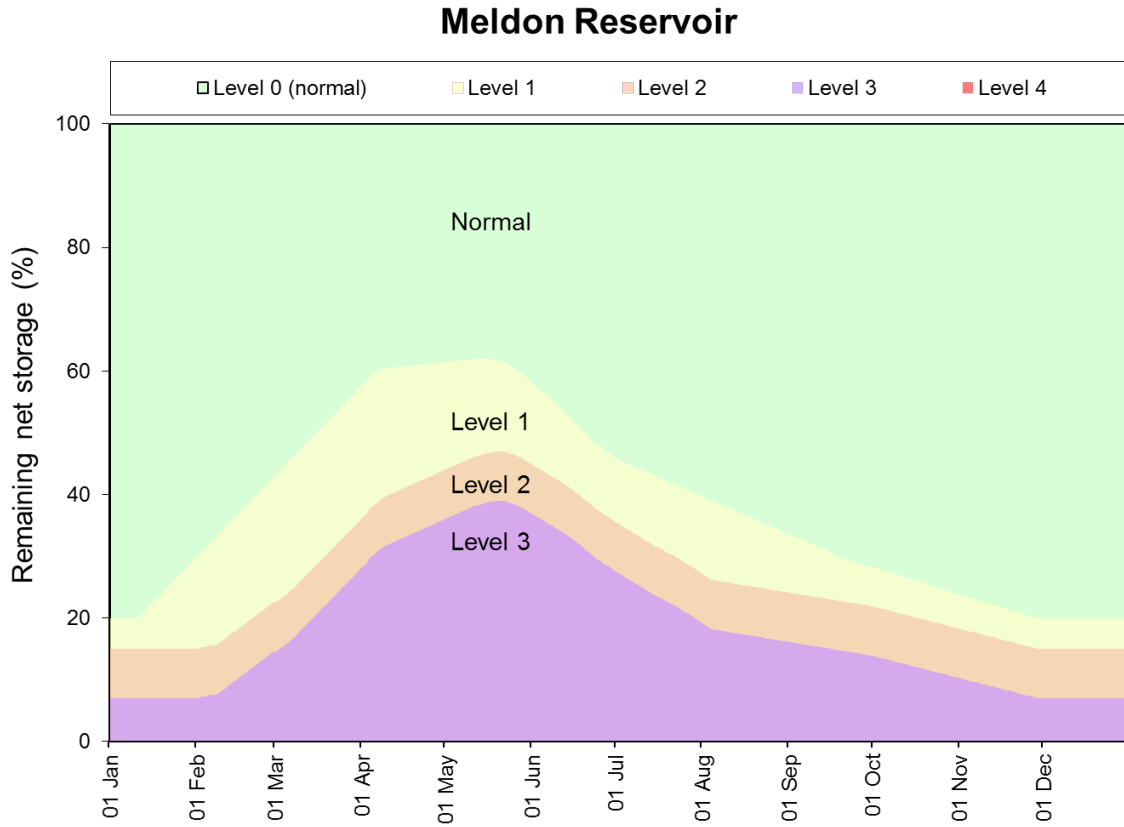


Figure A2.36: Drought management zones - Upper Tamar Lake

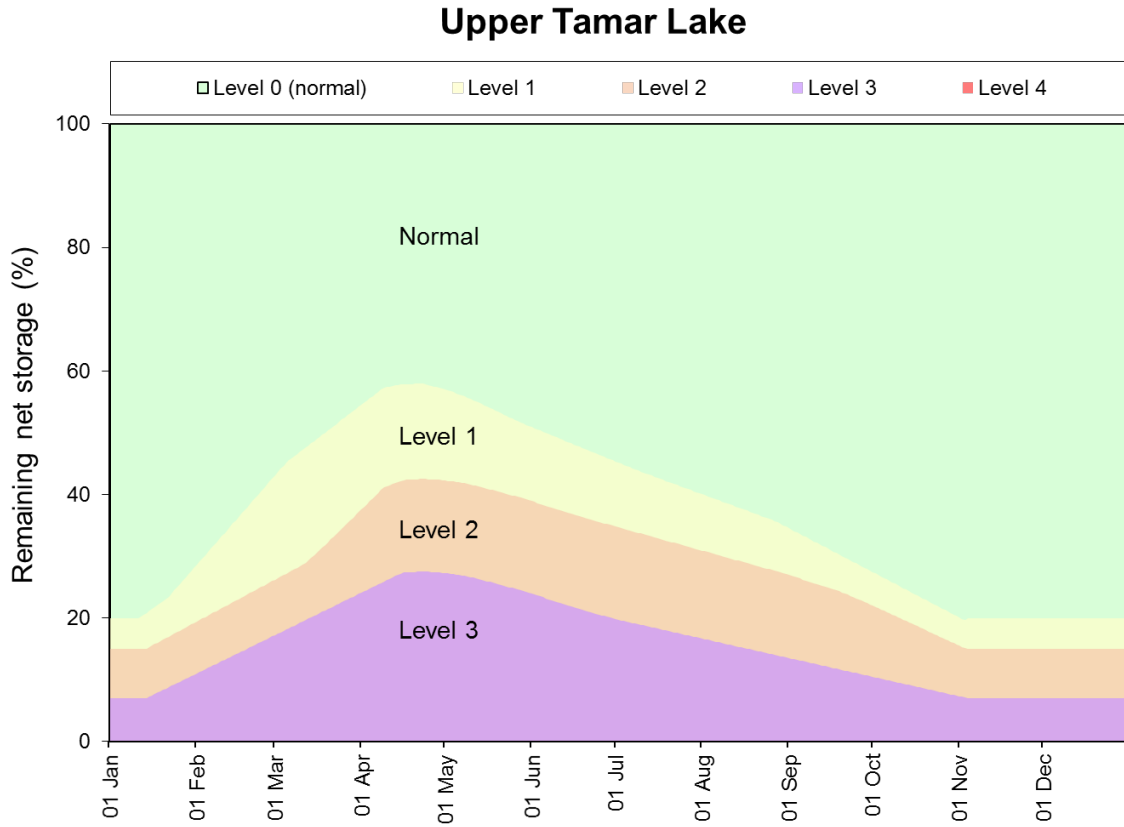


Figure A2.37: Drought management zones - Venford Reservoir

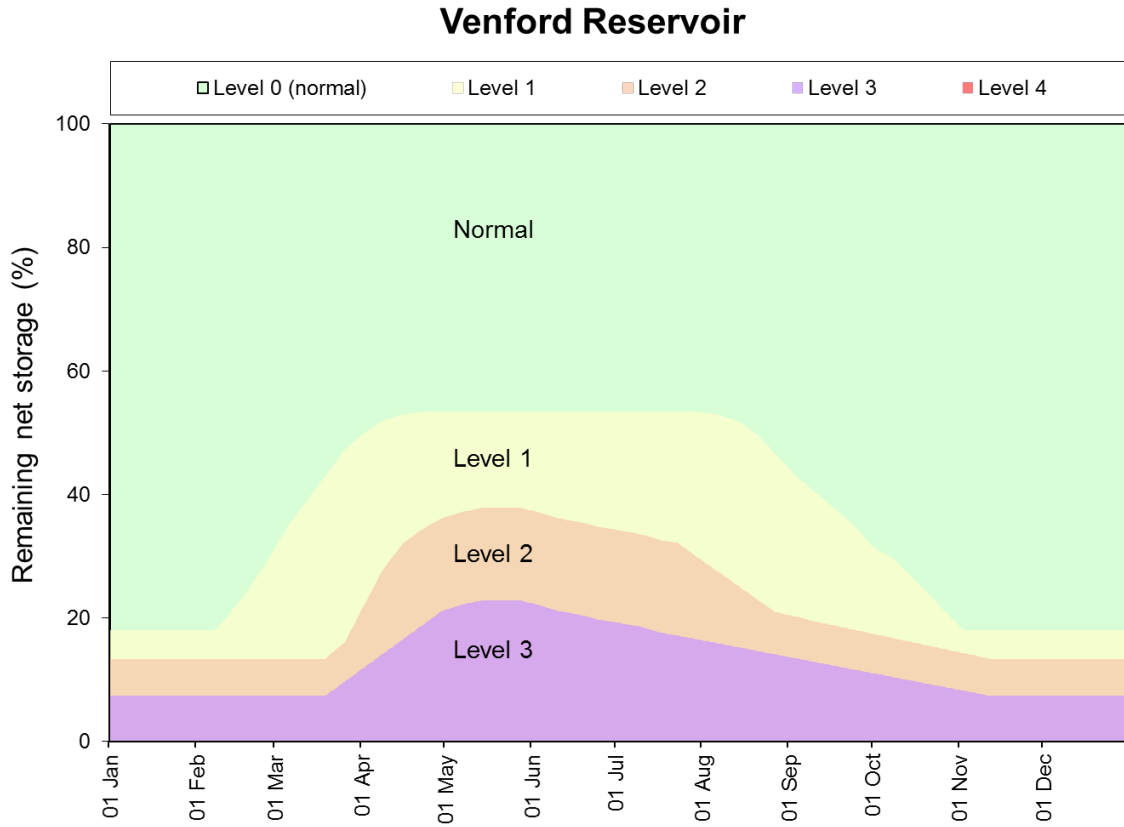
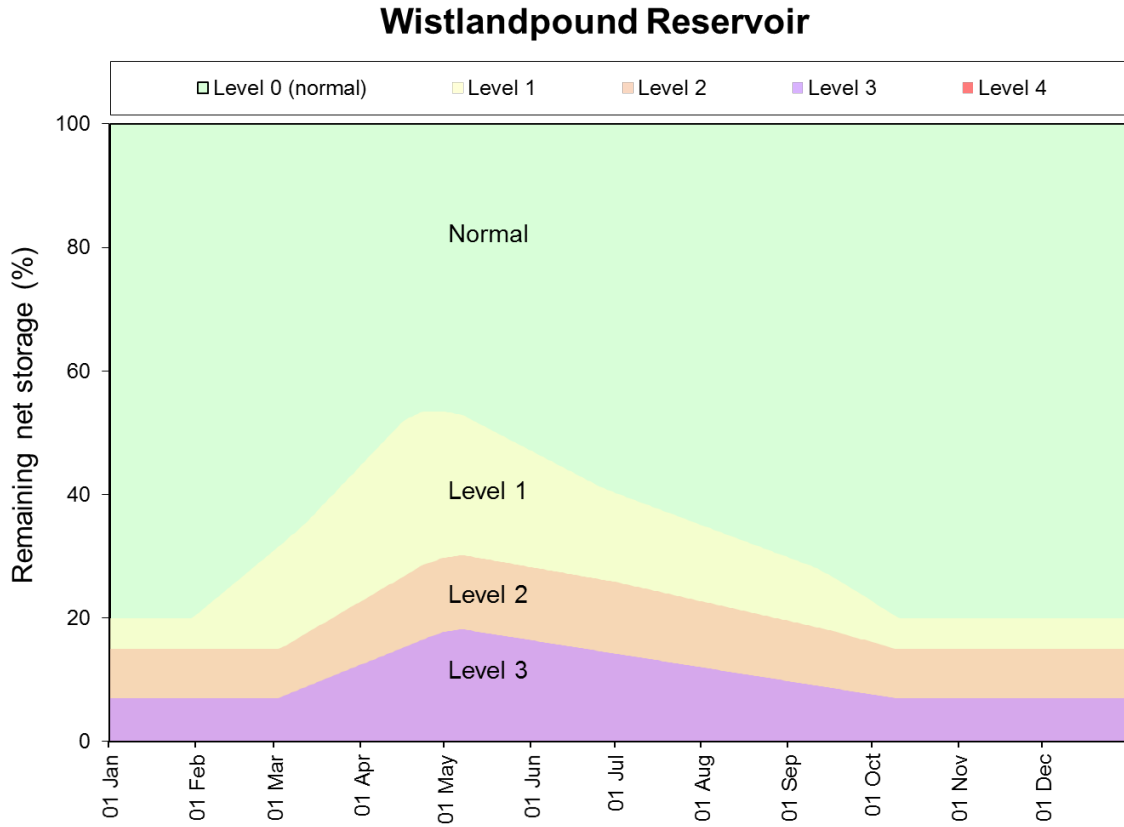
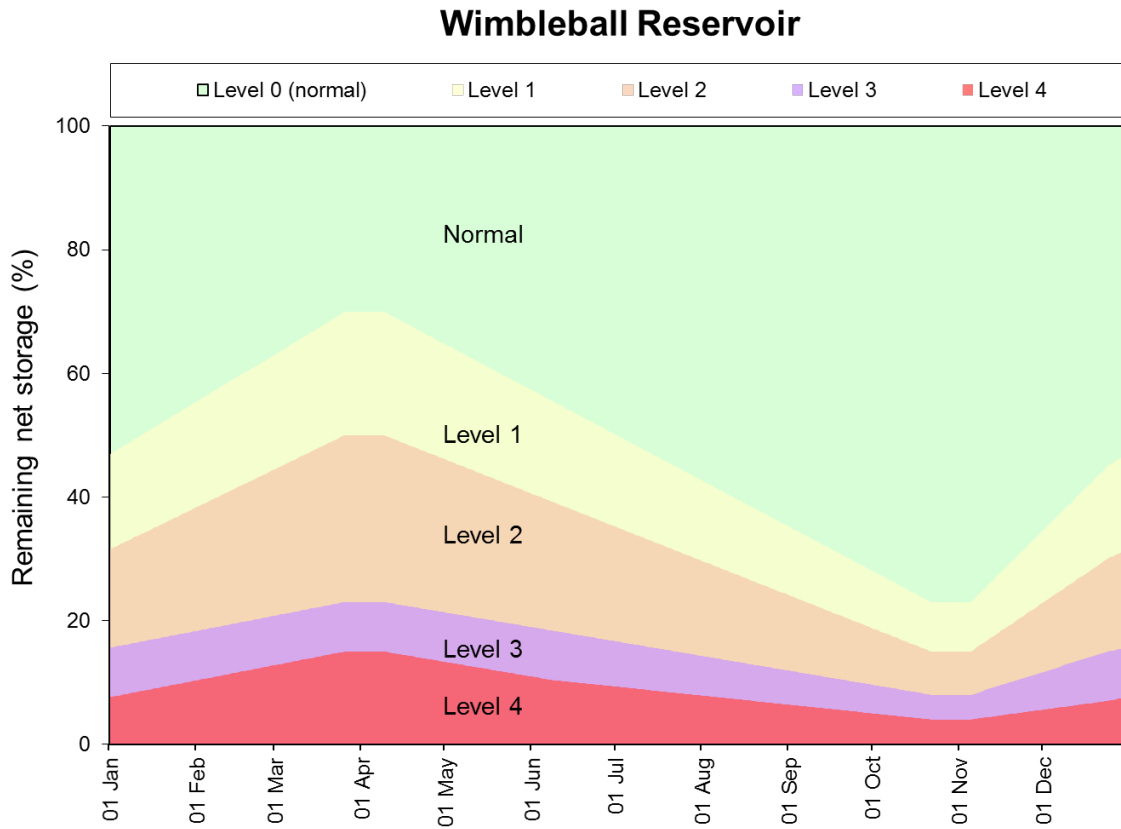


Figure A2.38: Drought management zones - Wistlandpound Reservoir



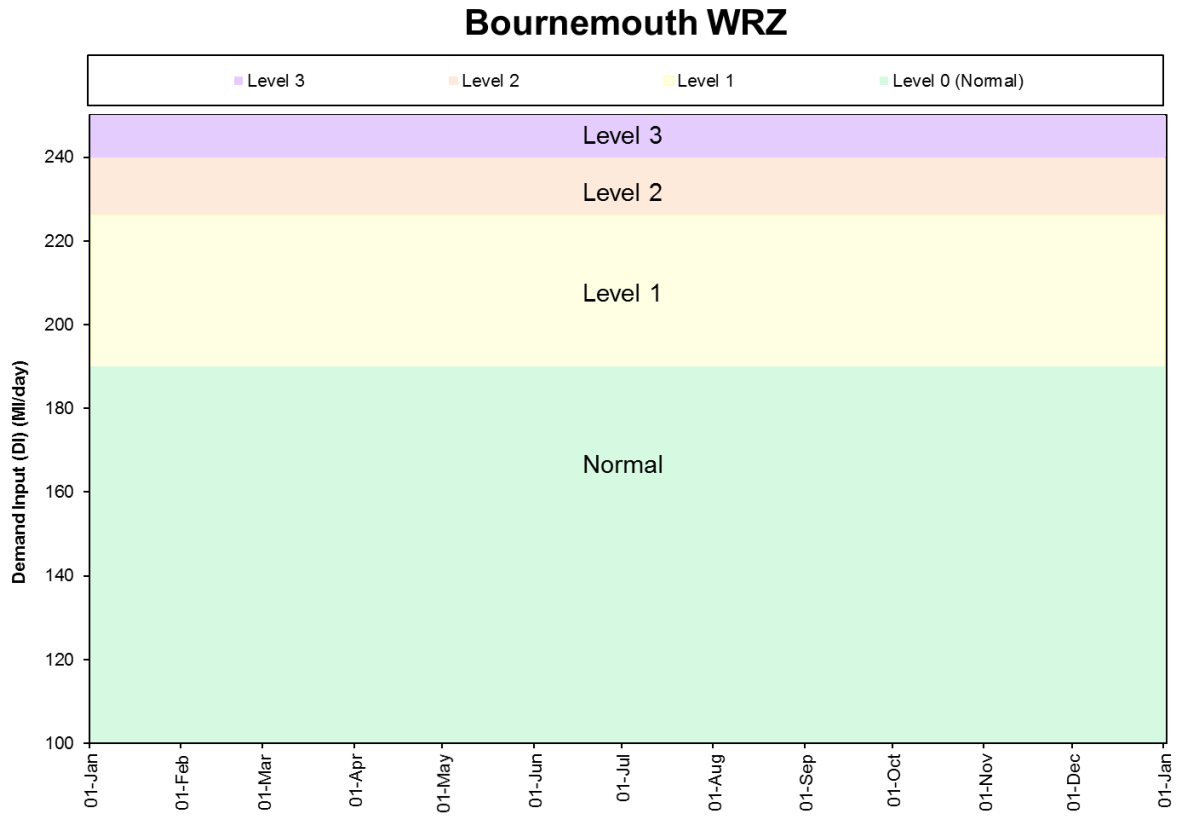
A2.2.3 Wimbleball WRZ

Figure A2.39: Drought management zones - Wimbleball Reservoir



A2.2.4 Bournemouth WRZ

Figure A2.40: Drought management zones - Bournemouth WRZ



A2.3 Comparison of 1976, 2018 and 2020 summer temperature and rainfall

The worst historic drought in the period of record for all of our WRZs was 1975/76. 1975/76 was a multi-season drought containing heatwaves and a prolonged period of meagre rainfall starting in summer 1975 and finishing in early autumn 1976. The 1975/76 winter was drier than average. April to August 1976 contained extended periods with negligible rainfall and there were periods of extremely high temperatures, with the main heatwave coinciding with the main summer holiday season.

More recently, 2018 and 2020 both experienced high temperatures and prolonged periods of little or no rainfall. However, these were not as intense or prolonged as in 1976.

Across all parts of the SWW and BW supply areas there is a consistent pattern where the highest temperature, longest periods of very high temperatures and least rainfall occurred in 1976. Although 2018 and 2020 had periods which were hot and dry, these years were not as extreme as 1976. This is illustrated in Figures A2.41 to A2.43 and Table A2.1, which show a comparison of temperature and rainfall between April and September for 1976, 2018 and 2020 for three areas (South Cornwall, East Devon and Bournemouth).

Temperature

Within the generally hot and dry summer of 1976 there are two intense heatwaves, the first starting in late June and the second in the middle of August. In South Cornwall (Figure A2.41) each of these periods had 10 consecutive days where the temperature was above or close to 25°C. In East Devon (Figure A2.42) the June heatwave saw temperatures at or above 25°C for 14 consecutive days, including 3 consecutive days over 30°C. In Bournemouth (Figure A2.43) the June heatwave saw temperatures above or close to 30°C for 10 consecutive days.

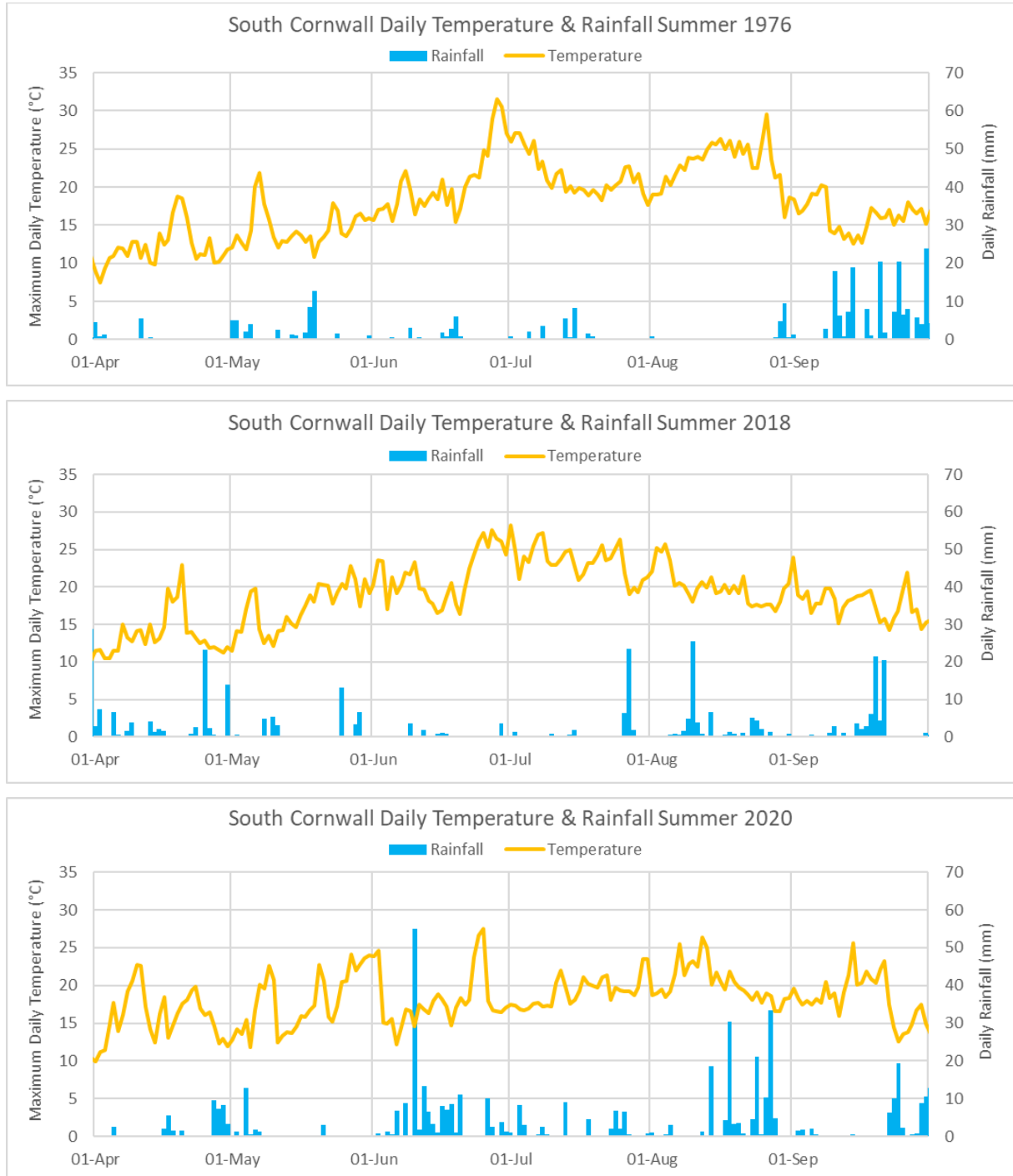
In comparison, 2018 was generally warm but without these heatwave peaks of intense temperature. 2020 saw some short intense peaks of temperature in the end of May, end of June and mid-August, but the high temperatures were not sustained between these peaks.

Rainfall

Figures A2.41 to A2.43 and Table A2.1 also show that there was much less rainfall during the summer of 1976 than in 2018 or 2020. Total rainfall during April to August in 2018 was over double that in 1976 and 2020 was at least three times higher than 1976 (Table A2.1). 1976 also experienced a longer period of consecutive dry days (<1 mm rainfall) over the summer than 2018 and 2020, apart from in Bournemouth where there were a few days of low rainfall in the middle of a 96 day period from the end of May to end of August 1976 which received only 17 mm rainfall in total.

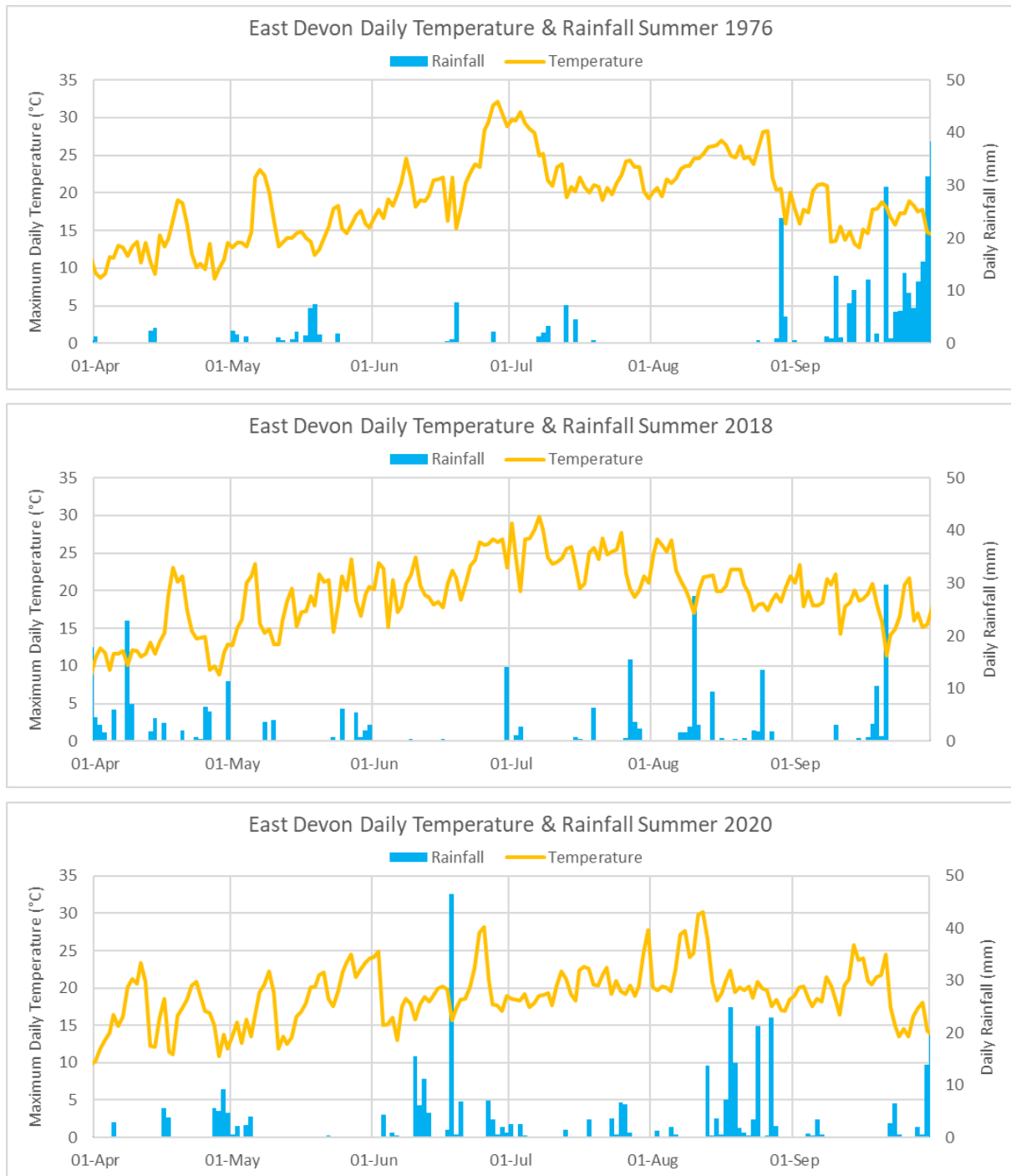
Figure A2.44 shows monthly rainfall totals as percent of long-term average for 1975-77 and 2018-20. This illustrates that 1975/76 experienced much lower rainfall than 2018/19 and 2019/20. In the South West region, January 1975 to August 1976 received 1283 mm of rainfall, whereas January 2018 to August 2019 received 1878 mm of rainfall.

Figure A2.41: Daily maximum temperature and daily total rainfall data for April to September 1976, 2018 and 2020 for South Cornwall⁹



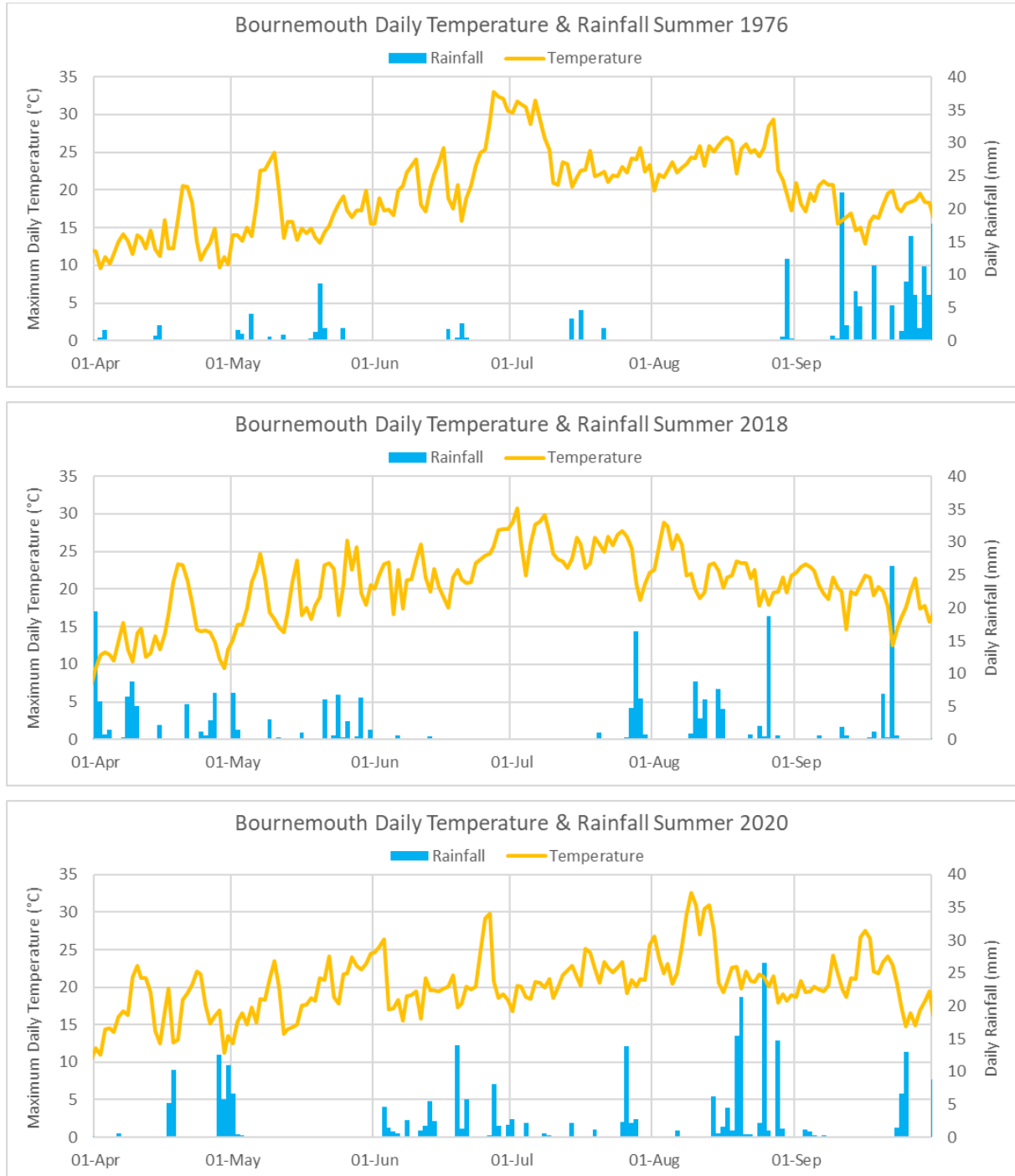
⁹ Source data: HadUK 5km grid data (*HadUK-Grid gridded and regional average climate observations for the UK*, Met Office; Hollis, D.; McCarthy, M.; Kendon, M.; Legg, T.; Simpson, I., 2018. Centre for Environmental Data Analysis, 2021 <http://catalogue.ceda.ac.uk/uuid/4dc8450d889a491ebb20e724debe2dfb>) for NRFA catchment area 48003 (River Fal at Tregony).

Figure A2.42: Daily maximum temperature and daily total rainfall data for April to September 1976, 2018 and 2020 for East Devon¹⁰



¹⁰ Data source: HADUK 5km grid data (*HadUK-Grid gridded and regional average climate observations for the UK*, Met Office; Hollis, D.; McCarthy, M.; Kendon, M.; Legg, T.; Simpson, I., 2018. Centre for Environmental Data Analysis, 2021 <http://catalogue.ceda.ac.uk/uuid/4dc8450d889a491ebb20e724debe2dfb>) for NRFA catchment area 45005 (River Otter at Dotton).

Figure A2.43: Daily maximum temperature and daily total rainfall data for April to September 1976, 2018 and 2020 for Bournemouth¹¹



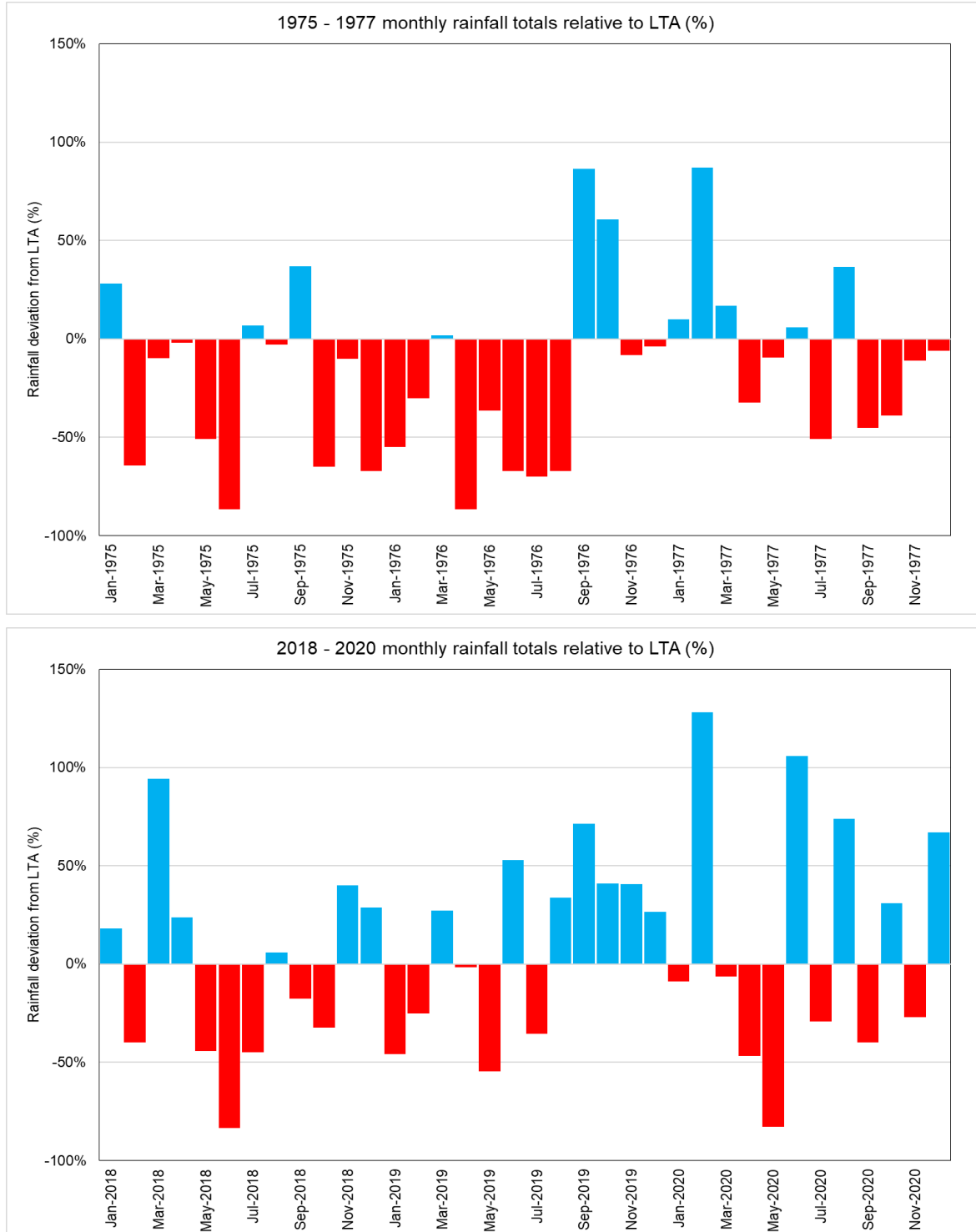
¹¹ Data source: HADUK 5km grid data (*HadUK-Grid gridded and regional average climate observations for the UK*, Met Office; Hollis, D.; McCarthy, M.; Kendon, M.; Legg, T.; Simpson, I., 2018. Centre for Environmental Data Analysis, 2021 <http://catalogue.ceda.ac.uk/uuid/4dc8450d889a491ebb20e724debe2dfb>) for the Bournemouth urban area.

Table A2.1: Key summary statistics for daily maximum temperature and daily total rainfall data during 1976, 2018 and 2020 for South Cornwall, East Devon and Bournemouth¹².

	South Cornwall			East Devon			Bournemouth		
	1976	2018	2020	1976	2018	2020	1976	2018	2020
Maximum temperature (°C)	31.5	28.2	27.5	32.1	29.9	30.2	33.0	30.7	32.5
Number of days where maximum temperature >= 30°C	2	0	0	4	0	1	9	1	4
Number of days where maximum temperature >=25°C & <30°C	16	15	5	19	24	8	22	30	18
June to Aug average daily maximum temperature (°C)	21.7	21.6	19.1	23.0	22.4	20.3	23.7	23.4	21.6
Total rainfall April to August (mm)	120	261	409	99	244	311	59	192	237
Total rainfall in driest 5 month period (mm)	120 (Apr-Aug)	238 (May-Sep)	360 (Mar-Jul)	99 (Apr-Aug)	194 (May-Sep)	253 (Mar-Jul)	59 (Apr-Aug)	157 (May-Sep)	193 (Mar-Jul)
Number of consecutive days with <= 1mm rain per day	41	13	13	44	29	28	39	49	31

¹² Data source: HADUK 5km grid data (*HadUK-Grid gridded and regional average climate observations for the UK*, Met Office; Hollis, D.; McCarthy, M.; Kendon, M.; Legg, T.; Simpson, I., 2018. Centre for Environmental Data Analysis, 2021 <http://catalogue.ceda.ac.uk/uuid/4dc8450d889a491ebb20e724debe2dfb>)

Figure A2.44: Monthly rainfall total deviation from monthly long term averages (LTA; 1981-2010)¹³



¹³ Data source: CEH data for South West region (*Monthly Hydrological Summary for the UK*, CEH, <https://nrfa.ceh.ac.uk/monthly-hydrological-summary-uk>).

A2.4 Worked examples

Worked examples are given in the following pages that show how we would expect our Drought Plan to work under a range of droughts. The examples show how storage is likely to change as the drought develops, the monitoring and decisions that are likely to be made and the drought management actions that are likely to be triggered.

The worked examples are grouped by WRZ and include the following scenarios:

SWW supply area:

- Our three strategic reservoirs in a repeat of the worst historic drought in the period of record (1975/76) and with WRMP19 forecast 2020/21 dry year demand (plus outage allowance)
- Our three strategic reservoirs in a repeat of the worst historic drought in the period of record (1975/76) and with WRMP19 forecast 2020/21 dry year demand plus target headroom (plus outage allowance). Hence this modelled demand represents a high demand scenario
- Our three strategic reservoirs in an extreme drought (of around a 1 in 500 year return period or worse) and with WRMP19 forecast 2020/21 dry year demand plus target headroom (plus outage allowance). Hence this modelled demand represents a high demand scenario
- A local reservoir in North Devon, showing how storage in the local reservoir (Wistlandpound) and strategic reservoir (Roadford Reservoir) may separately trigger drought actions

BW supply area:

- Bournemouth WRZ likely demand in a repeat of the worst historic drought in the period of record (1975/76) and with WRMP19 forecast 2020/21 dry year demand (plus outage allowance)
- Bournemouth WRZ with higher demand than that forecast in a repeat of the worst historic drought in the period of record (1975/76) (plus outage allowance)

The examples follow the management and communications plan process in Section 5. For simplicity, the following examples do not show when various management groups are set up, but rather the key decisions that secure supply to customers and protect the environment.

The examples illustrate how measures would be invoked and also how they adapt and flex to the conditions as they play out over time.

Heatwaves and prolonged high demand

The worked examples demonstrate the impact of heatwaves, intense dry weather and prolonged high demand on our water supply systems and how we would operate and manage our systems in such circumstances. This is because they are all based on a repeat of the conditions experienced in the 1975/76 historic drought which was the worst historic drought in the period of record for all of our WRZs.

1975/76 was a multi-season drought containing heatwaves and prolonged periods with little or no rainfall (see Figures A2.41 to A2.43 in Section A2.3 for examples). One of these periods of little or no rainfall was for six weeks or more depending on the location, and occurred in mid July to late August 1976, which coincided with the main summer holiday season. In a repeat of a 1975/76 type drought these high peak temperatures, prolonged periods of little or no rainfall and the timing of these (during school summer holidays) would trigger high demand for a prolonged period on top of the normal summer demand.

We have also included worked examples with higher demand than we have forecast would be experienced during a repeat of a 1975/76 type drought. These examples illustrate how we would manage our water supply system if a drought event like 1975/76 was to coincide with other events that might drive demand upwards, such as the Covid pandemic.

Section A2.3 compares temperature and rainfall for 1976 with 2018 and 2020, two recent years which experienced high temperatures and low summer rainfall. This comparison shows that 1976 was drier and experienced hotter, longer duration heatwaves than 2018 or 2020. Therefore, the worked examples represent more severe scenarios than would be the case if they had been based on a repeat of 2018 or 2020 weather.

A2.4.1 Colliford Reservoir (strategic reservoir)

Colliford Reservoir has a pumped storage scheme that permits abstractions from the River Fowey at Restormel to be pumped into Colliford Reservoir, supplementing the natural inflow into the reservoir and therefore boosting winter refill. Pumped storage abstraction is licensed via the Restormel abstraction licence, which covers abstraction for public water supply and the Colliford Reservoir pumped storage scheme. The amount of water available to abstract for pumped storage is constrained by both the river flow and the amount of water needed at Restormel for public water supply. Although the licence is for abstraction at any time of year, SWW will normally only operate this scheme between November and March inclusive. It has been operated occasionally in the past in a wet April when reservoir refill has not been sufficient over the previous winter, so that reservoir storage is as high as possible before the start of the summer drawdown period.

A specified volume of Colliford Reservoir storage is reserved for fisheries bank releases. The Environment Agency decides when and how the fisheries bank will be used during the year. SWW makes fisheries bank releases as and when the Environment Agency requests them.

For Colliford WRZ the severe drought modelled was the PD-2 plausible drought (WRMP19 extended 1975/76 drought), which the Met Office estimated as having a return period of 1 in 500 to 1000 years.

A2.4.1.1 Worked example – Colliford Reservoir, worst historic drought, dry year demand (plus outage allowance)

Figure A2.45: Colliford Reservoir, worst historic drought with dry year demand

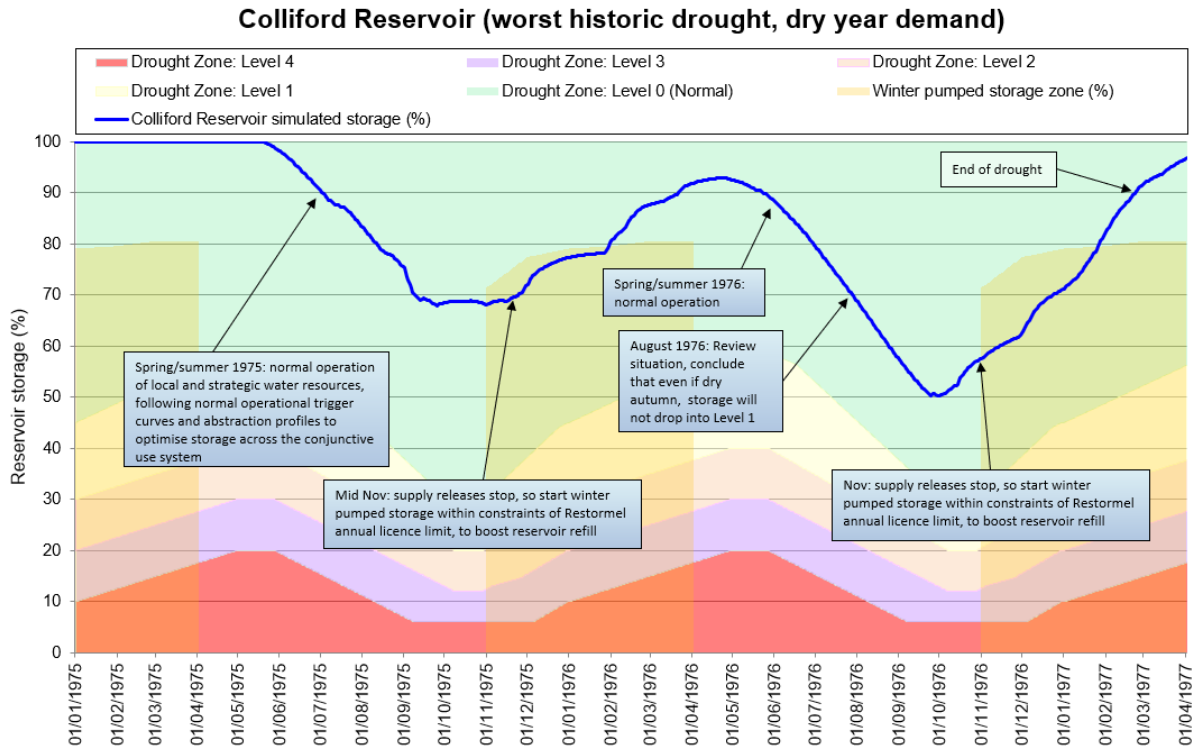


Table A2.2: Colliford Reservoir, worst historic drought with dry year demand

Time period, drought level, operational mode	Actions and decisions	Environmental monitoring
January – end October 1975 Level 0 - Normal operation	<ul style="list-style-type: none"> Routine monitoring – see Section 2.2 	Normal level of monitoring including: <ul style="list-style-type: none"> When reservoirs stop spilling, undertake spot gaugings downstream of dams to confirm instrumentation correct and releasing required compensation flow
November 1975 – March 1976 Level 0 - Normal operation	<ul style="list-style-type: none"> Colliford Reservoir supply releases stop in mid November Start Colliford pumped storage scheme Minimise abstraction from Colliford Reservoir by maximising local sources within licence and water availability constraints, to aid Colliford refill 	Normal level of monitoring
April – July 1976 Level 0 - Normal operation	<ul style="list-style-type: none"> River flows low by late April – river abstractions reduce as river flows drop towards hands-off flows Colliford Reservoir supply releases to support abstraction downstream Reduce abstraction from local reservoirs to conserve storage for peak demand period 	Normal level of monitoring
August 1976 Level 0 - Dry weather operation	<ul style="list-style-type: none"> Continuation of hot, dry weather Restormel WTW is supporting local sources, resulting in large supply releases from Colliford Reservoir and storage dropping, however projections indicate Colliford storage unlikely to drop into Level 1 this year 	Normal level of monitoring
End September - October 1976 Level 0 - Dry weather operation	<ul style="list-style-type: none"> Significant rainfall River flows improve Colliford Reservoir supply releases stop Colliford Reservoir storage starts to recover 	Normal level of monitoring
November 1976 – March 1977 Level 0 - Normal operation	<ul style="list-style-type: none"> Operate Colliford winter pumped storage scheme Minimise abstraction from Colliford Reservoir by maximising local sources within licence and water availability constraints, to aid Colliford refill 	Normal level of monitoring
End February 1977 Level 0 - Normal operation	<ul style="list-style-type: none"> Colliford storage approaching 90% River flows healthy All local reservoirs 100% <p>Officially confirm End of Drought</p>	Normal level of monitoring
Spring 1977 Level 0 - Normal operation	<ul style="list-style-type: none"> Post drought review 	Normal level of monitoring

A2.4.1.2 Worked example – Colliford Reservoir, worst historic drought, high demand (plus outage allowance)

Figure A2.46: Colliford Reservoir, worst historic drought with high demand

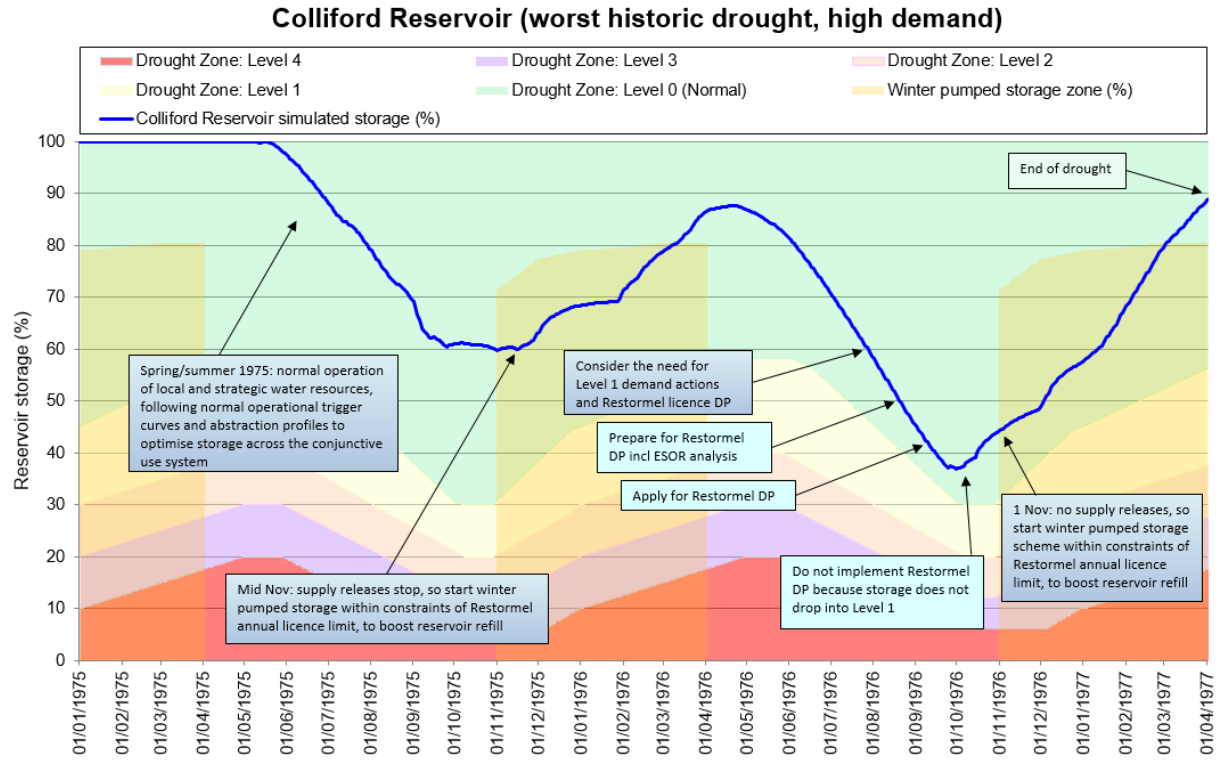


Table A2.3: Colliford Reservoir, worst historic drought with high demand

Time period, drought level, operational mode	Actions and decisions	Environmental monitoring
January – end April 1975 Level 0 - Normal operation	<ul style="list-style-type: none"> Routine monitoring – see Section 2.2 	Normal level of monitoring
May – October 1975 Level 0 - Normal operation	<ul style="list-style-type: none"> Routine monitoring – see Section 2.2 	Normal level of monitoring including: <ul style="list-style-type: none"> When reservoirs stop spilling, undertake spot gaugings downstream of dams to confirm instrumentation correct and releasing required compensation flow
November 1975 – March 1976 Level 0 - Normal operation	<ul style="list-style-type: none"> Colliford Reservoir supply releases stop in mid November Start Colliford pumped storage scheme Minimise abstraction from Colliford Reservoir by maximising local sources within licence and water availability constraints, to aid Colliford refill 	Normal level of monitoring
April – July 1976 Level 0 - Normal operation	<ul style="list-style-type: none"> River flows low by late April – river abstractions reduce as river flows drop towards hands-off flows Colliford Reservoir supply releases to support abstraction downstream Reduce abstraction from local reservoirs to conserve storage for peak demand period Reservoir storage projections show possibility of storage dropping into Level 1 drought trigger zone by mid October if it remains dry 	Normal level of monitoring
August 1976 Level 0 - Dry weather operation	<ul style="list-style-type: none"> Continuation of hot, dry weather Restormel WTW is supporting local sources, resulting in large supply releases from Colliford Reservoir Colliford Reservoir storage showing steep rate of drop – projections indicate storage could drop into Level 1 drought zone by mid October if it remains dry Early August: <ul style="list-style-type: none"> Consider need for Level 1 Drought Permit (removal of Restormel annual licence limit, which would allow more winter pumped storage into Colliford Reservoir) Late August: <ul style="list-style-type: none"> Prepare Drought Permit application Undertake ESOR analysis 	Normal level of monitoring, plus <ul style="list-style-type: none"> Monitoring related to Level 1 Drought Permit (Restormel licence)
Early – mid September 1976 Level 0 - Dry weather operation	<ul style="list-style-type: none"> Weather continues hot and dry River flows continue to drop Colliford Reservoir supply releases continue If it stays dry Colliford storage will drop into Level 1 by mid October and into Level 2 by early November Prepare for enhanced media campaign Update ESOR analysis Prepare Level 1 company actions Apply for Level 1 Drought Permit 	Normal level of monitoring, plus <ul style="list-style-type: none"> Monitoring related to Level 1 Drought Permit (Restormel licence) Monitoring related to Level 2 Drought Permit (Stannon Lake)

Time period, drought level, operational mode	Actions and decisions	Environmental monitoring
	<ul style="list-style-type: none"> Prepare for Level 2 Drought Permit (increased abstraction from Stannon Lake) Decide not to prepare to abstract from disused, licensed source (Porth Reservoir) due to lead-in time, requirement for temporary WTW and pipelines and because storage is likely to only be in Level 2 for a few weeks before winter pumped storage can potentially start. 	
End September - October 1976 Level 0 - Dry weather operation	<ul style="list-style-type: none"> Significant rainfall River flows improve Colliford Reservoir supply releases stop Colliford Reservoir storage starts to recover Drought Permits not needed 	Normal level of monitoring <ul style="list-style-type: none"> Stop additional monitoring because Drought Permits not needed
November 1976 – March 1977 Level 0 - Normal operation	<ul style="list-style-type: none"> Operate Colliford winter pumped storage scheme Minimise abstraction from Colliford Reservoir by maximising local sources within licence and water availability constraints, to aid Colliford refill 	Normal level of monitoring
End March 1977 Level 0 - Normal operation	<ul style="list-style-type: none"> Colliford storage approaching 90% River flows healthy All local reservoirs 100% <p>Officially confirm End of Drought</p>	Normal level of monitoring
Spring 1977 Level 0 - Normal operation	<ul style="list-style-type: none"> Post drought review 	Normal level of monitoring

A2.4.1.3 Worked example – Colliford Reservoir, severe drought, high demand (plus outage allowance)

Figure A2.47: Colliford Reservoir, severe drought with high demand - 1975/76

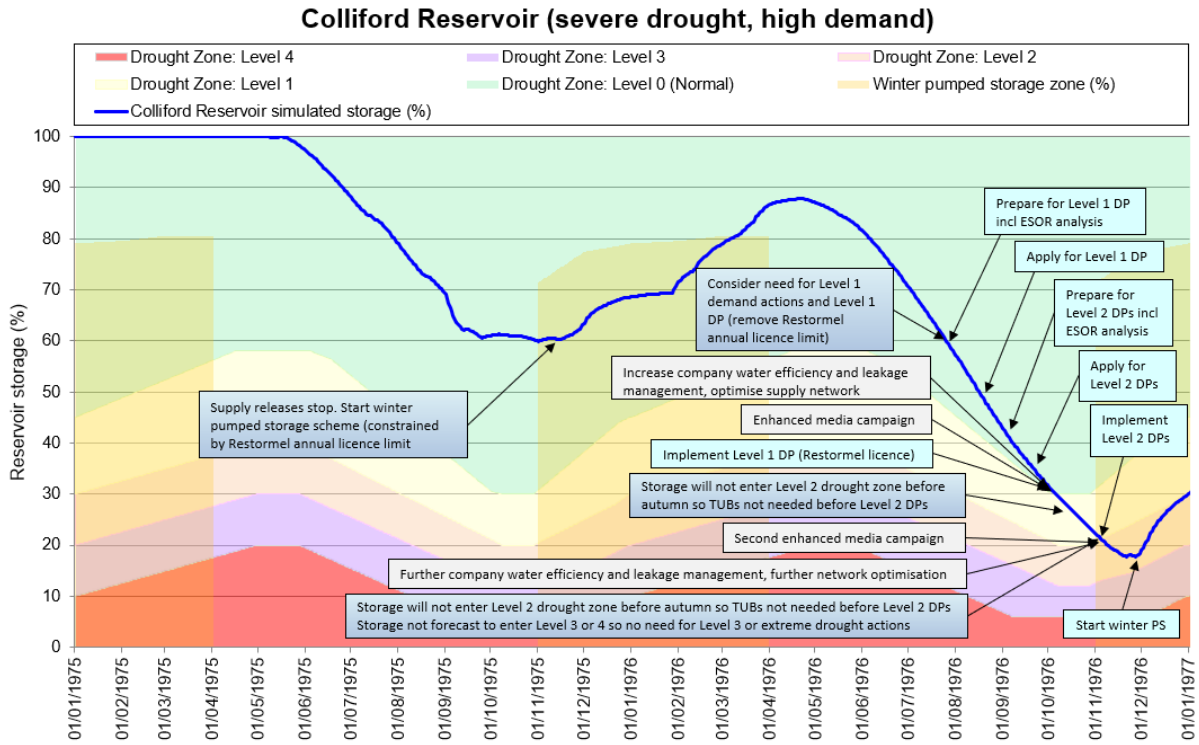


Figure A2.48: Colliford Reservoir, severe drought with high demand - 1977/78

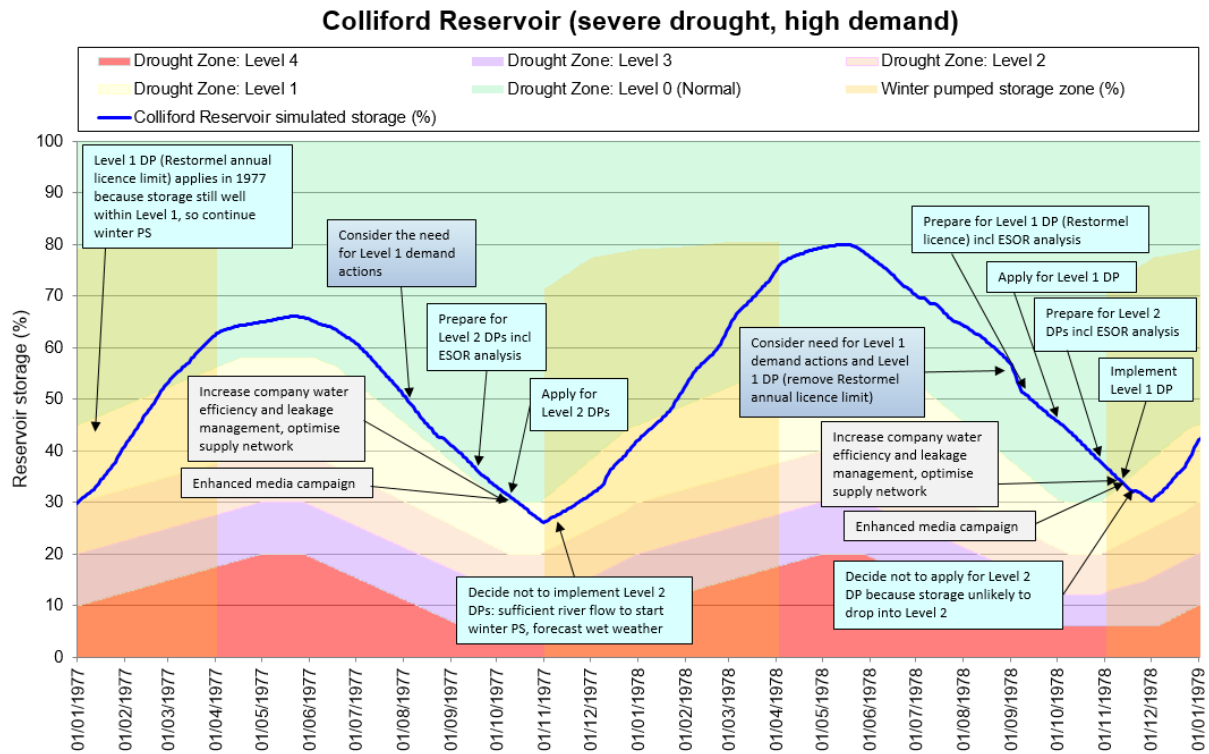


Figure A2.49: Colliford Reservoir, severe drought with high demand - 1979/80

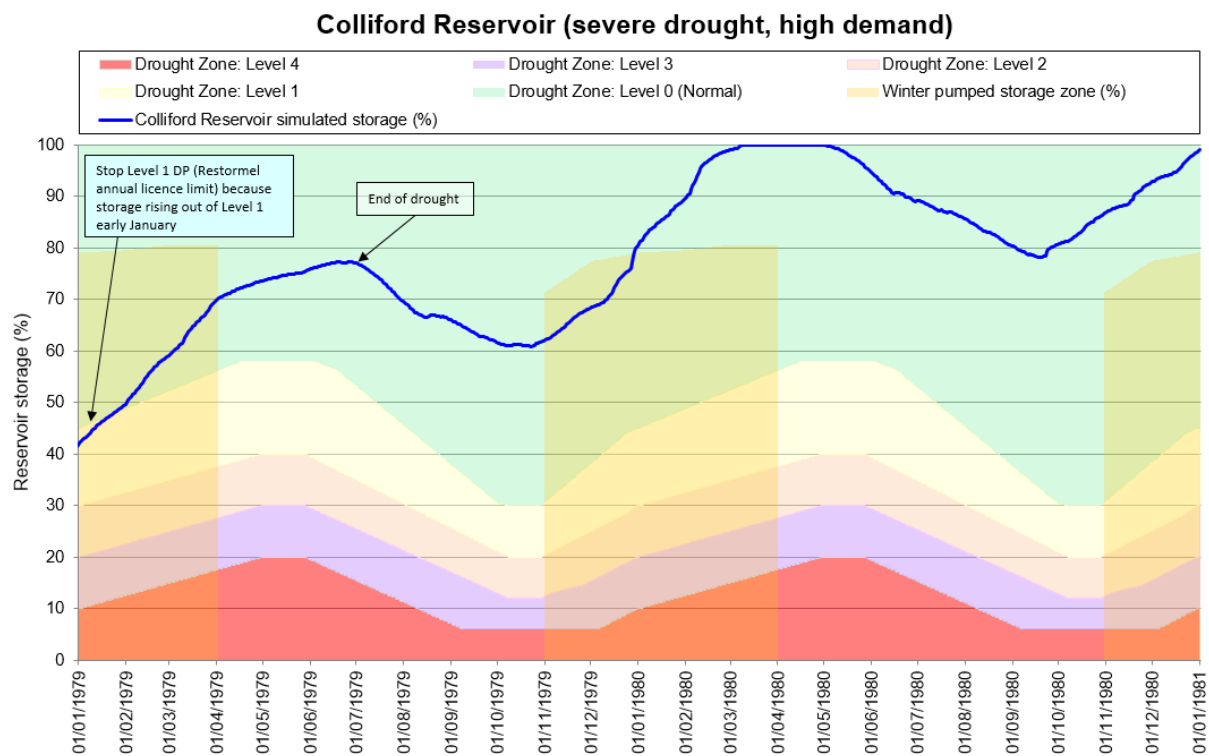


Table A2.4: Colliford Reservoir, severe drought with high demand

Time period, drought level, operational mode	Actions and decisions	Environmental monitoring
January – end April 1975 Level 0 - Normal operation	<ul style="list-style-type: none"> Routine monitoring – see Section 2.2 	Normal level of monitoring
May – October 1975 Level 0 - Normal operation	<ul style="list-style-type: none"> Routine monitoring – see Section 2.2 	Normal level of monitoring including: <ul style="list-style-type: none"> When reservoirs stop spilling, undertake spot gaugings downstream of dams to confirm instrumentation correct and releasing required compensation flow
November 1975 – March 1976 Level 0 - Normal operation	<ul style="list-style-type: none"> Colliford Reservoir supply releases stop in mid November Start Colliford pumped storage scheme Minimise abstraction from Colliford Reservoir by maximising local sources within licence and water availability constraints, to aid Colliford refill 	Normal level of monitoring
April – July 1976 Level 0 - Normal operation	<ul style="list-style-type: none"> River flows low by late April – river abstractions reduce as river flows drop towards hands-off flows Start Colliford Reservoir supply releases to support downstream abstraction Reduce abstraction from local reservoirs to conserve storage for peak demand period Reservoir storage projections show possibility of storage dropping into Level 1 drought trigger zone by November if it remains dry 	Normal level of monitoring
August 1976 Level 0 - Dry weather operation	<ul style="list-style-type: none"> Continuation of hot, dry weather Restormel WTW is supporting local sources, resulting in large supply releases from Colliford Reservoir Colliford Reservoir storage showing steep rate of drop - projections indicate storage could drop into Level 1 by mid October if it remains dry Early August: <ul style="list-style-type: none"> Consider need for Level 1 Drought Permit (removal of Restormel annual licence limit, which would allow more winter pumped storage into Colliford Reservoir) Late August: <ul style="list-style-type: none"> Prepare Drought Permit application Undertake ESOR analysis Apply for Level 1 Drought Permit 	Normal level of monitoring, plus <ul style="list-style-type: none"> Monitoring related to Level 1 Drought Permit (Restormel licence)
Early – mid September 1976 Level 0 - Dry weather operation	<ul style="list-style-type: none"> Weather continues hot and dry River flows continue to drop Colliford Reservoir supply releases continue If it stays dry Colliford storage will drop into Level 1 by mid October and there is a risk of storage entering Level 2 by early November Prepare for enhanced media campaign 	Normal level of monitoring, plus <ul style="list-style-type: none"> Monitoring related to Level 1 Drought Permit (Restormel licence)

Time period, drought level, operational mode	Actions and decisions	Environmental monitoring
Invoke Drought Plan	<ul style="list-style-type: none"> Prepare company actions (increased water efficiency at company sites, increased leakage management, optimising supply network, etc) Update ESOR analysis Prepare for Level 2 Drought Permit to increase abstraction from Stannon Lake 	<ul style="list-style-type: none"> Monitoring related to Level 2 Drought Permit (Stannon Lake)
Late September 1976 Level 0 - Drought Plan operation	<ul style="list-style-type: none"> Apply for Level 2 Drought Permit (Stannon Lake) 	<p>Normal level of monitoring, plus</p> <ul style="list-style-type: none"> Monitoring related to Level 1 Drought Permit (Restormel licence) Monitoring related to Level 2 Drought Permit (Stannon Lake)
Early October 1976 Level 1 – Drought Plan operation	<p>Storage drops into Level 1 drought zone</p> <ul style="list-style-type: none"> Enhanced media campaign Implement company actions (increase water efficiency, targeted leakage management, optimize supply network) Implement Level 1 Drought Permit (Restormel licence), which will enable Colliford pumped storage abstraction to be maximised (no requirement to show benefit of Level 1 demand-side actions first because outside summer period) No need for TUBs if storage enters Level 2 drought zone because it is autumn 	<p>Enhanced monitoring, plus</p> <ul style="list-style-type: none"> Monitoring related to Level 1 Drought Permit (Restormel licence) Monitoring related to Level 2 Drought Permit (Stannon Lake)
Early November 1976 Level 2 - Drought Plan operation	<p>Storage drops into Level 2 drought zone</p> <ul style="list-style-type: none"> Implement Level 2 Drought Permit (Stannon Lake increased abstraction) Second enhanced media campaign – although demand is lower in winter and hence savings likely to be lower, some demand savings may still be achieved Further water company efficiency and leakage management, further network optimisation Storage not forecast to enter Level 3 or 4 drought zones, so no need for Level 3 or extreme drought actions 	<p>Enhanced monitoring, plus</p> <ul style="list-style-type: none"> Monitoring related to Level 1 Drought Permit (Restormel licence) Monitoring related to Level 2 Drought Permit (Stannon Lake)
End November 1976 Level 2 - Drought Plan operation	<ul style="list-style-type: none"> Wet weather River flows recover Colliford Reservoir supply releases stop Start winter pumped storage scheme - Level 1 Drought Permit has removed Restormel annual licence constraint, allowing more pumped storage abstraction 	<p>Enhanced monitoring, plus</p> <ul style="list-style-type: none"> Monitoring related to Level 1 Drought Permit (Restormel licence) Monitoring related to Level 2 Drought Permit (Stannon Lake)
January 1977 Level 1 – Drought Plan operation	<ul style="list-style-type: none"> Colliford Reservoir storage still well within Level 1 drought zone, so Level 1 Drought Permit still applies in 1977 (removing 1977 Restormel annual licence limit) Continue winter pumped storage Minimise abstraction from Colliford Reservoir by maximising local sources within licence and water availability constraints, to aid Colliford refill 	<p>Enhanced monitoring, plus</p> <ul style="list-style-type: none"> Monitoring related to Level 1 Drought Permit (Restormel licence) Monitoring related to Level 2 Drought Permit (Stannon Lake)
February 1977	<ul style="list-style-type: none"> Continue to minimise abstraction from Colliford Reservoir by maximising local sources within licence and water availability constraints, to aid Colliford refill 	<p>Enhanced monitoring, plus</p>

Time period, drought level, operational mode	Actions and decisions	Environmental monitoring
Level 1 – Drought Plan operation	<ul style="list-style-type: none"> End February: Colliford Reservoir storage rises above Level 1 drought zone 	<ul style="list-style-type: none"> Monitoring related to Level 1 Drought Permit (Restormel licence) Monitoring related to Level 2 Drought Permit (Stannon Lake)
March 1977 Level 0 - Normal operation	<ul style="list-style-type: none"> End March: <ul style="list-style-type: none"> stop winter pumped storage stop Stannon Lake increased abstraction (Level 2 Drought Permit) 	<p>Normal level of monitoring, plus</p> <ul style="list-style-type: none"> Monitoring related to Level 1 Drought Permit (Restormel licence) Monitoring related to Level 2 Drought Permit (Stannon Lake)
April – June 1977 Level 0 - Normal operation	<ul style="list-style-type: none"> Routine monitoring – see Section 2.2 	<p>Normal level of monitoring</p> <ul style="list-style-type: none"> Post-use monitoring related to Level 1 Drought Permit (Restormel licence) Post-use monitoring related to Level 2 Drought Permit (Stannon Lake)
July 1977 Level 0 - Dry weather operation	<ul style="list-style-type: none"> End July: Colliford Reservoir storage projections show that storage could drop into Level 1 drought zone by early September and into Level 2 by early November Consider the need for Level 1 demand actions Level 1 Drought Permit continuing because it applies to a calendar year annual licence limit, so no need to re-apply Undertake ESOR analysis 	<p>Normal level of monitoring, plus</p> <ul style="list-style-type: none"> Monitoring related to Level 1 Drought Permit (Restormel licence)
Early September 1977 Level 0 - Dry weather operation	<ul style="list-style-type: none"> Update ESOR analysis Prepare for Level 2 Drought Permit (Stannon Lake) if ESOR can be proved 	<p>Normal level of monitoring, plus</p> <ul style="list-style-type: none"> Monitoring related to Level 1 Drought Permit (Restormel licence) Monitoring related to Level 2 Drought Permit (Stannon Lake), if ESOR proved
Early October 1977 Level 1 – Dry weather operation Invoke Drought Plan	<p>Storage drops into Level 1 drought zone</p> <ul style="list-style-type: none"> Enhanced media campaign Increase company water efficiency and leakage management, optimise supply network Apply for Level 2 Drought Permit (Stannon Lake) if ESOR can be proved 	<p>Enhanced monitoring, plus</p> <ul style="list-style-type: none"> Monitoring related to Level 1 Drought Permit (Restormel licence) Monitoring related to Level 2 Drought Permit (Stannon Lake), if ESOR proved
Early November 1977 Level 1 – Drought Plan	<ul style="list-style-type: none"> Improving rainfall and river flow situation Colliford supply releases stop Winter pumped storage scheme starts Level 2 Drought Permit (Stannon Lake) not needed 	<p>Enhanced monitoring, plus</p> <ul style="list-style-type: none"> Monitoring related to Level 1 Drought Permit (Restormel licence)

Time period, drought level, operational mode	Actions and decisions	Environmental monitoring
		Stop monitoring related to Level 2 Drought Permit (Stannon Lake) – Drought Permit not required
November – end December 1977 Level 1 – Drought Plan	<ul style="list-style-type: none"> Storage still in Level 1 drought zone although steadily improving Continue Colliford winter pumped storage to aid reservoir refill Minimise abstraction from Colliford Reservoir by maximising local sources within licence and water availability constraints, to aid Colliford refill 	Enhanced monitoring, plus <ul style="list-style-type: none"> Monitoring related to Level 1 Drought Permit (Restormel licence)
January 1978 – March 1978 Level 0 - Normal operation	<ul style="list-style-type: none"> Continue to minimise abstraction from Colliford Reservoir by maximising local sources within licence and water availability constraints, to aid Colliford refill End January: Colliford Reservoir storage rises above Level 1 drought zone Do not operate Level 1 Drought Permit (Restormel annual licence) because storage above Level 1 drought zone by end January and rising steadily, with wet weather forecast Continue Colliford pumped storage scheme within the annual licence limit and ensuring enough water is kept back for supply throughout 1978 	Enhanced monitoring, plus <ul style="list-style-type: none"> Post-use monitoring related to Level 1 Drought Permit (Restormel licence)
April – July 1978 Level 0 - Normal operation	<ul style="list-style-type: none"> Routine monitoring – see Section 2.2 	Normal level of monitoring
August 1978 Level 0 - Dry weather operation	<ul style="list-style-type: none"> Projections show that Colliford storage could drop into Level 1 drought zone in late autumn Consider the need for Level 1 demand actions Consider the need for Level 1 Drought Permit (Restormel licence) 	Normal level of monitoring
Early September 1978 Level 0 - Dry weather operation	<ul style="list-style-type: none"> Prepare for Level 1 Drought Permit (Restormel licence) Undertake ESOR analysis 	Normal level of monitoring, plus <ul style="list-style-type: none"> Monitoring related to Level 1 Drought Permit (Restormel licence)
Early October 1978 Level 0 - Dry weather operation	<ul style="list-style-type: none"> Update ESOR analysis Apply for Level 1 Drought Permit Prepare for enhanced media campaign Prepare company actions (increased water efficiency at company sites, increased leakage management, optimising supply network, etc) 	Normal level of monitoring, plus <ul style="list-style-type: none"> Monitoring related to Level 1 Drought Permit (Restormel licence)
End October 1978 Level 0 - Dry weather operation Invoke Drought Plan	<ul style="list-style-type: none"> Prepare for Level 2 Drought Permit (Stannon Lake) 	Normal level of monitoring, plus <ul style="list-style-type: none"> Monitoring related to Level 1 Drought Permit (Restormel licence) Monitoring related to Level 2 Drought Permit (Stannon Lake), if ESOR proved

Time period, drought level, operational mode	Actions and decisions	Environmental monitoring
Early November 1978 Level 1 – Drought Plan	<p>Colliford storage drops into Level 1 drought zone</p> <ul style="list-style-type: none"> Enhanced media campaign Implement company actions (increased water efficiency at company sites, increased leakage management, optimising supply network, etc) Implement Level 1 Drought Permit (Restormel licence), but cannot start pumped storage abstraction because still need to make supply releases Decide not to apply for Level 2 Drought Permit (Stannon Lake) because Colliford storage unlikely to drop into Level 2 and because winter pumped storage scheme can start as soon as Colliford supply releases stop, which should be within next few weeks 	<p>Enhanced monitoring, plus</p> <ul style="list-style-type: none"> Monitoring related to Level 1 Drought Permit (Restormel licence) <p>Stop monitoring related to Level 2 Drought Permit (Stannon Lake) – Drought Permit not required</p>
Early December 1978 Level 1 – Drought Plan	<ul style="list-style-type: none"> Improving rainfall and river flow situation Colliford supply releases stop Winter pumped storage scheme starts 	<p>Enhanced monitoring, plus</p> <ul style="list-style-type: none"> Monitoring related to Level 1 Drought Permit (Restormel licence)
January 1979 Level 0 - Dry weather operation	<p>Colliford storage rises out of Level 1 drought zone</p> <ul style="list-style-type: none"> Do not operate Level 1 Drought Permit (Restormel annual licence) because storage above Level 1 drought zone in January and rising steadily, with wet weather forecast Continue Colliford pumped storage scheme within the annual licence limit and ensuring enough water is kept back for supply throughout 1979 	<p>Enhanced monitoring, plus</p> <ul style="list-style-type: none"> Post-use monitoring related to Level 1 Drought Permit (Restormel licence)
End March 1979 Level 0 - Dry weather operation	<ul style="list-style-type: none"> Storage only reaches 70% by end March 1977, so storage could be of concern if get dry summer 	Normal level of monitoring
April – June 1979 Level 0 - Normal operation	<ul style="list-style-type: none"> Wet weather experienced River flows are healthy Colliford storage continues to increase through April to June inclusive, reaching 77% by end June Most local reservoirs are above 90% at end June Colliford storage projections show that even if summer and autumn are dry, Colliford storage would remain above Level 1 drought zone <p>Officially confirm End of drought</p>	Normal level of monitoring
Summer 1979 Level 0 - Normal operation	<ul style="list-style-type: none"> Post drought review 	Normal level of monitoring

A2.4.2 Roadford Reservoir (strategic reservoir)

Roadford Reservoir does not have a permanent, licensed winter pumped storage scheme. However, infrastructure exists from a previous drought (the 1996 River Lyd to Roadford Reservoir winter pumped storage drought scheme). There are three Drought Permits associated with this infrastructure and they are:

1. Level 1 Drought Permit covering the period January to March inclusive
2. “More before 4” (extreme drought) Drought Permit covering the period November to March inclusive
3. “More before 4” (extreme drought) Drought Permit covering the summer period.

The current EAR is for the Level 1 Drought Permit. The EAR has been revised to cover the November to March period and is currently being updated in response to Environment Agency feedback. However, as this extension is only needed in an extreme drought it does not have to be permit ready, so the extended period EAR is not required for this Drought Plan. The Lyd EAR also does not cover the summer period Drought Permit, but again as the summer period Drought Permit is only required in an extreme drought it does not need to be permit ready and hence does not need to be covered by the existing Lyd EAR.

A specified volume of Roadford Reservoir storage is reserved for fisheries bank releases. The Environment Agency decides when and how the fisheries bank will be used during the year. SWW makes fisheries bank releases as and when the Environment Agency requests them.

For Roadford WRZ the severe drought modelled was the PD-2 plausible drought (WRMP19 extended 1975/76 drought), which the Met Office estimated as having a return period of 1 in 400 to 430 years.

A2.4.2.1 Worked example – Roadford Reservoir, worst historic drought, dry year demand (plus outage allowance)

Figure A2.50: Roadford Reservoir, worst historic drought with dry year demand

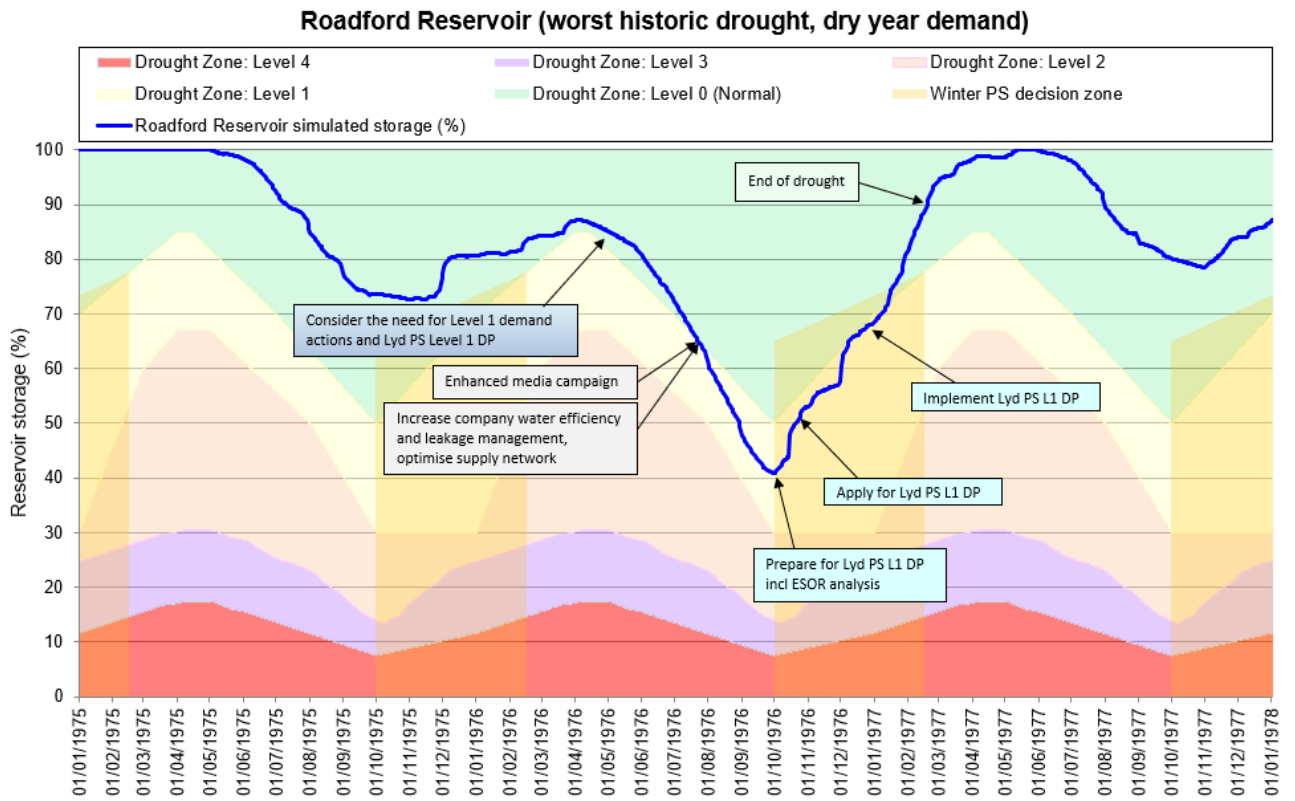


Table A2.5: Roadford Reservoir, worst historic drought with dry year demand

Time period, drought level, operational mode	Actions and decisions	Environmental monitoring
January – end September 1975 Level 0 - Normal operation	<ul style="list-style-type: none"> Routine monitoring – see Section 2.2 	Normal level of monitoring including: <ul style="list-style-type: none"> When reservoirs stop spilling, undertake spot gaugings downstream of dams to confirm instrumentation correct and releasing required compensation flow
October – November 1975 Level 0 - Normal operation	<ul style="list-style-type: none"> Projections show that Roadford storage unlikely to enter Level 1 drought zone in winter 1975/76 – decide not to apply for Lyd to Roadford Level 1 winter pumped storage scheme Drought Permit 	Normal level of monitoring
December 1975 – end March 1976 Level 0 - Dry weather operation	<ul style="list-style-type: none"> Roadford Reservoir storage remains above Level 1 drought zone, but is only slightly above Level 1 at end March 	Normal level of monitoring
April 1976 Level 0 - Dry weather operation	<ul style="list-style-type: none"> Very hot, dry weather experienced in April Roadford storage only slightly above Level 1 drought zone Projections indicate that if it remains dry Roadford storage could drop into Level 1 drought zone by July, but unlikely to drop into Level 2 zone in 1976 	Enhanced monitoring
May 1976 – June 1976 Level 0 - Dry weather operation	<ul style="list-style-type: none"> Prepare for enhanced media campaign Prepare company actions (increased water efficiency at company sites, increased leakage management, optimising supply network, etc) Lyd to Roadford pumped storage Level 1 Drought Permit applies in winter so too soon to prepare Drought Permit application 	Enhanced monitoring
July 1976 Level 1 - Dry weather operation Invoke Drought Plan	<ul style="list-style-type: none"> Mid July: Roadford storage drops into Level 1 drought zone Implement enhanced media campaign Implement company actions (increased water efficiency at company sites, increased leakage management, optimising supply network, etc) Undertake any required site maintenance for Lyd to Roadford Level 1 Drought Permit 	Enhanced monitoring
August – September 1976 Level 1 - Drought Plan Operation	<ul style="list-style-type: none"> Local reservoir storages low so reduce abstraction from these, which results in increased abstraction and supply releases from Roadford Reservoir 	Enhanced monitoring: <ul style="list-style-type: none"> in preparation for potential need for Lyd to Roadford Level 1 Drought Permit
October 1976 Level 1 - Drought Plan Operation	<ul style="list-style-type: none"> Prepare for Lyd to Roadford Level 1 Drought Permit Undertake ESOR analysis 	Enhanced monitoring, including: <ul style="list-style-type: none"> As specified in Lyd Drought Permit EAR

Time period, drought level, operational mode	Actions and decisions	Environmental monitoring
November 1976 Level 1 - Drought Plan Operation	<ul style="list-style-type: none"> Apply for Lyd to Roadford Level 1 Drought Permit 	Enhanced monitoring: <ul style="list-style-type: none"> As specified in Lyd Drought Permit EAR
January 1977 Level 1 - Drought Plan Operation	<ul style="list-style-type: none"> Implement Lyd to Roadford Level 1 Drought Permit Minimise abstraction from Roadford Reservoir by maximising local sources within licence and water availability constraints, to aid Roadford refill 	Enhanced monitoring: <ul style="list-style-type: none"> As specified in Lyd Drought Permit EAR
February 1977 Level 0 - Drought Plan Operation	<ul style="list-style-type: none"> Roadford storage rises out of Level 1, however continue Lyd to Roadford Level 1 Drought Permit abstraction because reservoir projections show that storage may not recover sufficiently if Lyd to Roadford Level 1 Drought Permit abstraction stopped before end March Continue to minimise abstraction from Roadford Reservoir by maximising local sources within licence and water availability constraints, to aid Roadford refill End Feb: significant rainfall in February, Roadford storage reaches 90% so stop Lyd to Roadford Level 1 Drought Permit abstraction because storage likely to continue to increase through March 	Enhanced monitoring: <ul style="list-style-type: none"> As specified in Lyd Drought Permit EAR
March 1977 Level 0 - Normal operation	<ul style="list-style-type: none"> Roadford storage >90% All local reservoirs are full River flows are healthy Normal operation, normal hydrological, water storage and demand monitoring <p>Officially confirm End of Drought</p>	Enhanced monitoring, plus <ul style="list-style-type: none"> Post-use monitoring related to Lyd to Roadford Level 1 Drought Permit
Summer 1977 Level 0 - Normal operation	<ul style="list-style-type: none"> Post drought review 	Normal level of monitoring

A2.4.2.2 Worked example – Roadford Reservoir, worst historic drought, high demand (plus outage allowance)

Figure A2.51: Roadford Reservoir, worst historic drought with high demand - 1975/76

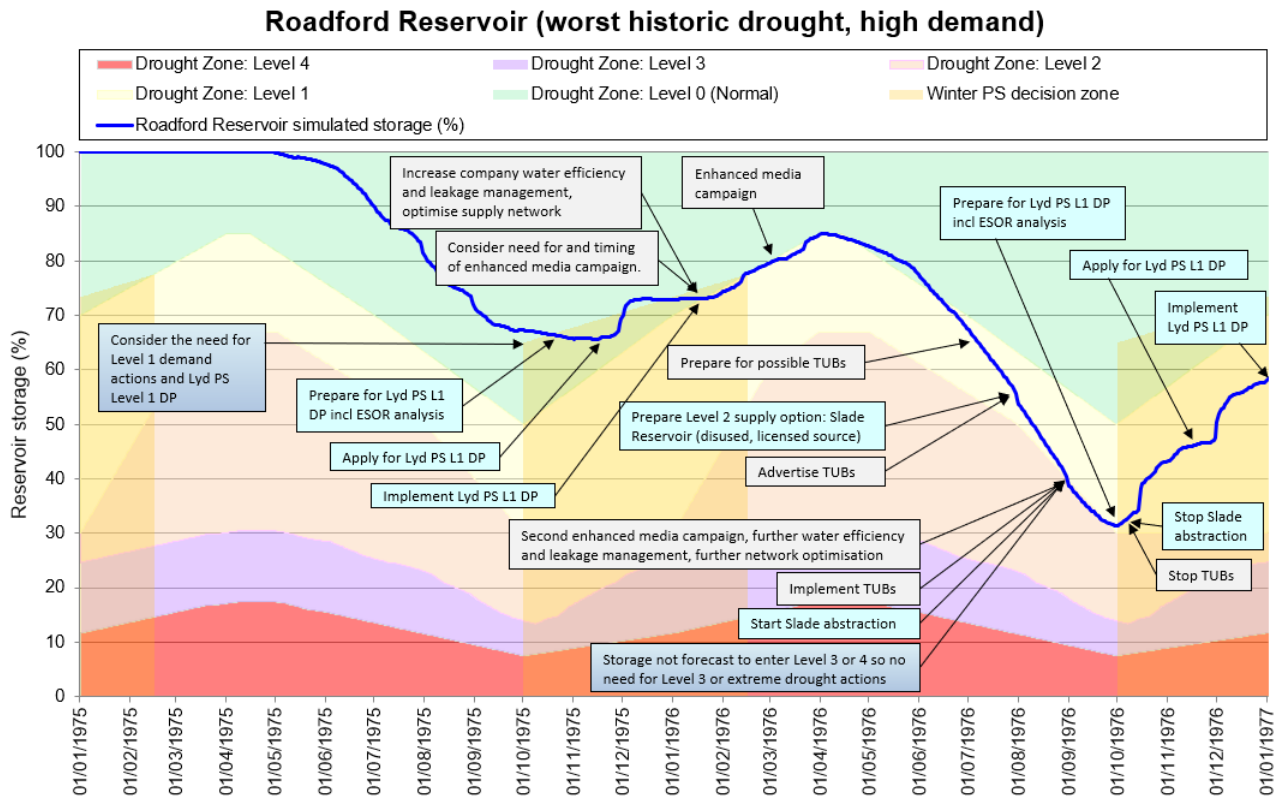


Figure A2.52: Roadford Reservoir, worst historic drought with high demand – 1977/78

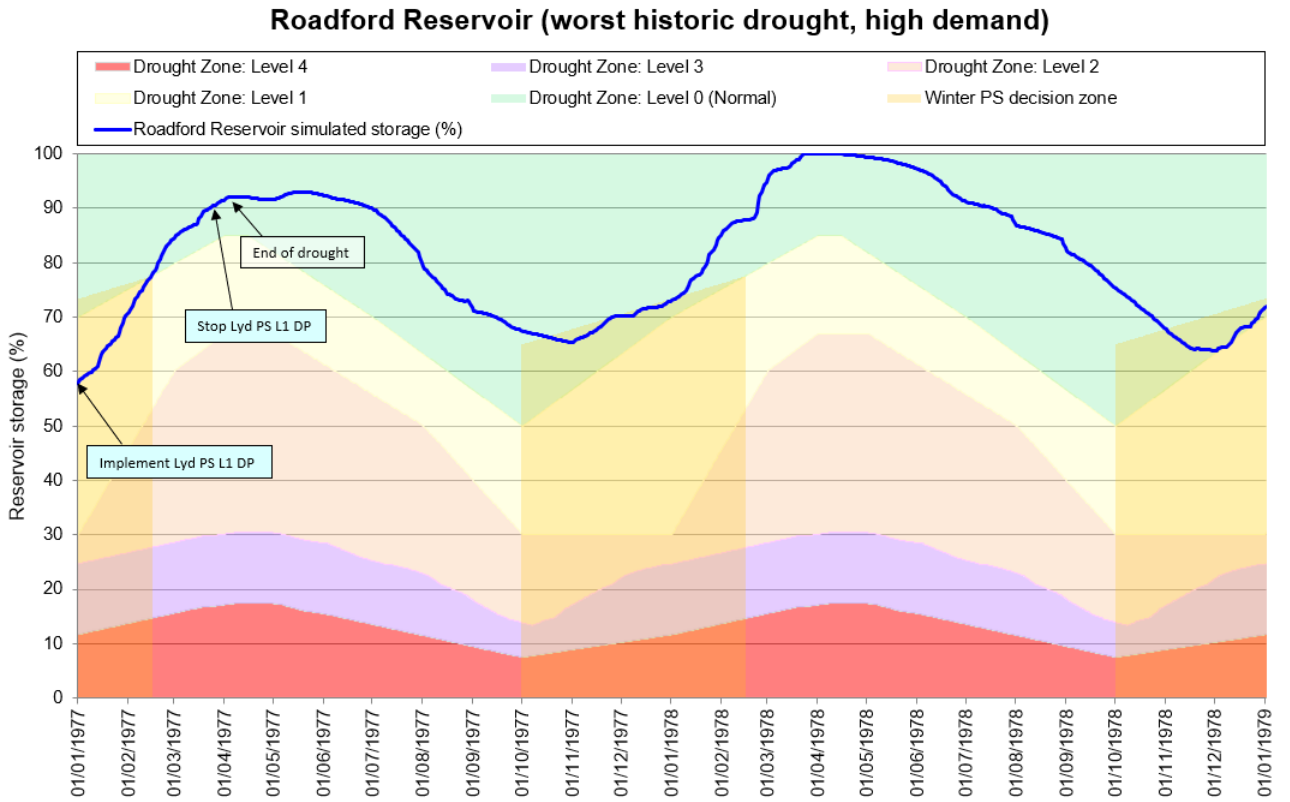


Table A2.6: Roadford Reservoir, worst historic drought with high demand

Time period, drought level, operational mode	Actions and decisions	Environmental monitoring
January – end March 1975 Level 0 - Normal operation	<ul style="list-style-type: none"> Routine monitoring – see Section 2.2 	Normal level of monitoring
April – end September 1975 Level 0 - Normal operation	<ul style="list-style-type: none"> Routine monitoring – see Section 2.2 	Normal level of monitoring including: <ul style="list-style-type: none"> When reservoirs stop spilling, undertake spot gaugings downstream of dams to confirm instrumentation correct and releasing required compensation flow
October – November 1975 Level 0 - Level 0 - Normal operation	Consider the need for the Lyd to Roadford Level 1 Drought Permit: <ul style="list-style-type: none"> Although in early November storage is above the Level 1 drought trigger curve, storage has not started to recover yet, so may need to apply for the Lyd to Roadford Level 1 Drought Permit this winter to supplement natural reservoir refill. Undertake ESOR analysis and prepare to apply for Lyd to Roadford Level 1 Drought Permit Undertake any required site maintenance for Lyd to Roadford Level 1 Drought Permit 	Normal level of monitoring, plus <ul style="list-style-type: none"> Lyd monitoring as defined in EAR
Mid November 1975 Level 0 - Dry weather operation	<ul style="list-style-type: none"> Apply for Lyd to Roadford Level 1 Drought Permit 	Normal level of monitoring, plus <ul style="list-style-type: none"> Lyd monitoring as defined in EAR
End November – end December 1975 Level 0 - Dry weather operation	Rapid recovery in Roadford Reservoir storage at the end of November is followed by virtually no increase in storage throughout December, with storage approaching Level 1 drought trigger curve in early January 1976. <ul style="list-style-type: none"> Minimise abstraction from Roadford Reservoir by maximising local sources within licence and water availability constraints, to aid Roadford refill Prepare for Level 1 drought actions: <ul style="list-style-type: none"> Enhanced media campaign Company actions (increased water efficiency at company sites, increased leakage management, optimising supply network, etc) Lyd to Roadford Level 1 Drought Permit 	Normal level of monitoring, plus <ul style="list-style-type: none"> Lyd monitoring as defined in EAR
Mid January 1976 Level 1 - Dry weather operation	<ul style="list-style-type: none"> Implement Level 1 supply-side action: Lyd to Roadford Level 1 Drought Permit Consider timing of enhanced media campaign – decide to wait until March to tie in with start of garden watering season and leading up to Easter holiday demand increase Implement company actions (increase water efficiency, targeted leakage management, optimize supply network) 	Normal level of monitoring, plus <ul style="list-style-type: none"> Lyd monitoring as defined in EAR

Time period, drought level, operational mode	Actions and decisions	Environmental monitoring
	<ul style="list-style-type: none"> Continue to minimise abstraction from Roadford Reservoir by maximising local sources within licence and water availability constraints, to aid Roadford refill 	
March 1976 Level 1 - Dry weather operation	<ul style="list-style-type: none"> Early March: enhanced media campaign End March: stop Lyd to Roadford Level 1 Drought Permit abstraction because only permitted until 31 March Continue company actions to reduce demand and improve connectivity of supply network Continue to minimise abstraction from Roadford Reservoir by maximising local sources within licence and water availability constraints, to aid Roadford refill 	Normal level of monitoring, plus <ul style="list-style-type: none"> Lyd monitoring as defined in EAR
April – May 1976 Level 0 - Dry weather operation	<ul style="list-style-type: none"> Very hot, dry weather experienced in April Roadford storage skimming Level 1 drought trigger curve Reservoir storage projections show possibility of storage dropping into Level 2 drought trigger zone by late summer / early autumn if it remains dry Prepare for follow-up enhanced media campaign Continue company actions 	Normal level of monitoring, plus <ul style="list-style-type: none"> Lyd monitoring as defined in EAR, post operation
June 1976 Level 1 - Dry weather operation Invoke Drought Plan	<ul style="list-style-type: none"> Enhanced hydrological and demand monitoring Start follow-up enhanced media campaign Continue company actions 	Normal level of monitoring
Early July 1976 Level 1 - Drought Plan Operation	<ul style="list-style-type: none"> Prepare for potential TUBs 	Normal level of monitoring
Late July 1976 Level 1 - Drought Plan Operation	<ul style="list-style-type: none"> Advertise TUBs Undertake any required site maintenance at Slade Reservoir (disused, licensed source) and agree any changes to existing licence conditions with Environment Agency (e.g. compensation release change) 	Enhanced monitoring: <ul style="list-style-type: none"> Monitoring related to Slade Reservoir operation
Late August 1976 Level 2 - Drought Plan Operation	<ul style="list-style-type: none"> Implement TUBs Further enhanced media campaign Further company drought actions Abstract from Slade Reservoir Analyse demand reductions from TUBs and media campaign Storage is not forecast to enter Level 3 or 4 so no need for Level 3 or extreme drought actions. 	Enhanced monitoring: <ul style="list-style-type: none"> Monitoring related to Slade Reservoir operation
Early September 1976 Level 2 - Drought Plan Operation	<ul style="list-style-type: none"> Continue to abstract from Slade Reservoir 	Enhanced monitoring: <ul style="list-style-type: none"> Monitoring related to Slade Reservoir operation
October 1976 Level 1 - Drought Plan Operation	<ul style="list-style-type: none"> Stop TUBs as storage is starting to recover, is now in Level 1 and because demand savings from TUBs reduce in autumn 	Enhanced monitoring: <ul style="list-style-type: none"> Monitoring related to Slade Reservoir, post operation

Time period, drought level, operational mode	Actions and decisions	Environmental monitoring
	<ul style="list-style-type: none"> Stop abstracting from Slade Reservoir because Wistlandpound Reservoir storage sufficiently recovered Prepare for Lyd to Roadford Level 1 Drought Permit Undertake ESOR analysis 	<ul style="list-style-type: none"> As specified in Lyd Drought Permit EAR
Level 1 - Mid November 1976 Level 1 - Drought Plan Operation	<ul style="list-style-type: none"> Apply for Lyd to Roadford Level 1 Drought Permit 	Enhanced monitoring: <ul style="list-style-type: none"> Monitoring related to Slade Reservoir, post operation As specified in Lyd Drought Permit EAR
December 1976 Level 1 - Drought Plan Operation	<ul style="list-style-type: none"> Roadford Reservoir storage increasing but still well within the Level 1 drought trigger zone, so likely to need Lyd to Roadford Level 1 Drought Permit Undertake any required site maintenance for Lyd to Roadford Level 1 Drought Permit 	Enhanced monitoring: <ul style="list-style-type: none"> Monitoring related to Slade Reservoir, post operation As specified in Lyd Drought Permit EAR
January 1977 Level 1 - Drought Plan Operation	<ul style="list-style-type: none"> Implement Lyd to Roadford Level 1 Drought Permit Minimise abstraction from Roadford Reservoir by maximising local sources within licence and water availability constraints, to aid Roadford refill 	Enhanced monitoring: <ul style="list-style-type: none"> Monitoring related to Slade Reservoir, post operation As specified in Lyd Drought Permit EAR
Mid February 1977 Level 0 - Drought Plan Operation	<ul style="list-style-type: none"> Roadford storage rises out of Level 1, however continue Lyd to Roadford Level 1 Drought Permit abstraction because reservoir projections show that storage may not recover sufficiently if abstraction stopped before end March Continue to minimise abstraction from Roadford Reservoir by maximising local sources within licence and water availability constraints, to aid Roadford refill 	Enhanced monitoring: <ul style="list-style-type: none"> Monitoring related to Slade Reservoir, post operation As specified in Lyd Drought Permit EAR
End March 1977 Level 0 - Normal operation	<ul style="list-style-type: none"> Stop Lyd to Roadford Level 1 Drought Permit abstraction because only permitted until 31 March Continue to minimise abstraction from Roadford Reservoir by maximising local sources within licence and water availability constraints, to aid Roadford refill 	Normal level of monitoring
April 1977 Level 0 - Normal operation	<ul style="list-style-type: none"> Roadford storage >90% All local reservoirs are full River flows are healthy Normal operation, normal hydrological, water storage and demand monitoring <p>Officially confirm End of Drought</p>	Normal level of monitoring
Summer 1977 Level 0 - Normal operation	<ul style="list-style-type: none"> Post drought review 	Normal level of monitoring

A2.4.2.3 Worked example – Roadford Reservoir, severe drought, high demand (plus outage allowance)

Figure A2.53: Roadford Reservoir, severe drought with high demand - 1975/76

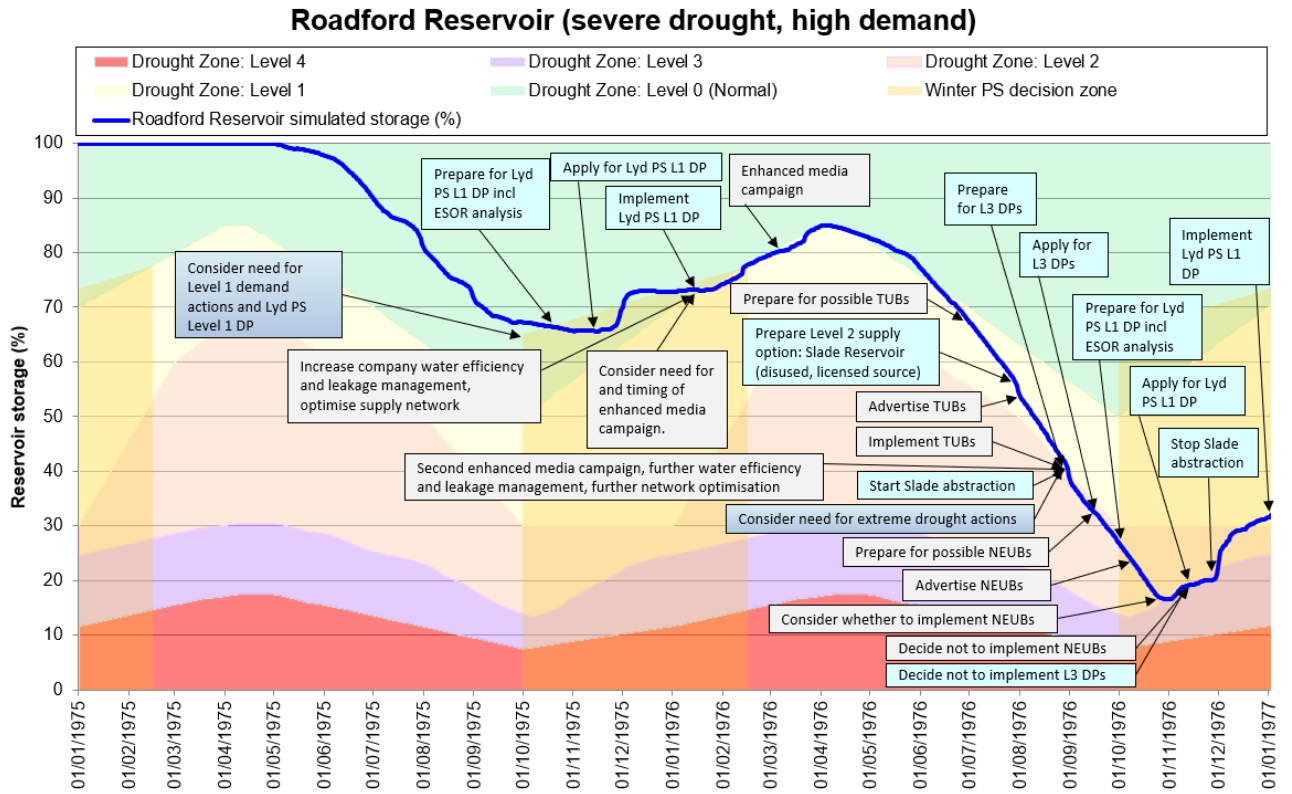
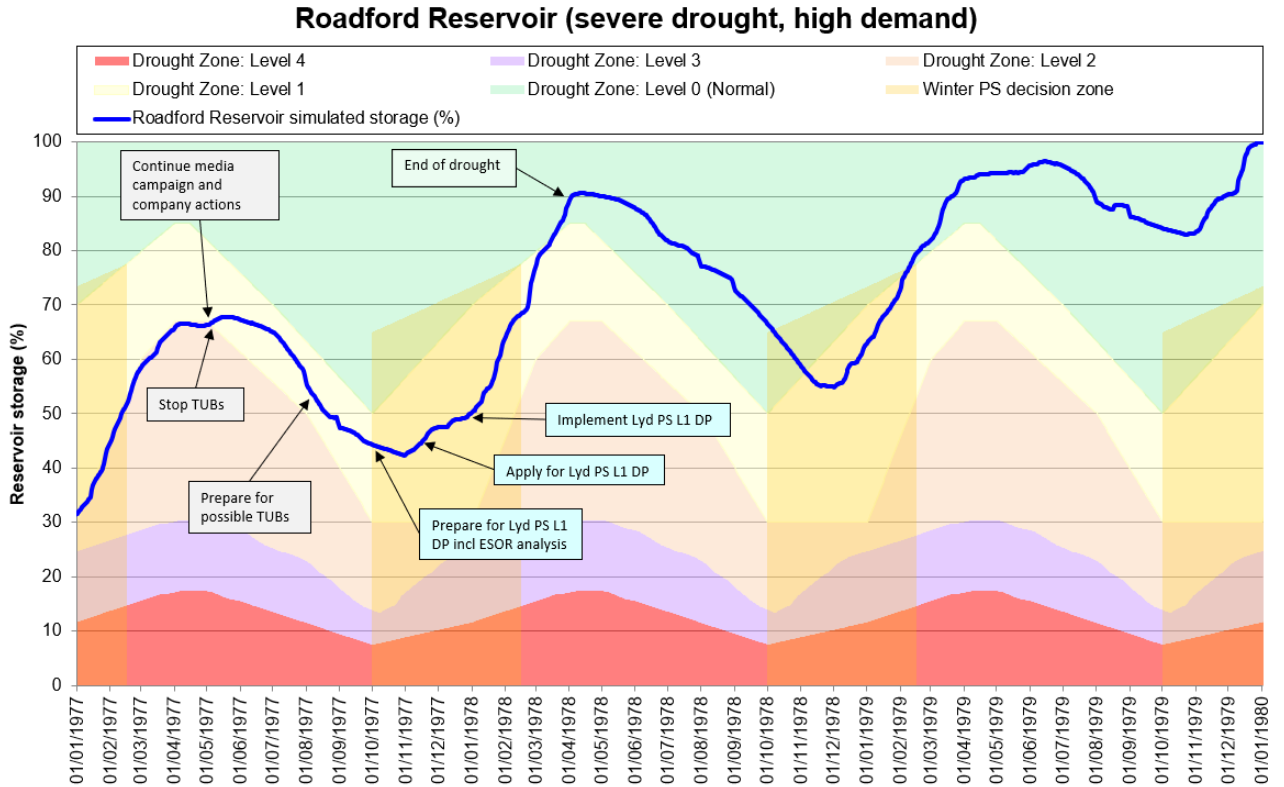


Figure A2.54: Roadford Reservoir, severe drought with high demand - 1977-79



In this scenario, Roadford Reservoir storage will also enter the Level 1 drought zone in winter 1978/79. The same process would be followed through 1978-79 as for the 1975-78 drought, however as this would be a separate potential drought it is not covered in this worked example.

Table A2.7: Roadford Reservoir, severe drought with high demand

Time period, drought level, operational mode	Actions and decisions	Environmental monitoring
January – end March 1975 Level 0 - Normal operation	<ul style="list-style-type: none"> Routine monitoring – see Section 2.2 	Normal level of monitoring
April – end September 1975 Level 0 - Normal operation	<ul style="list-style-type: none"> Routine monitoring – see Section 2.2 	Normal level of monitoring including: <ul style="list-style-type: none"> When reservoirs stop spilling, undertake spot gaugings downstream of dams to confirm instrumentation correct and releasing required compensation flow
October – November 1975 Level 0 - Normal operation	Consider the need for the Lyd to Roadford Level 1 Drought Permit: <ul style="list-style-type: none"> Although in early November storage is above the Level 1 drought trigger curve, storage has not started to recover yet, so may need to apply for the Lyd to Roadford Level 1 Drought Permit this winter to supplement natural reservoir refill. Undertake ESOR analysis and prepare to apply for Lyd to Roadford Level 1 Drought Permit Undertake any required site maintenance for Lyd to Roadford Level 1 Drought Permit 	Normal level of monitoring, plus <ul style="list-style-type: none"> Lyd monitoring as defined in EAR
Mid November 1975 Level 0 - Dry weather operation	<ul style="list-style-type: none"> Apply for Lyd to Roadford Level 1 Drought Permit 	Normal level of monitoring, plus <ul style="list-style-type: none"> Lyd monitoring as defined in EAR
End November – end December 1975 Level 0 - Dry weather operation	<ul style="list-style-type: none"> Rapid recovery in Roadford Reservoir storage end November is followed by virtually no increase in storage throughout December, with storage approaching Level 1 drought trigger curve in early January 1976. Prepare for enhanced media campaign Prepare company actions (increased water efficiency at company sites, increased leakage management, optimising supply network, etc) 	Normal level of monitoring, plus <ul style="list-style-type: none"> Lyd monitoring as defined in EAR
Mid January 1976 Level 1 – Dry weather operation	<ul style="list-style-type: none"> Implement Lyd to Roadford Level 1 Drought Permit Consider timing of enhanced media campaign – decide to wait until March to tie in with start of garden watering season and leading up to Easter holiday demand increase Implement company actions (increase water efficiency, targeted leakage management, optimize supply network) 	Normal level of monitoring, plus <ul style="list-style-type: none"> Lyd monitoring as defined in EAR
March 1976 Level 1 – Dry weather operation	<ul style="list-style-type: none"> Early March: enhanced media campaign End March: stop Lyd to Roadford Level 1 Drought Permit abstraction because only permitted until 31 March 	Normal level of monitoring, plus <ul style="list-style-type: none"> Lyd monitoring as defined in EAR

Time period, drought level, operational mode	Actions and decisions	Environmental monitoring
	<ul style="list-style-type: none"> Continue company actions to reduce demand and improve connectivity of supply network 	
April – May 1976 Level - Dry weather operation	<ul style="list-style-type: none"> Very hot, dry weather experienced in April Roadford storage skimming Level 1 drought trigger curve Reservoir storage projections show possibility of storage dropping into Level 2 drought trigger zone by late summer / early autumn if it remains dry Prepare for another enhanced media campaign Prepare for / continue company drought actions 	Normal level of monitoring
June 1976 Level 1 - Dry weather operation Invoke Drought Plan	<ul style="list-style-type: none"> Enhanced hydrological and demand monitoring Start follow-up enhanced media campaign Continue company actions 	Normal level of monitoring
Early July 1976 Level 1 - Drought Plan Operation	<ul style="list-style-type: none"> Prepare for potential TUBs 	Normal level of monitoring
Early August 1976 Level 1 – Drought Plan operation	<ul style="list-style-type: none"> Undertake any required site maintenance at Slade Reservoir (disused, licensed source) and agree any changes to existing licence conditions with Environment Agency (e.g. compensation release change) Advertise TUBs 	Enhanced monitoring: <ul style="list-style-type: none"> Monitoring related to Slade Reservoir operation
End August 1976 Level 2 - Drought Plan operation	<ul style="list-style-type: none"> Implement TUBs Further enhanced media campaign Further company drought actions Abstract from Slade Reservoir Analyse demand reductions from TUBs and media campaign Risk that storage could drop into Level 3 drought zone but unlikely to drop into Level 4: <ul style="list-style-type: none"> Prepare for Level 3 Drought Permits Not forecast to need extreme drought actions 	Enhanced monitoring: <ul style="list-style-type: none"> Monitoring related to Slade Reservoir operation Start monitoring related to Level 3 Drought Permits
Mid September 1976 Level 2 - Drought Plan operation	<ul style="list-style-type: none"> Continue to abstract from Slade Reservoir Prepare for possible need for NEUBs 	Enhanced monitoring: <ul style="list-style-type: none"> Monitoring related to Slade Reservoir operation Monitoring related to Level 3 Drought Permits
October 1976 Level 2 – Drought Plan operation	<ul style="list-style-type: none"> Prepare for Lyd to Roadford Level 1 Drought Permit, including ESOR analysis Continue to abstract from Slade Reservoir Advertise NEUBs early October Consider the need for NEUBs end October: Roadford storage projected to reach Level 3, but Roadford abstraction and supply releases reducing due to water available from local sources, limited demand savings from NEUBs in winter, approaching winter PS period. Decide to defer implementation for a week and monitor situation. 	Enhanced monitoring: <ul style="list-style-type: none"> As specified in Lyd Drought Permit EAR Monitoring related to Slade Reservoir operation Monitoring related to Level 3 Drought Permits

Time period, drought level, operational mode	Actions and decisions	Environmental monitoring
Mid November 1976 Level 2 – Drought Plan operation	<ul style="list-style-type: none"> Apply for Lyd to Roadford Level 1 Drought Permit Decide not to implement NEUBs or Level 3 Drought Permits because storage starting to recover, forecast for wetter weather and approaching winter pumped storage period. 	Enhanced monitoring: <ul style="list-style-type: none"> Monitoring related to Slade Reservoir operation As specified in Lyd Drought Permit EAR Stop monitoring related to Level 3 Drought Permits
December 1976 Level 2 – Drought Plan operation	<ul style="list-style-type: none"> Stop abstracting from Slade Reservoir because Wistlandpound Reservoir storage sufficiently recovered Roadford Reservoir storage increasing, rising out of Level 2 drought trigger zone but still well within Level 1, so likely to need Lyd to Roadford Level 1 Drought Permit Undertake any required site maintenance for Lyd to Roadford Level 1 Drought Permit 	Enhanced monitoring: <ul style="list-style-type: none"> Monitoring related to Slade Reservoir, post operation As specified in Lyd Drought Permit EAR
January 1977 Level 2 – Drought Plan operation	<ul style="list-style-type: none"> Implement Lyd to Roadford Level 1 Drought Permit Roadford storage increasing and virtually following the top of the Level 2 drought zone 	Enhanced monitoring: <ul style="list-style-type: none"> Monitoring related to Slade Reservoir, post operation As specified in Lyd Drought Permit EAR
End April 1977 Drought Plan operation	<ul style="list-style-type: none"> Storage rises into Level 1 drought zone, so stop TUBs Refresh/continue media campaign Continue company actions 	Enhanced monitoring
August 1977 Level 1 – Drought Plan operation	<ul style="list-style-type: none"> Prepare for possible TUBs because if it remains dry, storage could drop into Level 2 drought zone 	Enhanced monitoring
October 1977 Level 1 – Drought Plan operation	<ul style="list-style-type: none"> Storage looks unlikely to drop into Level 2, so TUBs unlikely to be needed Storage is still well within Level 1 so likely to need Lyd to Roadford Level 1 Drought Permit this winter, so prepare Drought Permit application including ESOR analysis 	Enhanced monitoring
Mid November 1977 Level 1 – Drought Plan operation	<ul style="list-style-type: none"> Apply for Lyd to Roadford Level 1 Drought Permit 	Enhanced monitoring, plus <ul style="list-style-type: none"> Lyd monitoring as defined in EAR
January 1978 Level 1 – Drought Plan operation	<ul style="list-style-type: none"> Implement Lyd to Roadford Level 1 Drought Permit 	Enhanced monitoring, plus <ul style="list-style-type: none"> Lyd monitoring as defined in EAR
End March 1978 Level 0 - Dry weather operation	<ul style="list-style-type: none"> Stop Lyd to Roadford Level 1 Drought Permit abstraction because only permitted until 31 March 	Normal level of monitoring, plus <ul style="list-style-type: none"> Lyd monitoring as defined in EAR
Early April 1978 Level 0 - Normal operation	<ul style="list-style-type: none"> Roadford Reservoir approaching 90% All local reservoirs are full River flows are healthy 	Normal level of monitoring, plus <ul style="list-style-type: none"> Lyd monitoring as defined in EAR

Time period, drought level, operational mode	Actions and decisions	Environmental monitoring
	Officially confirm End of drought	
Summer 1978 Level 0 - Normal operation	<ul style="list-style-type: none"> Post drought review 	Normal level of monitoring

A2.4.3 Wimbleball Reservoir (strategic reservoir)

Wimbleball Reservoir is a shared resource between SWW and Wessex Water. In drought analysis and forecasting, SWW assumes that Wessex Water abstracts their maximum licensed volume from Wimbleball Reservoir in all years. Wessex Water has confirmed that there are no Drought Permits in their Drought Plan affecting Wimbleball Reservoir storage.

Wimbleball Reservoir has a licensed pumped storage scheme that permits abstractions from further downstream on the River Exe into Wimbleball Reservoir between November and March inclusive when river flow exceeds a hands-off flow. This pumped storage scheme supplements the natural inflow into the reservoir and the water available under this licence is generally sufficient to ensure that the reservoir can be refilled each year.

A specified volume of Wimbleball Reservoir storage is reserved for fisheries bank releases. The Environment Agency decides when and how the fisheries bank will be used during the year. SWW makes fisheries bank releases as and when the Environment Agency requests them. Releases are normally made in late spring and late summer/early autumn, to aid fish migration.

For Wimbleball WRZ the severe drought modelled was the PD-2 plausible drought (WRMP19 extended 1975/76 drought), which the Met Office estimated as having a return period of 1 in 525 to 675 years.

A2.4.3.1 Worked example – Wimbleball Reservoir, worst historic drought, dry year demand (plus outage allowance)

Figure A2.55: Wimbleball Reservoir, worst historic drought with dry year demand

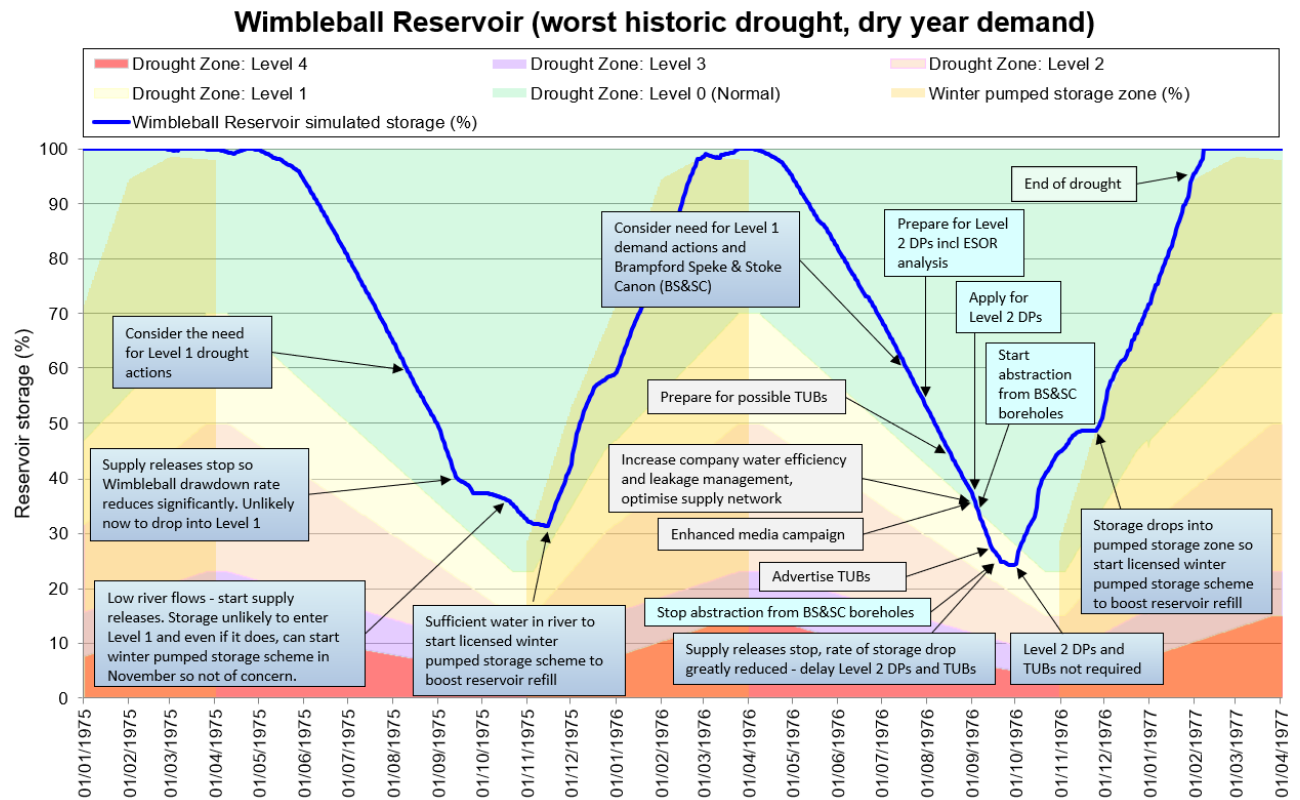


Table A2.8: Wimbleball Reservoir, worst historic drought with dry year demand

Time period, drought level, operational mode	Actions and decisions	Environmental monitoring
January – end April 1975 Level 0 - Normal operation	<ul style="list-style-type: none"> Routine monitoring – see Section 2.2 	Normal level of monitoring
May– July 1975 Level 0 - Normal operation	<ul style="list-style-type: none"> Routine monitoring – see Section 2.2 	Normal level of monitoring including: <ul style="list-style-type: none"> When reservoir stops spilling, check SWW and Environment Agency river gauges to confirm releasing required compensation flow from Wimbleball Reservoir
August 1975 Level 0 - Normal operation	<ul style="list-style-type: none"> Wimbleball storage 60% Potential for storage to drop into Level 1 drought zone by October if it continues hot and dry Consider the need for Level 1 drought actions: <ul style="list-style-type: none"> Enhanced media campaign Company actions to reduce demand Prepare to start abstraction from Brampford Speke and Stoke Canon boreholes (disused, licensed sources) 	Normal level of monitoring
Mid September 1975 Level 0 - Normal operation	<ul style="list-style-type: none"> River flows recovering, supply releases stop so Wimbleball storage drawdown rate reduces significantly – storage is now unlikely to drop into Level 1 drought zone 	Normal level of monitoring
Mid October 1975 Level 0 - Normal operation	<ul style="list-style-type: none"> River flows drop sufficiently to need to start Wimbleball supply releases again. Rate of storage drop increases. Even if it remains dry, storage unlikely to drop into Level 1 drought zone. Even if it does, winter pumped storage scheme can be started from 1 November as soon as there is sufficient water available, so conclude Level 1 drought actions not required 	Normal level of monitoring
Mid November 1975 Level 0 – Normal operation	<ul style="list-style-type: none"> Start winter pumped storage scheme now that there is sufficient water in the river to permit abstraction 	Normal level of monitoring
Mid November 1975 – end March 1976 Level 0 - Normal operation	<ul style="list-style-type: none"> Operate winter pumped storage scheme in line with pumped storage trigger curve, to ensure that storage is at least 98% by end March 1976 	Normal level of monitoring
April – June 1976 Level 0 - Normal operation	<ul style="list-style-type: none"> Very hot, dry weather experienced in April River flows low by mid April - start Wimbleball supply releases to support river abstractions at Tiverton and Exeter 	Normal level of monitoring

Time period, drought level, operational mode	Actions and decisions	Environmental monitoring
	<ul style="list-style-type: none"> Reservoir storage projections show possibility of storage dropping into Level 1 drought trigger zone by early September if it remains dry 	
July 1976 Level 0 - Dry weather operation	<ul style="list-style-type: none"> Weather continues hot and dry River flows continue to drop and supply releases continue from Wimbleball Reservoir If it continues to be dry Wimbleball storage will drop into the Level 1 drought zone by early September and Level 2 drought zone by early October Prepare for enhanced media campaign Prepare for Level 1 company actions Prepare to start abstraction from Brampford Speke and Stoke Canon boreholes (disused, licensed sources) 	<p>Normal level of monitoring, plus</p> <ul style="list-style-type: none"> Monitoring related to abstraction from Brampford Speke and Stoke Canon
August 1976 Level 0 - Dry weather operation	<ul style="list-style-type: none"> Weather continues hot and dry Undertake ESOR analysis Prepare for Level 2 Drought Permits (remove annual abstraction licence limits from Hook and Wilmington Springs licences to allow more abstraction, subject to water availability) Prepare for possible TUBs 	
Early September 1976 Level 1 – Dry weather operation Invoke Drought Plan	<p>Storage drops into the Level 1 drought zone:</p> <ul style="list-style-type: none"> Enhanced media campaign Company drought actions: increase company water efficiency, increase leakage management, optimise supply network Start abstraction from Brampford Speke and Stoke Canon boreholes (disused, licensed sources) <p>Storage could enter Level 2 drought zone by early October if it remains dry:</p> <ul style="list-style-type: none"> Update ESOR analysis Apply for Level 2 Drought Permits 	<p>Enhanced level of monitoring, including</p> <ul style="list-style-type: none"> Monitoring related to abstraction from Brampford Speke and Stoke Canon Follow monitoring programme relating to Level 2 Drought Permits
Mid September 1976 Level 1 – Drought Plan operation	<ul style="list-style-type: none"> Advertise TUBs Wet weather experienced River flows improve sufficiently for Wimbleball supply releases to stop, reducing the rate of storage drop Stop abstracting from Brampford Speke and Stoke Canon boreholes Wet weather is forecast so unlikely to need to recommence supply releases 	<p>Enhanced level of monitoring, including</p> <ul style="list-style-type: none"> Monitoring related to abstraction from Brampford Speke and Stoke Canon Follow monitoring programme relating to Level 2 Drought Permits
Early October 1976 Level 1 – Drought Plan operation	<ul style="list-style-type: none"> Significant rainfall experienced River flows high Rapid rate of increase in Wimbleball Reservoir storage, rising quickly out of Level 1 drought zone into normal zone More wet weather forecast TUBs not required Level 2 Drought Permits not required 	<p>Enhanced level of monitoring, including</p> <ul style="list-style-type: none"> Monitoring related to abstraction from Brampford Speke and Stoke Canon – post operation <p>Monitoring no longer required for Level 2 Drought Permits</p>
Mid October – early November 1975	<ul style="list-style-type: none"> Continued rapid rate of increase in Wimbleball Reservoir storage in response to ongoing wet weather 	<p>Normal level of monitoring</p>

Time period, drought level, operational mode	Actions and decisions	Environmental monitoring
Level 0 - Normal operation		
Mid November 1976 Level 0 - Normal operation	<ul style="list-style-type: none"> Operate winter pumped storage scheme in line with pumped storage zone, to ensure that storage is at least 98% by end March 1976 	Normal level of monitoring
February 1977 Level 0 - Normal operation	<ul style="list-style-type: none"> Wimbleball storage approaching 100% River flows are healthy Normal operation, normal hydrological, water storage and demand monitoring <p>Officially confirm End of Drought</p>	Normal level of monitoring
Spring 1977 Level 0 - Normal operation	<ul style="list-style-type: none"> Post drought review 	Normal level of monitoring

A2.4.3.2 Worked example – Wimbleball Reservoir, worst historic drought, high demand (plus outage allowance)

Figure A2.56: Wimbleball Reservoir, worst historic drought with high demand

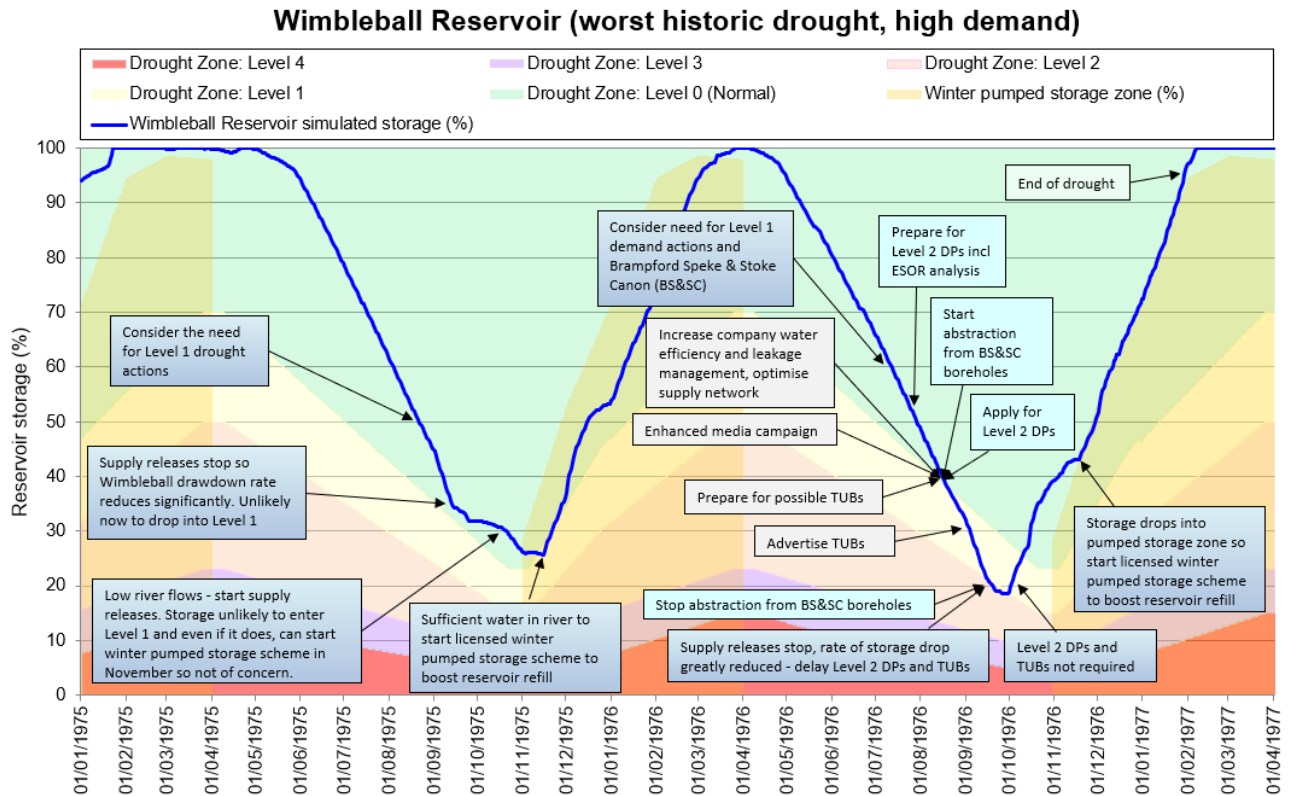


Table A2.9: Wimbleball Reservoir, worst historic drought with high demand

Time period, drought level, operational mode	Actions and decisions	Environmental monitoring
January – end April 1975 Level 0 - Normal operation	<ul style="list-style-type: none"> Routine monitoring – see Section 2.2 	Normal level of monitoring
May 1975 Level 0 - Normal operation	<ul style="list-style-type: none"> Routine monitoring – see Section 2.2 	Normal level of monitoring including: <ul style="list-style-type: none"> When reservoir stops spilling, check SWW and Environment Agency river gauges to confirm releasing required compensation flow from Wimbleball Reservoir
August 1975 Level 0 - Normal operation	<ul style="list-style-type: none"> Wimbleball storage 50% Potential for storage to drop into Level 1 drought zone by mid – late September if it continues hot and dry Consider the need for Level 1 drought actions: <ul style="list-style-type: none"> Enhanced media campaign Company actions to reduce demand Prepare to start abstraction from Brampford Speke and Stoke Canon boreholes (disused, licensed sources) 	Normal level of monitoring
Mid September 1975 Level 0 - Normal operation	<ul style="list-style-type: none"> River flows recovering, supply releases stop so Wimbleball storage drawdown rate reduces significantly – storage is now unlikely to drop into Level 1 drought zone 	Normal level of monitoring
Mid October 1975 Level 0 - Normal operation	<ul style="list-style-type: none"> River flows drop sufficiently to need to start Wimbleball supply releases again. Rate of storage drop increases. If it remains dry, storage could drop into the Level 1 drought zone but even if it does, as the winter pumped storage scheme can be started from 1 November as soon as there is sufficient water available, Level 1 drought actions are not required 	Normal level of monitoring
Mid November 1975 Level 1 – Normal operation	<ul style="list-style-type: none"> Start winter pumped storage scheme now that there is sufficient water in the river to permit abstraction 	Normal level of monitoring
Mid November 1975 – end March 1976 Level 0 - Normal operation	<ul style="list-style-type: none"> Operate winter pumped storage scheme in line with pumped storage trigger curve, to ensure that storage is at least 98% by end March 1976 	Normal level of monitoring
April – June 1976 Level 0 - Normal operation	<ul style="list-style-type: none"> Very hot, dry weather experienced in April River flows low by mid April - start Wimbleball supply releases to support river abstractions at Tiverton and Exeter Reservoir storage projections show possibility of storage dropping into Level 1 drought trigger zone by early – mid August if it remains dry 	Normal level of monitoring

Time period, drought level, operational mode	Actions and decisions	Environmental monitoring
July 1976 Level 0 - Dry weather operation	<ul style="list-style-type: none"> Weather continues hot and dry River flows continue to drop and supply releases continue from Wimbleball Reservoir If it continues to be dry Wimbleball storage will drop into the Level 1 drought zone by mid August and Level 2 drought zone by mid/end September Prepare for enhanced media campaign Prepare for Level 1 company actions Prepare to start abstraction from Brampford Speke and Stoke Canon boreholes (disused, licensed sources) Prepare for Level 2 Drought Permits (remove annual abstraction licence limits from Hook and Wilmington Springs licences to allow more abstraction, subject to water availability) Undertake ESOR analysis 	<p>Normal level of monitoring, plus</p> <ul style="list-style-type: none"> Monitoring related to abstraction from Brampford Speke and Stoke Canon
Mid August 1976 Level 1 – Dry weather operation Invoke Drought Plan	<p>Storage drops into the Level 1 drought zone:</p> <ul style="list-style-type: none"> Enhanced media campaign Company drought actions: increase company water efficiency, increase leakage management, optimise supply network Start abstraction from Brampford Speke and Stoke Canon boreholes (disused, licensed sources) <p>Storage could enter Level 2 drought zone by mid/late September if it remains dry:</p> <ul style="list-style-type: none"> Update ESOR analysis with latest data Apply for Level 2 Drought Permits Prepare for possible TUBs 	<p>Enhanced level of monitoring, including</p> <ul style="list-style-type: none"> Monitoring related to abstraction from Brampford Speke and Stoke Canon Follow monitoring programme relating to Level 2 Drought Permits
End August 1976 Level 1 – Drought Plan operation	<ul style="list-style-type: none"> Advertise TUBs 	<p>Enhanced level of monitoring, including</p> <ul style="list-style-type: none"> Monitoring related to abstraction from Brampford Speke and Stoke Canon Follow monitoring programme relating to Level 2 Drought Permits
Mid September 1976 Level 1 – Drought Plan operation	<p>Storage drops into Level 2 drought zone:</p> <ul style="list-style-type: none"> Wet weather experienced River flows improve sufficiently for Wimbleball supply releases to stop, greatly reducing the rate of storage drop Stop abstracting from Brampford Speke and Stoke Canon boreholes Wet weather is forecast so unlikely to need to recommence supply releases Decide not to implement TUBs or Level 2 Drought Permits yet but to monitor the situation, reviewing each week 	<p>Enhanced level of monitoring, including</p> <ul style="list-style-type: none"> Monitoring related to abstraction from Brampford Speke and Stoke Canon Follow monitoring programme relating to Level 2 Drought Permits
Early October 1976 Level 1 – Drought Plan operation	<ul style="list-style-type: none"> Significant rainfall experienced River flows high Rapid rate of increase in Wimbleball Reservoir storage, rising quickly through Level 1 drought zone towards normal zone More wet weather forecast 	<p>Enhanced level of monitoring, including</p> <ul style="list-style-type: none"> Monitoring related to abstraction from Brampford Speke and Stoke Canon – post operation

Time period, drought level, operational mode	Actions and decisions	Environmental monitoring
	<ul style="list-style-type: none"> Do not implement TUBs Do not implement Level 2 Drought Permits not required 	Monitoring no longer required for Level 2 Drought Permits
Mid October – early November 1976 Level 0 - Normal operation	<ul style="list-style-type: none"> Continued rapid rate of increase in Wimbleball Reservoir storage in response to ongoing wet weather – storage now back into normal zone 	Normal level of monitoring
Mid November 1976 Level 0 - Normal operation	<ul style="list-style-type: none"> Operate winter pumped storage scheme in line with pumped storage trigger curve, to ensure that storage is at least 98% by end March 1976 	Normal level of monitoring
February 1977 Level 0 - Normal operation	<ul style="list-style-type: none"> Wimbleball storage approaching 100% River flows are healthy Normal operation, normal hydrological, water storage and demand monitoring <p>Officially confirm End of Drought</p>	Normal level of monitoring
Spring 1977 Level 0 - Normal operation	<ul style="list-style-type: none"> Post drought review 	Normal level of monitoring

A2.4.3.3 Worked example – Wimbleball Reservoir, severe drought, high demand (plus outage allowance)

Figure A2.57: Wimbleball Reservoir, severe drought with high demand

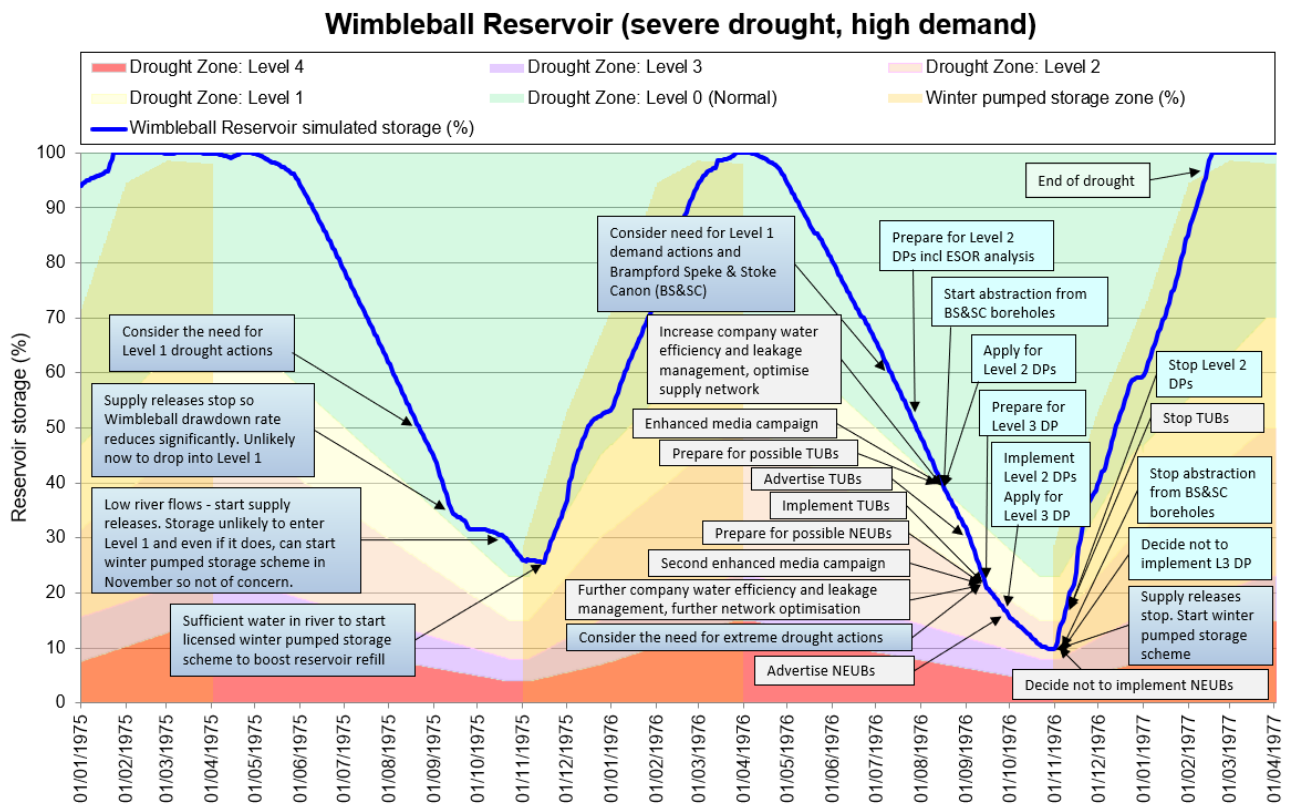


Table A2.10: Wimbleball Reservoir, severe drought with high demand

Time period, drought level, operational mode	Actions and decisions	Environmental monitoring
January – end April 1975 Level 0 - Normal operation	<ul style="list-style-type: none"> Routine monitoring – see Section 2.2 	Normal level of monitoring
May 1975 Level 0 - Normal operation	<ul style="list-style-type: none"> Routine monitoring – see Section 2.2 	Normal level of monitoring including: <ul style="list-style-type: none"> When reservoir stops spilling, check SWW and Environment Agency river gauges to confirm releasing required compensation flow from Wimbleball Reservoir Make fisheries bank releases if directed to do so by the Environment Agency
August 1975 Level 0 - Normal operation	<ul style="list-style-type: none"> Wimbleball storage 50% Potential for storage to drop into Level 1 drought zone by mid – late September if it continues hot and dry Consider the need for Level 1 drought actions: <ul style="list-style-type: none"> Enhanced media campaign Company actions to reduce demand Prepare to start abstraction from Brampford Speke and Stoke Canon boreholes (disused, licensed sources) 	Normal level of monitoring <ul style="list-style-type: none"> Make fisheries bank releases if directed to do so by the Environment Agency
Mid September 1975 Level 0 - Normal operation	<ul style="list-style-type: none"> River flows recovering, supply releases stop so Wimbleball storage drawdown rate reduces significantly – storage is now unlikely to drop into Level 1 drought zone 	Normal level of monitoring <ul style="list-style-type: none"> Make fisheries bank releases if directed to do so by the Environment Agency
Mid October 1975 Level 0 - Normal operation	<ul style="list-style-type: none"> River flows drop sufficiently to need to start Wimbleball supply releases again. Rate of storage drop increases. If it remains dry, storage could drop into the Level 1 drought zone but even if it does, as the winter pumped storage scheme can be started from 1 November as soon as there is sufficient water available, Level 1 drought actions are not required 	Normal level of monitoring <ul style="list-style-type: none"> Make fisheries bank releases if directed to do so by the Environment Agency
Mid November 1975 Level 1 – Dry weather operation	<ul style="list-style-type: none"> Start winter pumped storage scheme now that there is sufficient water in the river to permit abstraction 	Normal level of monitoring
Mid November 1975 – end March 1976 Level 0 - Normal operation	<ul style="list-style-type: none"> Operate winter pumped storage scheme in line with pumped storage trigger curve, to ensure that storage is at least 98% by end March 1976 	Normal level of monitoring
April – June 1976	<ul style="list-style-type: none"> Very hot, dry weather experienced in April 	Normal level of monitoring

Time period, drought level, operational mode	Actions and decisions	Environmental monitoring
Level 0 - Normal operation	<ul style="list-style-type: none"> River flows low by mid April - start Wimbleball supply releases to support river abstractions at Tiverton and Exeter Reservoir storage projections show possibility of storage dropping into Level 1 drought trigger zone by early – mid August if it remains dry 	
July 1976 Level 0 - Dry weather operation	<ul style="list-style-type: none"> Weather continues hot and dry River flows continue to drop and supply releases continue from Wimbleball Reservoir If it continues to be dry Wimbleball storage will drop into the Level 1 drought zone by mid August and Level 2 drought zone by mid/end September Prepare for enhanced media campaign Prepare for Level 1 company actions Prepare to start abstraction from Bramford Speke and Stoke Canon boreholes (disused, licensed sources) Prepare for Level 2 Drought Permits (remove annual abstraction licence limits from Hook and Wilmington Springs licences to allow more abstraction, subject to water availability) Undertake ESOR analysis 	<p>Normal level of monitoring, plus</p> <ul style="list-style-type: none"> Monitoring related to abstraction from Bramford Speke and Stoke Canon
Mid August 1976 Level 1 – Dry weather operation Invoke Drought Plan	<p>Storage drops into the Level 1 drought zone:</p> <ul style="list-style-type: none"> Enhanced media campaign Company drought actions: increase company water efficiency, increase leakage management, optimise supply network Start abstraction from Bramford Speke and Stoke Canon boreholes (disused, licensed sources) <p>Storage could enter Level 2 drought zone by mid/late September if it remains dry:</p> <ul style="list-style-type: none"> Update ESOR analysis with latest data Apply for Level 2 Drought Permits Prepare for possible TUBs 	<p>Enhanced level of monitoring, including</p> <ul style="list-style-type: none"> Monitoring related to abstraction from Bramford Speke and Stoke Canon Follow monitoring programme relating to Hook and Wilmington Springs Level 2 Drought Permits
End August 1976 Level 1 – Drought Plan operation	<ul style="list-style-type: none"> Advertise TUBs 	<p>Enhanced level of monitoring, including</p> <ul style="list-style-type: none"> Monitoring related to abstraction from Bramford Speke and Stoke Canon Follow monitoring programme relating to Hook and Wilmington Springs Level 2 Drought Permits
Mid September 1976 Level 2 - Drought Plan operation	<p>Storage drops into Level 2 drought zone:</p> <ul style="list-style-type: none"> Dry weather forecast River flows low – need to continue to make Wimbleball supply releases to support abstraction at Tiverton and Exeter Further enhanced media campaign Further company water efficiency and leakage management, further network optimisation Implement TUBs Prepare for possible NEUBs 	<p>Enhanced level of monitoring, including</p> <ul style="list-style-type: none"> Monitoring related to abstraction from Bramford Speke and Stoke Canon Follow monitoring programme relating to Hook and Wilmington Springs Level 2 Drought Permits

Time period, drought level, operational mode	Actions and decisions	Environmental monitoring
	<p>Risk that storage could drop into Level 3 and possibly Level 4 drought zones:</p> <ul style="list-style-type: none"> • Prepare for Level 3 Drought Permit • Consider the need for extreme drought actions 	<ul style="list-style-type: none"> • Start monitoring related to Level 3 Drought Permit
<p>Early October 1976</p> <p>Level 2 - Drought Plan operation</p>	<ul style="list-style-type: none"> • River flow low – continue to need to make Wimbleball supply releases • Weather forecast dry • Implement Level 2 Drought Permits – annual limits removed from Hook and Wilmington springs licence so increase daily abstraction to daily licence limit at both sources • Advertise NEUBs • Apply for Level 3 Drought Permit • Demand reducing - supply releases reducing and rate of drop in storage reducing <ul style="list-style-type: none"> • Extreme drought actions unlikely to be required 	<p>Enhanced level of monitoring, including</p> <ul style="list-style-type: none"> • Monitoring related to abstraction from Bramford Speke and Stoke Canon • Follow monitoring programme relating to Hook and Wilmington Springs Level 2 Drought Permits • Monitoring related to Level 3 Drought Permit
<p>Mid – end October 1976</p> <p>Level 2 - Drought Plan operation</p>	<ul style="list-style-type: none"> • Wet weather forecast for end October – early November • Continuing to need to make Wimbleball supply releases but demand now reduced so smaller releases required • Can start winter pumped storage scheme on 1 November 1976 if supply releases no longer needed by then <p>End October:</p> <ul style="list-style-type: none"> • Conclude that storage is unlikely to drop into Level 3 drought zone: <ul style="list-style-type: none"> • decide not to implement NEUBs • decide not to implement Level 3 Drought Permit 	<p>Enhanced level of monitoring, including</p> <ul style="list-style-type: none"> • Monitoring related to abstraction from Bramford Speke and Stoke Canon • Follow monitoring programme relating to Hook and Wilmington Springs Level 2 Drought Permits • Stop monitoring related to Level 3 Drought Permit
<p>Early November 1976</p> <p>Level 2 - Drought Plan operation</p>	<ul style="list-style-type: none"> • Significant rainfall • River levels recover, supply releases no longer required • Stop abstracting from Bramford Speke and Stoke Canon boreholes • Start winter pumped storage scheme • Steep rate of rise in Wimbleball reservoir storage 	<p>Enhanced level of monitoring, including</p> <ul style="list-style-type: none"> • Monitoring related to abstraction from Bramford Speke and Stoke Canon • Follow monitoring programme relating to Hook and Wilmington Springs Level 2 Drought Permits
<p>Mid November 1976</p> <p>Level 1 – Drought Plan operation</p>	<ul style="list-style-type: none"> • Steep rate of rise in Wimbleball reservoir storage continues, rising out of Level 2 drought zone • Stop TUBs 	<p>Enhanced level of monitoring, including</p> <ul style="list-style-type: none"> • Monitoring related to abstraction from Bramford Speke and Stoke Canon – post operation • Monitoring programme relating to Hook and Wilmington Springs Level 2 Drought Permits

Time period, drought level, operational mode	Actions and decisions	Environmental monitoring
End November – end December 1976 Level 0 - Drought Plan operation	<ul style="list-style-type: none"> Steep rate of rise in Wimbleball reservoir storage continues, rising out of Level 1 drought zone in last week in November Drop in storage increase in last week of December due to reaching the annual licence limit on the winter pumped storage scheme licence End December: stop Level 2 Drought Permit schemes because apply to calendar year and Wimbleball Reservoir storage recovering well 	Enhanced level of monitoring, including <ul style="list-style-type: none"> Monitoring related to abstraction from Bramford Speke and Stoke Canon – post operation Monitoring programme relating to Hook and Wilmington Springs Level 2 Drought Permits
January – mid February 1977 Level 0 - Drought Plan operation	<ul style="list-style-type: none"> New calendar year so new annual licensed volume available on winter pumped storage scheme – restart abstraction Wimbleball storage approaching 100% by mid February River flows are healthy Normal operation, normal hydrological, water storage and demand monitoring <p>Officially confirm End of Drought</p>	Normal level of monitoring, plus <ul style="list-style-type: none"> Post-use monitoring at Bramford Speke, Stoke Canon, Hook and Wilmington Springs
Spring 1977 Level 0 - Normal operation	<ul style="list-style-type: none"> Post drought review 	Normal level of monitoring

A2.4.4 Wistlandpound Reservoir (local reservoir in Roadford WRZ)

Wistlandpound Reservoir supplies part of the North Devon area. The supply area is supported from Roadford Reservoir during periods of low reservoir storage and/or high demand.

The following worked examples show likely Wistlandpound Reservoir storage against the reservoir’s drought triggers. They also describe Roadford Reservoir storage relative to its drought triggers for the same time period. These examples show that Roadford Reservoir storage may trigger drought actions before Wistlandpound Reservoir storage crosses its own drought triggers.

A2.4.4.1 Worked example – Wistlandpound Reservoir, worst historic drought, dry year demand (plus outage allowance)

Figure A2.58: Wistlandpound Reservoir, worst historic drought with dry year demand

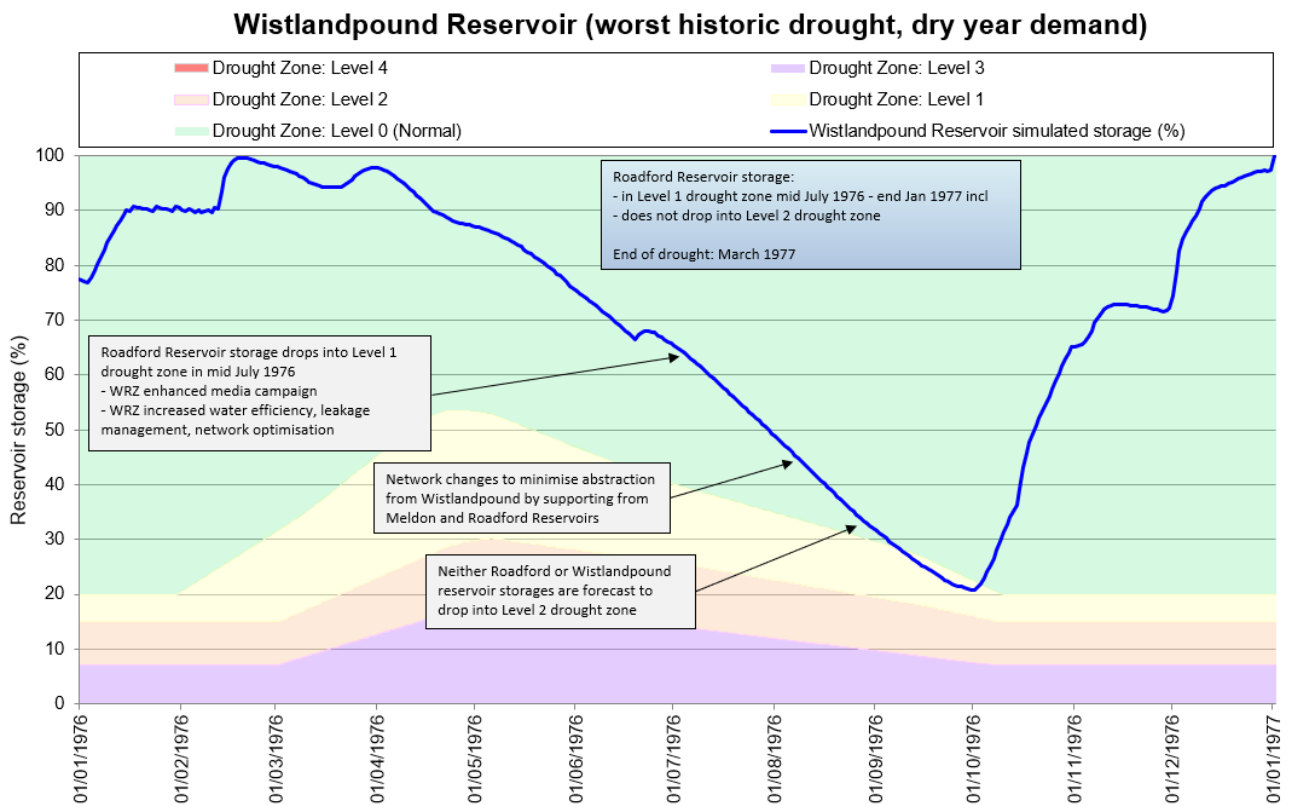


Table A2.11: Wistlandpound Reservoir, worst historic drought with dry year demand

Time period, drought level, operational mode	Actions and decisions	Environmental monitoring
January – March 1976 Level 0 - Normal operation	<ul style="list-style-type: none"> Routine monitoring – see Section 2.2 Abstracting from Leehamford and Brockenburrow to conserve Wistlandpound storage for spring/summer Stop abstracting from Brockenburrow end March (end of winter licensed period) 	Normal level of monitoring
April – June 1976 Level 0 - Normal operation	<ul style="list-style-type: none"> Very hot, dry weather experienced in April River flows low by mid April Leehamford available abstraction reducing due to low river flow Wistlandpound storage dropping Wistlandpound storage projections show possibility of storage dropping into Level 1 drought trigger zone by early September if it remains dry 	Normal level of monitoring
July 1976 Level 0 Invoke Drought Plan (<i>due to Roadford Reservoir storage dropping into Level 1</i>)	<ul style="list-style-type: none"> Mid July: Roadford storage drops into Level 1 drought zone: <ul style="list-style-type: none"> Enhanced media campaign Company actions to reduce water use If it continues to be dry Wistlandpound storage will drop into the Level 1 drought zone by end August, but Roadford Reservoir has already triggered Level 1 actions 	Normal level of monitoring
August 1976 Level 0 - Drought Plan operation	<ul style="list-style-type: none"> Weather continues hot and dry Wistlandpound storage now 45% Implement network changes (temporary booster pumps) to reduce abstraction from Wistlandpound and support from Meldon and Roadford Reservoirs Projections indicate that neither Roadford nor Wistlandpound reservoir storages will drop into Level 2 drought zone 	Normal level of monitoring
September 1976 Level 1 – Drought Plan operation	<p>Early September: storage drops into the Level 1 drought zone</p> <ul style="list-style-type: none"> Level 1 WRZ actions already implemented No Level 1 supply-side actions for Wistlandpound 	Enhanced monitoring
October 1976 Level 1 – Drought Plan operation	<ul style="list-style-type: none"> Significant rainfall experienced River flows high Rapid rate of increase in Wistlandpound Reservoir storage, rising quickly out of Level 1 drought zone into normal zone More wet weather forecast 	Normal level of monitoring
December 1976 Level 0 - Drought Plan operation	<ul style="list-style-type: none"> Wistlandpound storage 80% and increasing River flows are healthy Normal operation, normal hydrological, water storage and demand monitoring Roadford storage still in Level 1 	Normal level of monitoring
January – February 1977 Level 0 - Drought Plan operation	<ul style="list-style-type: none"> Wistlandpound Reservoir storage not of concern, however Roadford Reservoir storage remains in Level 1, so Drought Plan remains in place Implement Lyd to Roadford Level 1 Drought Permit 	Normal level of monitoring
March 1977	<ul style="list-style-type: none"> Stop Lyd to Roadford Level 1 Drought Permit abstraction end March. Roadford Reservoir storage >90% 	Normal level of monitoring

Time period, drought level, operational mode	Actions and decisions	Environmental monitoring
Level 0 – Normal operation	<ul style="list-style-type: none"> • All local reservoirs are full • River flows are healthy • Normal operation, normal hydrological, water storage and demand monitoring <p>Officially confirm End of Drought</p>	
Summer 1977 Level 0 – Normal operation	<ul style="list-style-type: none"> • Post drought review 	Normal level of monitoring

A2.4.4.2 Worked example – Wistlandpound Reservoir, worst historic drought, high demand
(plus outage allowance)

Figure A2.59: Wistlandpound Reservoir, worst historic drought with high demand

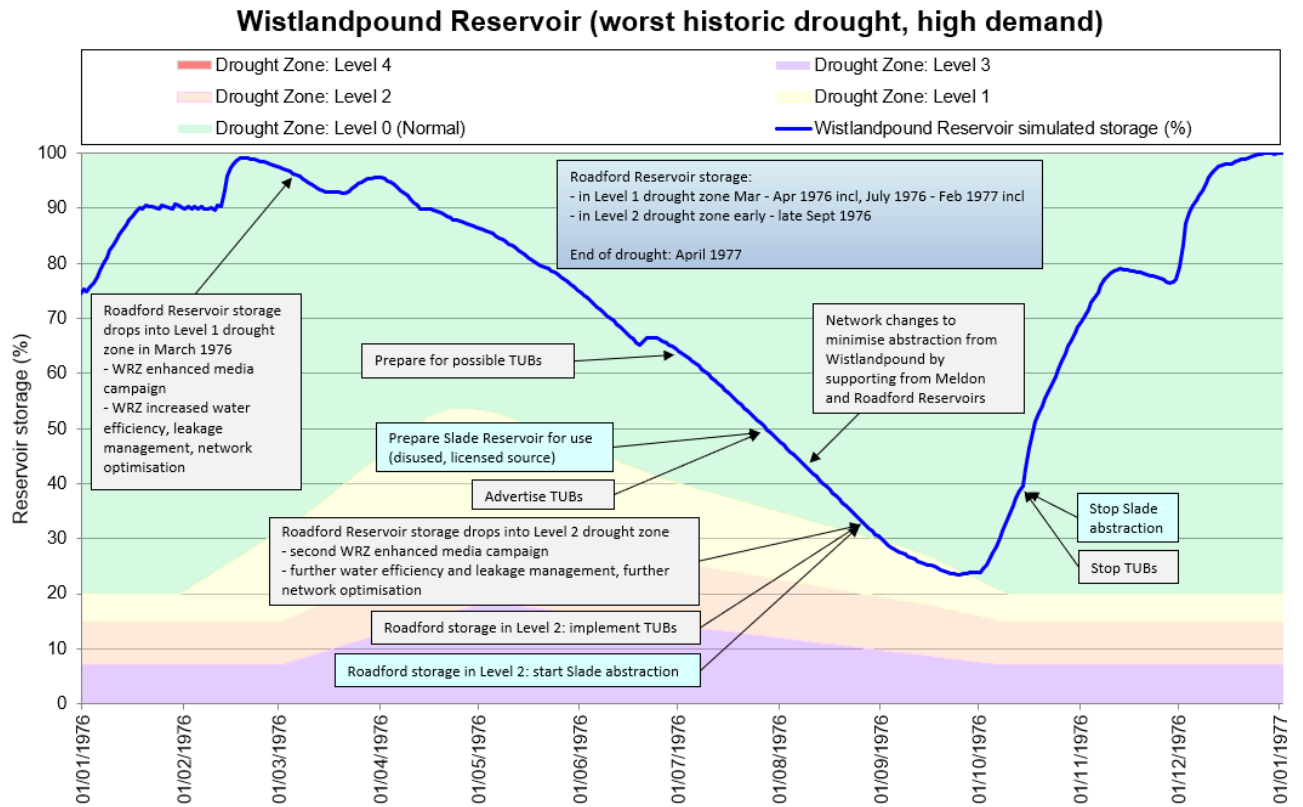


Table A2.12: Wistlandpound Reservoir, worst historic drought with high demand

Time period, drought level, operational mode	Actions and decisions	Environmental monitoring
January – March 1976 Level 0 - Normal operation	<ul style="list-style-type: none"> Routine monitoring – see Section 2.2 Abstracting from Leehamford and Brockenburrow to conserve Wistlandpound storage for spring/summer Stop abstracting from Brockenburrow end March (end of winter licensed period) Roadford storage in Level 1 drought zone March – April: <ul style="list-style-type: none"> Enhanced media campaign Company actions to reduce water use Lyd to Roadford Level 1 Drought Permit 	Normal level of monitoring
April – May 1976 Level 0 - Normal operation	<ul style="list-style-type: none"> Very hot, dry weather experienced in April River flows low by mid April Leehamford available abstraction reducing due to low river flow Wistlandpound storage dropping 	Normal level of monitoring
June 1976 Level 0 Invoke Drought Plan (due to Roadford Reservoir storage dropping into Level 1)	<ul style="list-style-type: none"> Roadford storage drops into Level 1 drought zone: <ul style="list-style-type: none"> Enhanced media campaign Company actions to reduce water use Wistlandpound storage projections show possibility of storage dropping into Level 1 drought trigger zone by late August if it remains dry 	Normal level of monitoring
Early July 1976 Level 0 - Drought Plan operation	<ul style="list-style-type: none"> Prepare for potential TUBs If it continues to be dry Wistlandpound storage will drop into the Level 1 drought zone by end August, but Roadford Reservoir has already triggered Level 1 actions 	Normal level of monitoring
Late July 1976 Level 0 - Drought Plan operation	<ul style="list-style-type: none"> Roadford storage triggers preparing for Level 2 actions: <ul style="list-style-type: none"> Undertake any required site maintenance at Slade Reservoir (disused, licensed source) Agree any changes to existing licence conditions with Environment Agency (e.g. compensation release) Advertise TUBs 	Normal level of monitoring
August 1976 Level 0 - Drought Plan operation	<ul style="list-style-type: none"> Weather continues hot and dry Wistlandpound storage now 45% Implement network changes (temporary booster pumps) to reduce abstraction from Wistlandpound and support from Meldon and Roadford Reservoirs <p>End August:</p> <ul style="list-style-type: none"> Roadford storage drops into Level 2: Implement TUBs Further enhanced media campaign Further company actions to reduce water use Start abstraction from Slade 	Enhanced monitoring: <ul style="list-style-type: none"> As required for Slade Reservoir operation
September 1976 Level 1 – Drought Plan operation	<p>Early September: storage drops into the Level 1 drought zone</p> <ul style="list-style-type: none"> Level 1 WRZ actions already implemented No Level 1 supply-side actions for Wistlandpound 	Enhanced monitoring: <ul style="list-style-type: none"> As required for Slade Reservoir operation

Time period, drought level, operational mode	Actions and decisions	Environmental monitoring
	<ul style="list-style-type: none"> Level 2 actions already triggered by Roadford storage 	
October 1976 Level 1 – Drought Plan operation	<ul style="list-style-type: none"> Significant rainfall experienced River flows high Rapid rate of increase in Wistlandpound Reservoir storage, rising quickly, reaching 70% by end October More wet weather forecast Stop TUBs Stop abstracting from Slade 	Enhanced monitoring: <ul style="list-style-type: none"> As required for Slade Reservoir operation
December 1976 Level 0 - Drought Plan operation	<ul style="list-style-type: none"> Wistlandpound storage 80% and increasing River flows are healthy Normal operation, normal hydrological, water storage and demand monitoring Roadford storage still in Level 1 	Enhanced monitoring: <ul style="list-style-type: none"> As required for Slade Reservoir operation, post operation
January – February 1977 Level 0 - Drought Plan operation	<ul style="list-style-type: none"> Wistlandpound Reservoir storage not of concern, however Roadford Reservoir storage remains in Level 1, so Drought Plan remains in place Implement Lyd to Roadford Level 1 Drought Permit 	Normal level of monitoring
March 1977 Level 0 – Drought Plan operation	<ul style="list-style-type: none"> Stop Lyd to Roadford Level 1 Drought Permit abstraction end March. 	Normal level of monitoring
April 1977 Level 0 – Normal operation	<ul style="list-style-type: none"> Roadford Reservoir storage >90% All local reservoirs are full River flows are healthy Normal operation, normal hydrological, water storage and demand monitoring <p>Officially confirm End of Drought</p>	Normal level of monitoring
Summer 1977 Level 0 – Normal operation	<ul style="list-style-type: none"> Post drought review 	Normal level of monitoring

A2.4.4.3 Worked example – Wistlandpound Reservoir, severe drought, high demand (plus outage allowance)

Figure A2.60: Wistlandpound Reservoir, severe drought with high demand

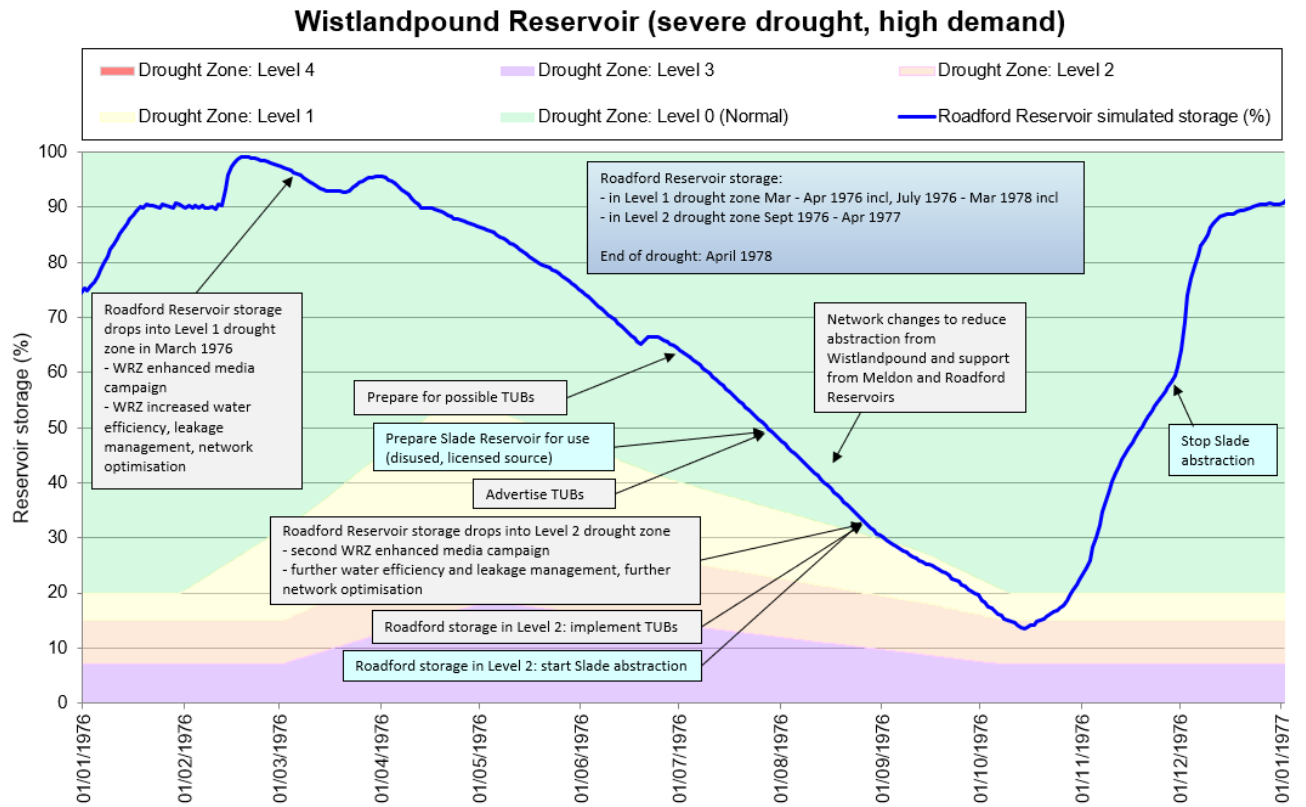


Table A2.13: Wistlandpound Reservoir, severe drought with high demand

Time period, drought level, operational mode	Actions and decisions	Environmental monitoring
January – March 1976 Level 0 - Normal operation	<ul style="list-style-type: none"> Routine monitoring – see Section 2.2 Abstracting from Leehamford and Brockenburrow to conserve Wistlandpound storage for spring/summer Stop abstracting from Brockenburrow end March (end of winter licensed period) Roadford storage in Level 1 drought zone March – April: <ul style="list-style-type: none"> Enhanced media campaign Company actions to reduce water use Lyd to Roadford Level 1 Drought Permit 	Normal level of monitoring
April – May 1976 Level 0 - Normal operation	<ul style="list-style-type: none"> Very hot, dry weather experienced in April River flows low by mid April Leehamford available abstraction reducing due to low river flow Wistlandpound storage dropping 	Normal level of monitoring
June 1976 Level 0 Invoke Drought Plan (due to Roadford Reservoir storage dropping into Level 1)	<ul style="list-style-type: none"> Roadford storage drops into Level 1 drought zone: <ul style="list-style-type: none"> Enhanced media campaign Company actions to reduce water use Wistlandpound storage projections show possibility of storage dropping into Level 1 drought trigger zone by late August if it remains dry 	Normal level of monitoring
Early July 1976 Level 0 - Drought Plan operation	<ul style="list-style-type: none"> Prepare for possible TUB (triggered by Roadford storage) If it continues to be dry Wistlandpound storage will drop into the Level 1 drought zone by end August, but Roadford Reservoir has already triggered Level 1 actions 	Enhanced monitoring: <ul style="list-style-type: none"> As required for Slade Reservoir operation
Late July 1976 Level 0 - Drought Plan operation	<ul style="list-style-type: none"> Roadford storage triggers preparing for Level 2 actions: <ul style="list-style-type: none"> Undertake any required site maintenance at Slade Reservoir (disused, licensed source) Agree any changes to existing licence conditions with Environment Agency (e.g. compensation release) Advertise TUBs 	Enhanced monitoring: <ul style="list-style-type: none"> As required for Slade Reservoir operation
August 1976 Level 0 - Drought Plan operation	<ul style="list-style-type: none"> Weather continues hot and dry Wistlandpound storage now 45% Implement network changes (temporary booster pumps) to reduce abstraction from Wistlandpound and support from Meldon and Roadford Reservoirs End August: Roadford storage drops into Level 2 <ul style="list-style-type: none"> Implement TUBs Further enhanced media campaign Further company actions to reduce water use Start abstraction from Slade 	Enhanced monitoring: <ul style="list-style-type: none"> As required for Slade Reservoir operation
September 1976 Level 1 – Drought Plan operation	<p>Early September: storage drops into the Level 1 drought zone</p> <ul style="list-style-type: none"> Level 1 WRZ actions already implemented No Level 1 supply-side actions for Wistlandpound Level 2 actions already triggered by Roadford storage 	Enhanced monitoring: <ul style="list-style-type: none"> As required for Slade Reservoir operation

Time period, drought level, operational mode	Actions and decisions	Environmental monitoring
October 1976 Level 1 – Drought Plan operation	<ul style="list-style-type: none"> Some rainfall mid and late October River flows start to recover Wistlandpound storage starts to recover from mid October TUBs remain in place due to Roadford storage in Level 2 Continue abstracting from Slade 	Enhanced monitoring: <ul style="list-style-type: none"> As required for Slade Reservoir operation
November 1976 Level 1 – Drought Plan operation	<ul style="list-style-type: none"> Significant rainfall experienced River flows high Rapid rate of increase in Wistlandpound Reservoir storage, rising quickly, reaching 60% by end November More wet weather forecast 	Enhanced monitoring: <ul style="list-style-type: none"> As required for Slade Reservoir operation
December 1976 Level 0 - Drought Plan operation	<p>Early December:</p> <ul style="list-style-type: none"> Stop abstracting from Slade Reservoir because Wistlandpound Reservoir storage sufficiently recovered River flows healthy Normal operation, normal hydrological, water storage and demand monitoring Wistlandpound storage 90% by end December TUBs still in force due to Roadford Reservoir storage still in Level 2. 	Enhanced monitoring: <ul style="list-style-type: none"> As required for Slade Reservoir operation, post operation
January 1977 – end March 1978 Level 0 - Drought Plan operation	<ul style="list-style-type: none"> Wistlandpound Reservoir storage not of concern, however Roadford Reservoir storage remains in Level 1 or Level 2, so Drought Plan remains in place <ul style="list-style-type: none"> See Roadford Reservoir worked example (severe drought, high demand) for drought actions for this time period (Section A2.3.2.3, page A87) 	Normal level of monitoring
Early April 1978 Level 0 – Normal operation	<ul style="list-style-type: none"> Roadford Reservoir storage approaching 90% All local reservoirs are full River flows are healthy Normal operation, normal hydrological, water storage and demand monitoring <p>Officially confirm End of Drought</p>	Normal level of monitoring
Summer 1978 Level 0 – Normal operation	<ul style="list-style-type: none"> Post drought review 	Normal level of monitoring

A2.4.5 Bournemouth WRZ

Bournemouth WRZ is constrained by peak demand, not by water available, even in severe droughts of 1 in 500 year return period or worse. Hence the drought triggers and drought management zones are set on demand.

A2.4.5.1 Worked example – Bournemouth WRZ, dry year demand (plus outage allowance)

Figure A2.61: Bournemouth WRZ, worst historic drought, dry year demand

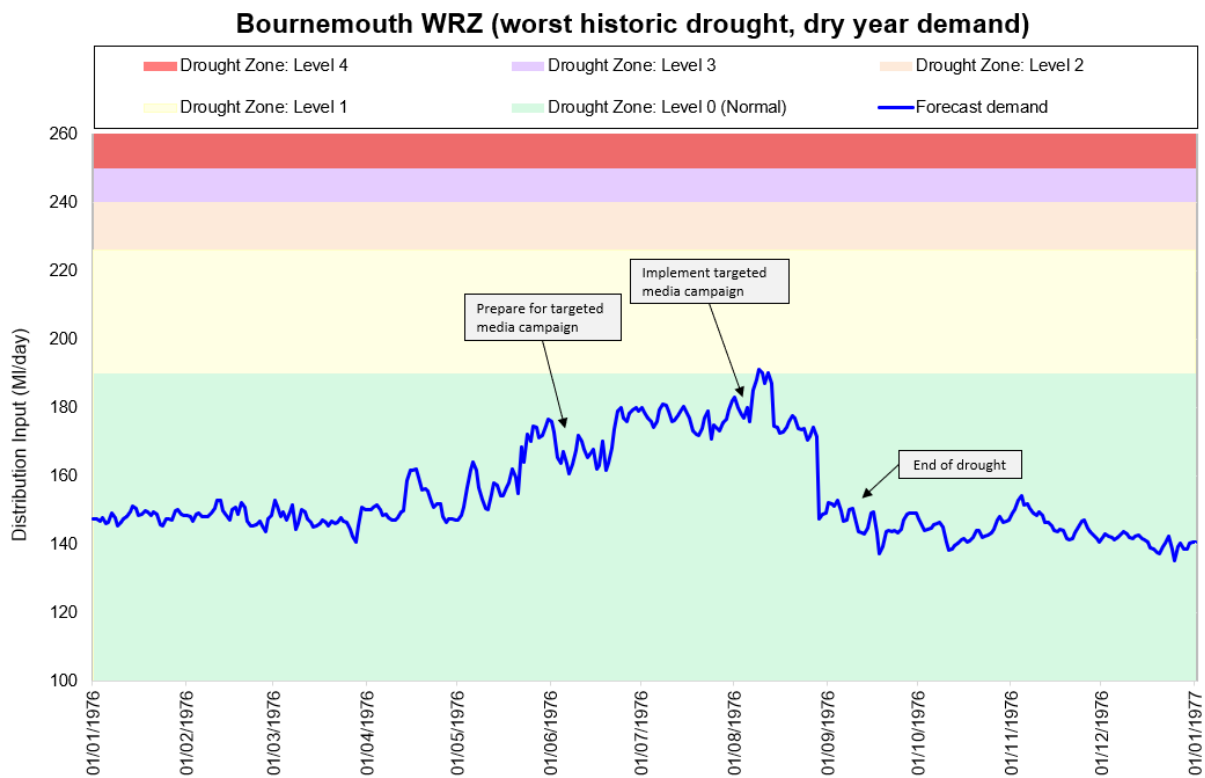


Table A2.14: Bournemouth WRZ, worst historic drought, dry year demand

Time period, drought level, operational mode	Actions and decisions	Environmental monitoring
January – end April 1976 Level 0 - Normal operation	<ul style="list-style-type: none"> Routine monitoring – see Section 2.2 Hot, sunny Easter – demand increases over Easter weekend 	Normal level of monitoring
May 1976 Level 0 - Normal operation	<ul style="list-style-type: none"> Routine monitoring – see Section 2.2 Early May dry Forecast for mid to end May hot, sunny and dry: likely to experience high demand during end May bank school half-term, however based on previous average to peak demand in hot, dry periods for the end May bank holiday week, would not expect end May demand to approach Level 1 drought zone 	Normal level of monitoring
June 1976 Level 0 - Normal operation	<ul style="list-style-type: none"> Review end May demand peak, conclude that there is a risk that summer demand peaks could enter Level 1 but is unlikely to be high enough to require large industrial customer to make voluntary water use reductions <ul style="list-style-type: none"> Prepare for targeted peak periods media campaign Ensure Longham bankside storage full before bank holiday weekend to provide short term buffer to demand peaks Monitor company assets and ensure they can be maximised during peak demand periods June weather generally hot and dry, demand experienced is slightly higher than at end May 	Normal level of monitoring
July 1976 Level 0 - Dry weather operation	<ul style="list-style-type: none"> Hot, dry weather forecast Monitor demand as enter school summer holidays 	Enhanced monitoring
Early August 1976 Level 0 - Dry weather operation	<ul style="list-style-type: none"> Forecast for mid August is for sunny, dry, hot weather, coinciding with school holidays: <ul style="list-style-type: none"> Risk of demand peak in Level 1 Implement targeted media campaign 	Enhanced monitoring
Mid August 1976 Level 0 – Dry weather operation	<ul style="list-style-type: none"> Sunny, dry, hot weather experienced <ul style="list-style-type: none"> Demand peaks on the border of Level 1 Forecast continuing hot and dry through August, demand likely to remain high but not likely to enter much further into Level 1 so no need for further drought actions Monitor in case situation changes, e.g. if weather hotter than forecast 	Enhanced monitoring
Late August 1976 Level 0 – Dry weather operation	<ul style="list-style-type: none"> Wet weather forecast for August bank holiday <ul style="list-style-type: none"> Demand likely to reduce Cooler, wetter weather experienced, reducing demand as expected 	Enhanced monitoring

Time period, drought level, operational mode	Actions and decisions	Environmental monitoring
September 1976 Level 0 – normal operation	<ul style="list-style-type: none"> • Cool, wetter weather continues • Demand stays low • Now outside summer holiday period so demand unlikely to peak again this year enough to require drought actions <p>Officially confirm End of Drought</p>	Normal level of monitoring
Autumn 1976 Level 0 - Normal operation	<ul style="list-style-type: none"> • Post drought review 	Normal level of monitoring

A2.4.5.2 Worked example – Bournemouth WRZ, worst historic drought, high demand (plus outage allowance)

Figure A2.62: Bournemouth WRZ, worst historic drought, high demand

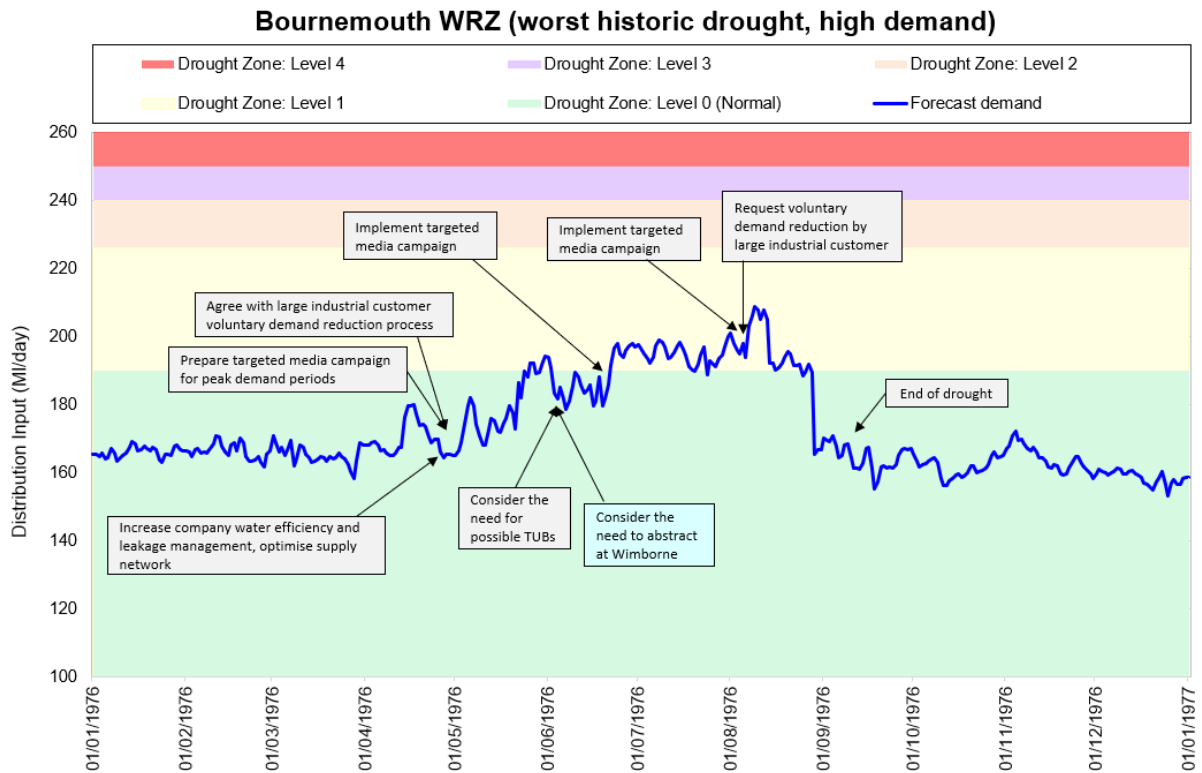


Table A2.15: Bournemouth WRZ, worst historic drought, high demand

Time period, drought level, operational mode	Actions and decisions	Environmental monitoring
January – end April 1976 Level 0 - Normal operation	<ul style="list-style-type: none"> Routine monitoring – see Section 2.2 Monitoring shows that demand running approx. 10% higher than same time in previous years, indicating that if a hot, dry summer is experienced, demand could enter Level 1 drought zone Hot, sunny Easter – demand increases, reinforcing indication that summer demand could enter Level 1 drought zone 	Normal level of monitoring
Early – mid May 1976 Level 0 - Normal operation	<ul style="list-style-type: none"> Routine monitoring – see Section 2.2 Weather continuing hot and dry <p>Early May:</p> <ul style="list-style-type: none"> Prepare for targeted peak periods media campaign Agree with large industrial customer potential voluntary demand reduction process Increase company water efficiency and leakage management, optimise supply network <p>Mid May:</p> <ul style="list-style-type: none"> Forecast for mid to end May hot, sunny and dry: likely to experience high demand during end May bank school half-term, hence risk that demand could approach Level 1 drought zone <ul style="list-style-type: none"> Ensure Longham bankside storage full before bank holiday weekend to provide short term buffer to demand peaks 	Normal level of monitoring
Late May 1976 Level 1 - Dry weather operation	<ul style="list-style-type: none"> Hot, dry, sunny weather experienced Demand in Level 1 for a few days, with weekly average on the Level 0 / Level 1 border <ul style="list-style-type: none"> Whilst demand entered Level 1 on a few days, enough spare WTW capacity to comfortably meet demand and Longham Lakes bankside storage provided contingency, although not required 	Enhanced monitoring
June 1976 Level 0 - Dry weather operation	<ul style="list-style-type: none"> Review end May demand peak, conclude that summer demand peaks likely to enter Level 1 in summer if hot, dry weather experienced Monitor company assets and ensure they can be maximised during summer peak demand period Consider the need for Level 2 drought actions (incl TUBs and Wimborne groundwater abstraction), conclude that demand very unlikely to approach Level 2 so not needed <p>End June:</p> <ul style="list-style-type: none"> Implement targeted media campaign Demand enters Level 1 drought zone in last few days of June 	Enhanced monitoring
July 1976 Level 1 - Dry weather operation	<ul style="list-style-type: none"> Hot, dry weather forecast Demand in lower part of Level 1 throughout July, remaining fairly constant throughout With current weather conditions unlikely at present to need large industrial customer to reduce demand, however if more extreme weather forecast, may need this 	Enhanced monitoring

Time period, drought level, operational mode	Actions and decisions	Environmental monitoring
Early August 1976 Level 1 - Dry weather operation	<ul style="list-style-type: none"> • Forecast for mid August is for sunny, dry, hot weather, coinciding with school holidays <ul style="list-style-type: none"> • High risk of demand spike • Implement targeted media campaign • Request short duration voluntary demand reduction by large industrial customer 	Enhanced monitoring
Mid August 1976 Level 1 – Dry weather operation	<ul style="list-style-type: none"> • Sunny, dry, hot weather experienced <ul style="list-style-type: none"> • Demand peaks well into Level 1 for but substantially below Level 2 • With voluntary demand reductions and Longham Lakes bankside storage, no concerns in meeting demand • Forecast continuing hot and dry through August, demand likely to remain high but unlikely to increase above recent peak, so no further drought actions required • Monitor in case situation changes, e.g. if weather hotter than forecast 	Enhanced monitoring
Late August 1976 Level 1 – Dry weather operation	<ul style="list-style-type: none"> • Wet weather forecast for August bank holiday <ul style="list-style-type: none"> • Demand likely to reduce • Cooler wetter weather experienced, reducing demand as expected 	Enhanced monitoring
September 1976 Level 0 - Normal operation	<ul style="list-style-type: none"> • Cool, wetter weather continues • Demand remains well below Level 1 • Now outside summer holiday period so demand unlikely to peak again this year enough to require drought actions <p>Officially confirm End of Drought</p>	Normal level of monitoring
Autumn 1976 Level 0 - Normal operation	<ul style="list-style-type: none"> • Post drought review 	Normal level of monitoring

A2.5 Drought trigger testing

As described in Section 2, significant routine monitoring and forecasting are carried out each year to monitor how water demand, our resources and the environment are responding to the weather conditions experienced. The frequency of monitoring and forecasting varies depending on how prolonged any dry weather periods are, with frequency increasing as dry weather periods become more prolonged and potentially develop into droughts. Examples of the monitoring and forecasting tools that we use are shown in this appendix in Section A2.1.

We run simulations of our water supply systems across the full period of record of historic flows in our supply areas (1957 to date for Colliford WRZ, 1962 to date for our other WRZs) against forecast dry year demand (with allowances for outage and uncertainty in our estimates) to confirm that our drought management zones trigger our drought actions in line with our Company Levels of Service.

Worked examples of how our drought triggers operate are included in Section A2.4 of this appendix. These worked examples show how our drought triggers in each WRZ operate in a range of drought scenarios, including the worst historic drought and a more severe drought with a return period of around 1 in 500 years or worse (an extreme drought).

A recent test of our drought triggers was undertaken considering the summer of 2018 which experienced high temperatures, low rainfall and high demand. At the time, we kept the situation under regular review, but it was not considered necessary to formally trigger our existing drought plan, largely due to high storage in our strategic reservoirs.

Roadford WRZ was most impacted by the dry weather in 2018. River flows in South Devon were below 1995 drought flows in June and July 2018. River flows in North Devon were below 1995 drought flows in June and dropped to, or below, 1976 drought flows in July.

This was a fairly typical year in terms of WTW outages and raw water quality issues such as algal blooms being experienced throughout the dry weather. Outages and water quality issues were mitigated through use of the flexibility in our conjunctive use supply systems, which allowed us to bring water into areas under stress from areas under less stress. In 2018 we installed temporary pumping stations at key locations in our network to increase the volumes of water that we could transfer into areas under stress. Throughout the prolonged dry weather period we used our monitoring and forecasting tools on a weekly basis to forecast reservoir storage, river flows and demand levels, to ensure that demand was met across our supply areas. All sources within each WRZ were operated so that no local area experienced a greater supply risk than any other.

Winter 2018-2019 was drier than average and whilst summer 2019 was not as dry as summer 2018, there were significant periods of hot, dry weather.

In line with our drought triggers and drought management zones for Roadford WRZ the following actions were undertaken in 2018-2019:

2018:

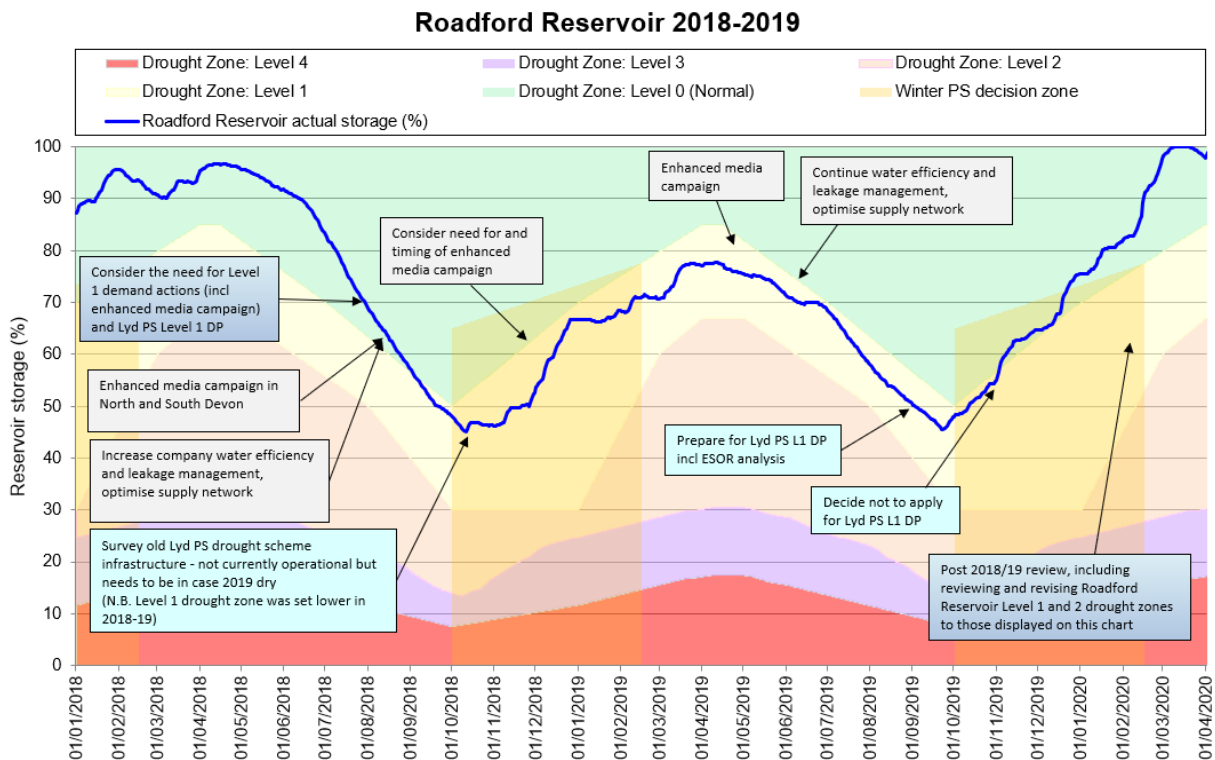
- Increased company water efficiency and leakage management, optimised the supply network
- Implemented enhanced media campaign
- Prepared for possible TUBs as a precautionary measure (TUBs Working Group established, process for implementing TUBs reviewed to ensure it aligned with the latest guidance and regulations, press releases and other TUBs material produced). See Section 3 for further details on the process and Appendix 3 for example material).

2019:

- Prepared for potential application for River Lyd to Roadford Reservoir winter pumped storage Level 1 (January to March) Drought Permit including ESOR analysis (discussed in Section A2.5.1) but this Drought Permit was not applied for due to heavy rainfall experienced in November 2019 with more forecast
- Applied for temporary abstraction licence for Challacombe Reservoir in order to test the existing infrastructure at this disused resource.

Figure A2.63 shows Roadford Reservoir recorded storage in 2018 and 2019, with timing of actions and decisions indicated. Note that this chart shows the latest Level 1 and Level 2 drought management zones, which were revised after 2018-2019. The reasons for this revision are described below and in Section A2.5.1.

Figure A2.63: Roadford Reservoir 2018-2019



As a result of our experiences from 2018-2019 and feedback from the Environment Agency, we have reviewed all our drought actions, including reviewing the benefits, timing and practicality of our supply-side options to confirm that they are still fit for purpose.

In particular, we have reviewed and revised the Level 1 and Level 2 drought management zones for Roadford Reservoir in this Drought Plan; these have been raised so that they trigger some drought actions sooner.

a) Level 1

Raising the Roadford Reservoir Level 1 drought management zone triggers the River Lyd to Roadford Reservoir winter pumped storage Level 1 (January to March) Drought Permit sooner.

b) Level 2

Raising the Roadford Reservoir Level 2 drought management zone triggers the Level 2 supply-side option sooner (Slade Reservoir). A review of the resource benefit of this option resulted in a change to the Challacombe Drought Permit Level from 2 to 3.

At present if we need to abstract from Challacombe Reservoir (a disused source in North Devon), we need to apply for a Drought Permit and we have included this in this Plan at Level 3. We have applied for a permanent abstraction licence at this reservoir. If this licence is granted, a Drought Permit will no longer be required in order to operate this source.

A2.5.1 Drought Permits and ESOR

One of the key qualifying criteria that must be met when applying for a supply-side Drought Permit is demonstrating an exceptional shortage of rainfall (ESOR), for which the Environment Agency has provided guidance^{14,15}.

During prolonged periods of dry weather our supply systems in Colliford, Roadford and Wimbleball WRZs are reliant on their strategic, multi-season reservoirs. Because of the multi-season nature of these reservoirs, the link between the water resource position and rainfall in these WRZs is often not direct or immediate.

As demonstrated in the worked examples in Section A2.4 of Appendix 2, during a prolonged spring and summer period of dry weather, storage in these strategic reservoirs will drop significantly. Also, because these reservoirs have small catchment areas, above average rainfall is required over the following winter for storage to recover enough to not be of concern in the following spring and summer. If, as in winter 1975/76 for example, winter rainfall is below average, a following prolonged dry spring and summer could result in very low strategic reservoir storages and the need for drought actions. We assess the risk of storage entering drought management zones by producing reservoir projections, which show

¹⁴ *Drought permits and drought orders, Supplementary guidance from the Environment Agency and Department of Environment, Food and Rural Affairs, Appendix D, 2020*

¹⁵ *Hydrological guidance for the assessment of an Exceptional Shortage of Rain (ESoR), Environment Agency, March 2021*

the risk of storage entering drought management zones in the next season with forecast dry year demand and a repeat of historic river flows and reservoir inflows.

Roadford Reservoir 2018-2019:

Roadford Reservoir storage was 97% in early April 2018. The 2018 spring and summer period was dry and hot, with June and July flows being close to or below historic drought flows for these months. Roadford Reservoir storage dropped to 47% by early October 2018. Winter 2018-19 was dry and Roadford Reservoir storage only recovered to 78%. The 2019 spring and summer experienced some significantly hot, dry periods and although it was not as dry as spring and summer 2018, it was dry enough to reduce reservoir storage to 47% by mid-September 2019.

There is not a defined value at which an ESOR is demonstrated, but as May 2018 to October 2018 rainfall was 75.3% of the Long Term Average (LTA) 1961-1990, this was likely to have met the criteria for an ESOR if a Drought Permit had been applied for in October 2018. However, because of significant rainfall at some points during spring and summer 2019, May 2018 to August 2019 rainfall in total was 95.3% of LTA despite the very dry periods within it. It was doubtful that the Environment Agency would have considered this sufficient to demonstrate ESOR, and hence they may not have approved the River Lyd to Roadford Reservoir winter pumped storage Level 1 (January to March) Drought Permit if applied for in September 2019, despite the low reservoir storage which had been driven by the earlier dry periods.

Our experience of ESOR analysis in 2018 and 2019 also highlighted that there is a limitation in the current ESOR guidance and legislation which only allows consideration of recent actual ESOR and a very short forecast period for future ESOR of a few weeks ahead, whereas for conjunctive use water resource systems dominated by a large, multi-season reservoir, the ESOR risk needs to extend across the following reservoir storage drawdown period.

As a result of our review of the 2018-2019 period we have raised our Level 1 drought management zone. We have tested this new Level 1 zone and it meets our Level of Service of being required no more than once in every 10 years on average. This revised Level 1 zone would trigger consideration of applying for the River Lyd to Roadford Reservoir winter pumped storage Level 1 (January to March) Drought Permit in a repeat of the 2018 dry weather and in such a scenario the ESOR requirement would be met.

The updated Environment Agency guidance¹⁶ specifies the types of analysis of areal rainfall that are suitable for demonstrating ESOR, including but not limited to:

- Cumulative rainfall ranking
- Rainfall probability ranking
- Standardised Precipitation Index (SPI)
- Percentage long term average rainfall

Examples for Roadford in 2018 are given in Figures A2.64 – A2.66 and Table A2.16.

¹⁶ *Ibid.* 15

The ESOR analysis is to be undertaken for a geographical area and time period appropriate to the specific drought being experienced.

The recommended dataset to use for this analysis is the total monthly rainfall produced by the Environment Agency for each of their hydrological areas, which is based on Met Office HadUK gridded rainfall and the Environment Agency Daily Rainfall Tool. The Environment Agency hydrological areas are typically large-scale river catchments and where these do not correlate well with the area impacted by a specific drought (e.g. a WRZ, reservoir catchment, or supply area), the equivalent data for a bespoke area would need to be requested from the Environment Agency.

Figure A2.64: Cumulative rainfall deficit for May to October comparing 2018 with historic drought years and LTA (1961-1990) using Environment Agency monthly rainfall data for the Tamar hydrological area

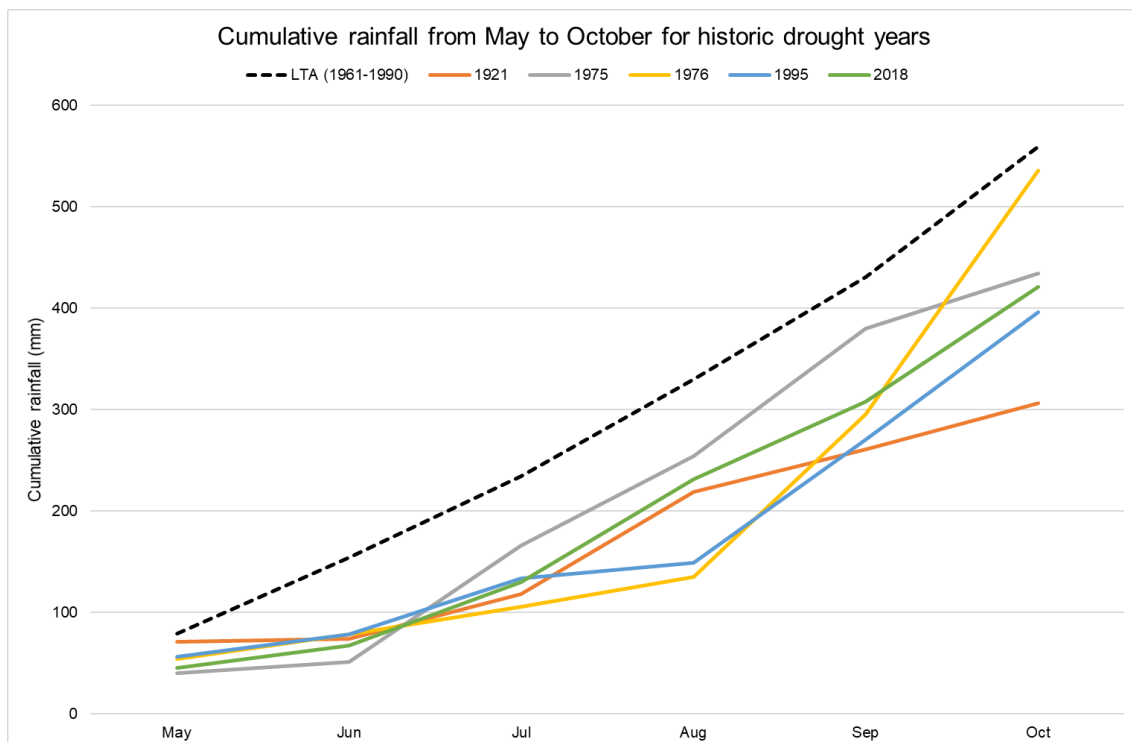


Table A2.16: Ranking of historic rainfall for May to October for 1891-2018 using Environment Agency monthly rainfall data for the Tamar hydrological area

Rank (1891-2018)	Year	Rainfall Total May-Oct (mm)
1	1921	306.1
2	1978	308.5
3	1919	361.4
4	1899	376.0
5	1959	386.7
6	1926	388.1
7	1995	396.2
8	1940	408.6
9	1905	409.0
10	2018	421.2
11	1955	421.8
12	1908	431.8
13	1975	434.3
14	1913	435.7
15	1901	436.5
16	2003	439.0
17	1977	439.7
18	1941	441.5
19	1937	445.6
20	1989	446.6

Figure A2.65: Monthly rainfall totals in 2018 as a percentage of monthly LTA (1961-1990) using Environment Agency monthly rainfall data for the Tamar hydrological area

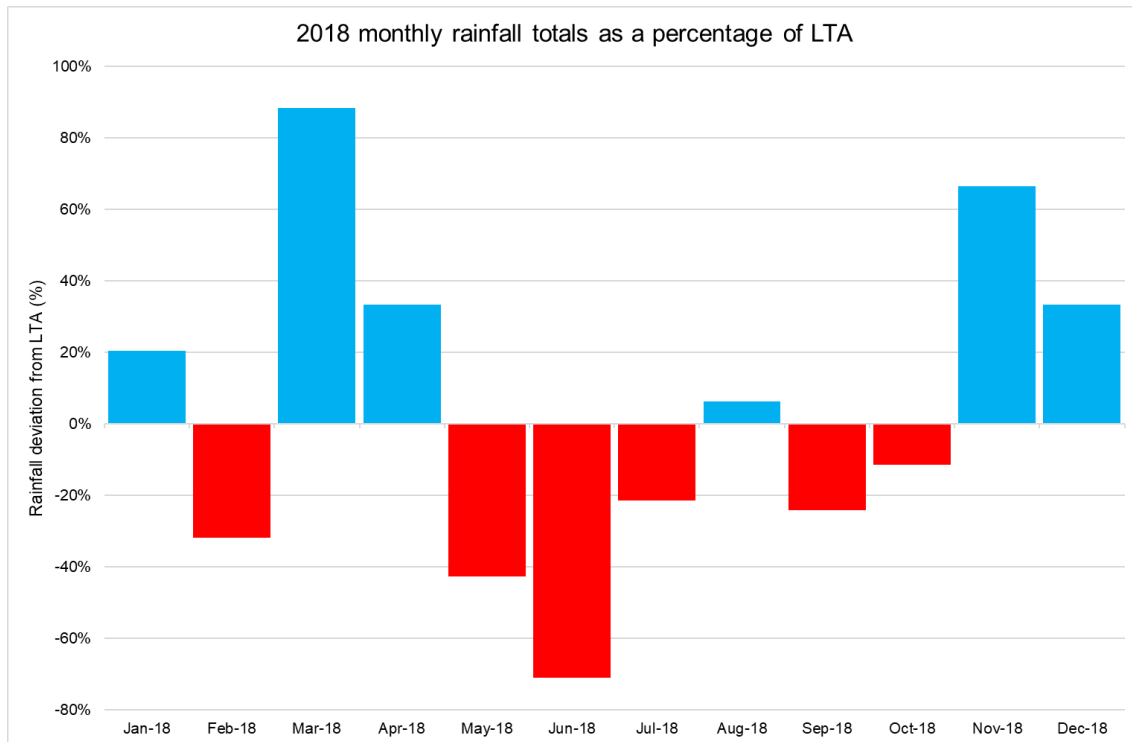
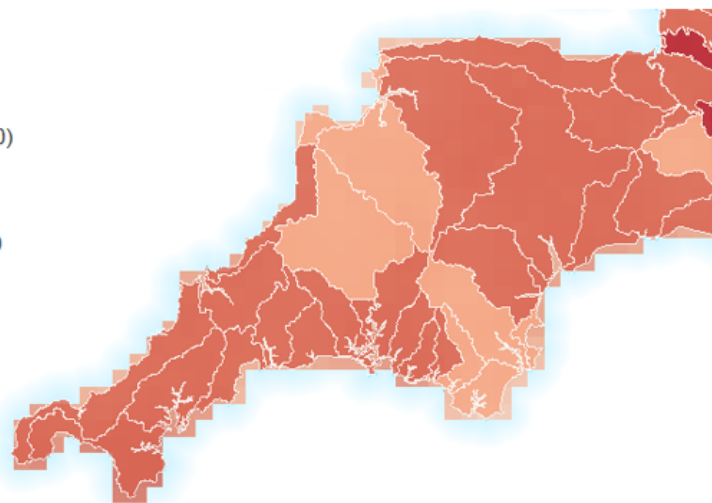


Figure A2.66: Example visualisation of Standardised Precipitation Index for May-October 2018 from CEH Drought Portal. The Environment Agency SPI Tool using Environment Agency monthly rainfall data for the Tamar hydrological area for May-Oct 2018 produces an SPI value of -1.334

All catchments moderately dry or severely dry

SPI Areas

- Extremely dry (SPI below -2.0)
- Severely dry (SPI from -2.0 to -1.5)
- Moderately dry (SPI from -1.5 to -1.0)
- Mildly dry (SPI From -1.0 to 0.0)
- Mildly wet (SPI from 0.0 to 1.0)
- Moderately wet (SPI from 1.0 to 1.5)
- Severely wet (SPI from 1.5 to 2.0)
- Extremely wet (SPI above 2.0)



CEH Standardised Precipitation Index: <https://eip.ceh.ac.uk/apps/droughts/>

A2.6 Additional drought triggers

The following tables expand on Table 2.1 to detail some of the additional hydrological and environmental parameters that will be considered as drought triggers (in addition to the primary trigger of reservoir storage). It is not expected that all of these trigger conditions would need to be met; some triggers may be added or disregarded based on expert judgement in an individual drought scenario.

In line with the definitions used in regular Environment Agency reporting, the categorisation used for rainfall, river flow and groundwater levels is as follows:

- Notably low = less than or equal to 18% of LTA (Q87)
- Exceptionally low = less than or equal to 5% of LTA (Q95)

It is expected that these values would be used as approximate guidelines for drought triggers, it is not expected that a drought level could not be triggered until a specific value is reached.

Table A2.17: More detailed definition of hydrological parameters listed in Table 2.1 (Section 2)

Hydrological parameter	Data source	Drought Level 1 trigger	Drought Level 2 trigger	Drought Level 3 trigger	Drought Level 4 trigger
Strategic reservoir storage (or demand for Bournemouth WRZ)	SWW	Level 1, no improvement expected	Level 2, no improvement expected	Level 3, no improvement expected	Level 4, no improvement expected
Local reservoirs storages	SWW	Level 1, no improvement expected	Level 2, no improvement expected	Level 3, no improvement expected	N/A
Rainfall - South West region and/or catchments	Environment Agency Report	Notably Low	Exceptionally Low	Exceptionally Low and lower than historic worst drought years	Exceptionally Low over widespread area and significantly lower than historic worst drought years
SPI - catchments	CEH Drought Portal	Severely Dry (-1.5 to -2)	Extremely Dry (< -2)	Extremely Dry and lower than historic worst drought years	Extremely Dry over widespread area and significantly lower than historic worst drought years
No significant rainfall forecast for:	Met Office / other	next 1 – 2 weeks, remaining predominantly dry longer term	next 1 – 2 weeks, remaining predominantly dry longer term	next 1 – 2 weeks, remaining predominantly dry longer term	next 1 – 2 weeks, remaining predominantly dry longer term

Hydrological parameter	Data source	Drought Level 1 trigger	Drought Level 2 trigger	Drought Level 3 trigger	Drought Level 4 trigger
River flows	Environment Agency Report	Notably Low	Exceptionally Low	Exceptionally Low and lower than historic worst drought years	Exceptionally Low over widespread area and significantly lower than historic worst drought years
Abstraction available from river sources (due to low natural flow):	SWW	Little / none	Little / none	Little / none	Little / none
Groundwater levels	Environment Agency Report	Notably Low	Exceptionally Low	Exceptionally Low and lower than historic worst drought years	Exceptionally Low over widespread area and significantly lower than historic worst drought years
Soil moisture deficit (SMD) areas	Environment Agency Report	Notably High (>50 mm above LTA)	Exceptionally High (>75 mm above LTA)	Exceptionally High for a sustained period	Exceptionally High over widespread area for longest period on record
Projections of river flow and/or groundwater show significant risk in next 1 or 6 months of levels becoming:	Environment Agency Report	Notably Low	Exceptionally Low	Exceptionally Low and lower than historic worst drought years	Exceptionally Low over widespread area and significantly lower than historic worst drought years

Table A2.18: Key monitoring sites per WRZ where hydrological information is available for drought trigger assessment (actual sites may vary depending on drought situation and data availability)

Hydrological parameter	Primary data Colliford WRZ	Primary data Roadford WRZ	Primary data Wimbleball WRZ	Primary data Bournemouth WRZ
Strategic reservoir	Colliford Reservoir	Roadford Reservoir	Wimbleball Reservoir	None. Demand-based drought trigger instead
Local reservoirs	Stithians, Drift, Argal & College, Crowdy, Sibilyback, Park, Stannon	Burrator, Upper Tamar Lake, Meldon, Fernworthy, KTT, Avon, Venford, Wistlandpound	None	None
Rainfall catchments	West Cornwall, North Cornwall, Fal & St Austell, Seaton Looe & Fowey, Tamar	Tamar, Avon Dart & Erme, Teign & Torbay, Taw & North Devon, Torridge & Hartland	Exe, Otter Sid Axe & Lim	Bournemouth region
River flows	Fowey at Restormel (naturalised), Kenwyn at Truro	Tamar at Gunnislake (naturalised), East Dart at Bellever	Exe at Thorverton (naturalised), Otter at Dotton	Stour at Throop, Avon at Knapp Mill
River sources	Fowey, Cober	Tamar, Tavy, Dart, Bray	Exe	Stour, Avon
Groundwater (Environment Agency)	Winnards Perch	Branscombe Lane	Woodbury Common No. 2	West Woodyates
Groundwater (SWW)	Park Lake & Stannon Lake	Cofton Cross	Otterton S1, Greatwell 9	
SPI catchments	Fal, Camel, Tamar	Tamar, Dart, Taw & Torridge	Exe	Avon & Stour, Hampshire Rivers
Projections of river flow (Environment Agency)	Torridge	Torridge	Torridge	Stour, Avon
Projections of groundwater level (Environment Agency)	Bussels	Bussels	Bussels	West Woodyates

Appendix 3: Drought management actions

A3.1 Demand-side drought management actions

This Section sets out the detail on the demand-side actions that would be undertaken during drought management.

Table A3.1 summarises the Level 1 to 3 demand-side drought management actions. Tables summarising each individual drought action are also included in this Section (Tables 3.2 – 3.9).

Demand-side extreme drought management actions are the same for all WRZs, although the trigger for implementation differs between the SWW supply area and the BW supply area.

Table A3.1: Level 1 to 3 demand-side drought actions

Name	Drought Level
Enhanced media campaign	1
Company use of water	1
Leakage control and pressure management	1
Temporary Use Bans	2
Demand-side Drought Orders	3

Table A3.2: Enhanced media campaign

Name	Enhanced media campaign
Restriction level	Level 1
Demand saving	Extremely difficult to quantify. However, for the purposes of drought planning we estimate this could give a demand saving of around 2.5%.
Source of estimate	<p><i>Evaluating the impact of restrictions on customer demand</i> (98/WR/06/2), UKWIR (1998)</p> <p><i>Drought and demand: Modelling the impact of the restrictions on demand during drought</i> (07/WR/02/3), UKWIR (2007)</p> <p>The 2007 report gives an average impact on annual demand of a local media campaign run between the end of May and June of between 3% and 5.6%. This value was for a WRZ with a neighbouring WRZ where restrictions were in place. The 1998 report gives a value of 2% for awareness and appeals campaigns and does not stipulate if surrounding WRZs have restrictions. We therefore base our assumptions on the lower value to avoid overestimating savings.</p>
Location	WRZ
Implementation timetable	<p>Preparation 4 weeks before Level 1, plus 1 week for implementation.</p> <p>We have a continual programme of water efficiency promotion, but during a drought, efforts are substantially increased. Messaging for distribution through online and traditional media outlets can be developed very quickly but we would seek to gradually increase this as a drought developed. During this period, we would liaise with neighbouring water companies to ensure consistent messaging, potentially including collaborative campaigns with other members of the West Country Water Resources Group.</p> <p>See also Section 5 which details our communications plan.</p>
Permissions required and constraints	None
Uncertainty associated with option	High level of confidence that some savings can be achieved, although there is uncertainty over the extent of these savings.

Table A3.3: Company use of water

Name	Company use of water
Restriction level	Level 1
Demand saving	Up to 2 MI/d (Although actual savings are unlikely to be significant, being seen to take action is important in keeping customers engaged with the water saving message.)
Source of estimate	Internal estimate
Location	Company-wide
Implementation timetable	Approximately 1 to 4 weeks
Permissions required and constraints	None
Uncertainty associated with option	High level of confidence that some savings can be achieved, although there is uncertainty over the extent of these savings. We already have examples of these projects in the field.

Table A3.4: Leakage control and pressure management

Name	Leakage control and pressure management
Restriction level	Level 1
Demand saving	In a severe drought intense leakage control activity could currently offer reductions in leakage of up to around 5 MI/d.
Source of estimate	Internal estimate
Location	WRZ
Implementation timetable	Approximately 6 to 8 weeks
Permissions required and constraints	To mitigate any risks of low pressure affecting fire hydrant supply, we will liaise with the Fire Service and other authorities on our plans.
Uncertainty associated with option	With leakage targets becoming increasingly challenging the potential to reduce from normal levels will reduce, so future savings may be more limited.

Table A3.5: Temporary Use Bans

Name	Temporary Use Bans
Restriction level	Level 2
Demand saving	A further 5%, in addition to the 2.5% demand saving from the enhanced media campaign
Source of estimate	<p><i>Managing through drought: Code of practice for water companies on water use restrictions (14/WR/33/6)</i>, UKWIR (2014)</p> <p>This report puts the impact of restricting hosepipe usage (which will form a large part of the savings associated with this measure) as a demand reduction of 5% – 9.5%. We assume that some of this saving is included in those resulting from calls from restraint, with TUBs providing an additional 5% saving.</p>
Location	WRZ
Implementation timetable	<p>Advertising time and period for representations (see Section 3.3.1)</p> <p>Typically, the preparation would start 4-6 weeks prior to implementation.</p> <p>Advertised 1 week before implementation.</p>
Permissions required and constraints	As specified in Section 36 of the <i>Flood and Water Management Act 2010</i>
Uncertainty associated with option	High level of confidence that some savings can be achieved, although there is uncertainty over the extent of these savings.

Table A3.6: Demand-side Drought Orders

Name	Demand-side Drought Orders
Restriction level	Level 3
Demand saving	A further 2.5%, in addition to the 5% demand saving from imposing TUBs in the same WRZ.
Source of estimate	<p>Our estimate of the additional saving that may be realised by the imposition of demand-side Drought Orders is based on the impact of those that Southern Water experienced during the drought of 2005-06.</p> <p>We have taken a conservative view of the likely impact to ensure we do not overestimate savings.</p>
Location	WRZ
Implementation timetable	<p>Advertising time and period for representations (see Section 3.4.1)</p> <p>Typically, the preparation would start 4-6 weeks prior to implementation.</p> <p>Advertised 1 week before implementation.</p>
Permissions required and constraints	Drought Order
Uncertainty associated with option	High level of confidence that some savings can be achieved, although there is uncertainty over the extent of these savings.

Table A3.7: Example Temporary Use Ban (TUB) representations form

Use this form to request an exception to one or more of the prohibited uses specified by the TUB, or make other representation regarding the TUB.				
Name:		Customer Account Number (if known):		
Address:				
Email Address:				
1. Are you requesting an exception to the TUB on the grounds of health and safety?		Yes		No
2. Representation details (please provide as much relevant information as possible, but extensive details concerning medical issues are not required):				
<p>Please complete the form and return to the postal or email address below:</p> <p>South West Water Peninsula House Rydon Lane Exeter EX2 7HR</p> <p>Email: (email address to be set up when required)</p>				
FOR COMPANY USE ONLY				
Representation approved:		Yes		No
Comments:				
Date:				
Approved by:				

Table A3.8: Example Temporary Use Ban (TUB) Notice

<p>Water Industry Act 1991 South West Water Limited</p> <p style="text-align: center;">TEMPORARY BAN ON WATER USE</p> <p>South West Water Limited gives notice that, pursuant to sections 76 and 76A–C of the Water Industry Act 1991, the following uses of water supplied by South West Water Limited are restricted.</p> <p>This notice, and further details concerning the prohibitions, current drought and water efficiency advice may be found on the website of South West Water Limited here: https://www.southwestwater.co.uk/</p> <p>Water use restrictions will start on (DATE) at (TIME) hours and continue until further notification. The restriction applies in (LOCATION) as defined in the drought plan of South West Water Limited and indicated on the map. Thank you for your support at this important time.</p> <p>Prohibited Uses</p> <p>The use of a hosepipe, including using sprinklers, dripper hoses, automatic irrigation systems and similar devices, is prohibited for the following:</p> <ol style="list-style-type: none">1. Watering a garden using a hosepipe2. Cleaning a private motor-vehicle using a hosepipe3. Watering plants on domestic or other non-commercial premises using a hosepipe4. Cleaning a private leisure boat using a hosepipe5. Filling or maintaining a domestic swimming or paddling pool6. Drawing water, using a hosepipe, for domestic recreational use7. Filling or maintaining a domestic pond using a hosepipe8. Filling or maintaining an ornamental fountain9. Cleaning walls, or windows, of domestic premises using a hosepipe10. Cleaning paths or patios using a hosepipe11. Cleaning other artificial outdoor surfaces using a hosepipe. <p>Note that customers can still undertake the above activities if they use mains water from a bucket or watering can; or use water that is not sourced from the mains such as grey water, rainwater from a water butt through a hosepipe, or private boreholes for example:</p>
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The following definitions apply:

- Using a hosepipe” includes the drawing of water supplied by the company from a container through a hosepipe; and filling a container by means of a hosepipe with water supplied by the company;
- “Garden” includes a park, gardens open to the public, a domestic garden, a lawn, a grass verge, an allotment used for non-commercial purposes and any other green space;
- “Hosepipe” includes anything designed, adapted or used to serve the same purpose as a hosepipe. The prohibitions apply whether or not any device is attached to the hosepipe, such as a sprinkler for example; and
- “Using a hosepipe for domestic recreational use” includes operating water slides and other recreational equipment.

These prohibited water uses are covered by the Water Industry Act 1991 Section 76, as amended by the Flood and Water Management Act 2010. Further definitions may be found in the Water Use (Temporary Bans) Order 2010, which is available at: legislation.gov.uk/uksi/2010/2231/contents/made

Statutory Exceptions

Customers who meet the requirements below can continue to use water without having to make representation to South West Water Limited to receive permission. It is requested that customers use water wisely and adopt water efficient practices:

- Using a hosepipe for health or safety reasons, where this includes (a) removing or minimising any risk to human or animal health or safety; and (b) preventing or controlling the spread of causative agents of disease
- Watering plants that are (1) grown or kept for sale or commercial use, or (2) that are part of a National Plant Collection or temporary garden or flower display
- Cleaning any area of a private leisure boat which, except for doors or windows, is enclosed by a roof and walls
- Filling or maintaining a pool where necessary in the course of its construction
- Filling or maintaining a pool that is designed, constructed or adapted for use in the course of a programme of medical treatment
- Filling or maintaining a pool that is used for the purpose of decontaminating animals from infections or disease
- Filling or maintaining a pool used in the course of a programme of veterinary treatment
- Filling or maintaining a pool in which fish or other aquatic animals are being reared or kept in captivity
- Filling or maintaining a domestic pond in which fish or other aquatic animals are being reared or kept in captivity
- Filling or maintaining an ornamental fountain which is in or near a fish-pond and whose purpose is to supply sufficient oxygen to the water in the pond in order to keep the fish healthy.

NB Watering areas of grass, which are used for sport or recreation, is covered by a Statutory Exception for health and safety only in relation to the active strip/playing area, not the entire ground.

Discretionary Exceptions

Customers who meet the criteria below for a Discretionary Exception can continue to use water without having to make representation to South West Water Limited to receive permission to use water for the following restricted uses. It is requested that customers that meet the requirements for a Discretionary Exception use water wisely and adopt water efficient practices.

The criteria for a Discretionary Exception include:

- Watering a garden attached to a domestic dwelling, or watering plants on domestic premises using a hosepipe by people who hold a Blue Badge or by people registered on the Priority Services Register of South West Water Limited
- Cleaning a private motor-vehicle using a hosepipe or specific low water use apparatus such as pressure washers by people who hold a Blue Badge or by people registered on the Priority Services Register of South West Water Limited
- Cleaning walls, or windows, of domestic premises using a hosepipe by people who hold a Blue Badge or by people registered on the Priority Services Register of South West Water Limited
- Cleaning paths or patios, or other artificial outdoor surfaces, using a hosepipe by people who hold a Blue Badge or by people registered on the Priority Services Register of South West Water Limited
- Filling or maintaining a domestic pond using a hosepipe by people who hold a Blue Badge or by people registered on the Priority Services Register of South West Water Limited
- Use of an approved drip or trickle irrigation watering system, fitted with a pressure reducing valve and a timer, that are not handheld, that place water drip by drip directly onto the soil surface or beneath the soil surface, without any surface run off or dispersion of water through the air using a jet or mist
- Commercial customers that use hosepipes in the course of their day-to-day cleaning business operation (for example hand car washing, window cleaning, graffiti removal), excluding the watering of domestic gardens
- Cleaning a private motor vehicle using specific low water use apparatus such as pressure washers
- Watering food crops at domestic premises or private allotments using a hosepipe
- Watering newly laid turf using a hosepipe for the first 28 days
- Watering newly-bought plants for the first 14 days
- Cleaning a private leisure boat using a hosepipe to remove graffiti
- Cleaning a private leisure boat using a hosepipe to prevent or control the spread of non-native and/or invasive species
- Filling or maintaining an ornamental fountain to operate water features with religious significance

- Filling or maintaining a new domestic swimming pool
- Filling or maintaining a domestic swimming or paddling pool with covers to minimise evaporative losses when not in use
- Filling or maintaining a domestic swimming or paddling pool with water conservation and/or recycling systems approved by South West Water
- Filling or maintaining a domestic swimming pool that is subject to significant repair and renovation
- Cleaning walls or windows of domestic premises using a hosepipe for the removal of graffiti or where very low water use technologies are employed and approved by South West Water
- Cleaning paths or patios or other artificial outdoor surfaces using a hosepipe for the removal of graffiti or where very low water use technologies are employed and approved by the water company.

The following definition applies:

- “Blue Badge” means a current valid Blue Badge issued by the relevant Local Authority.

Representations

Representations concerning any of these prohibitions may be made in writing at (ADDRESS) or by telephone on (NUMBER). To be considered, representations must be received by (DATE) at 1700 hours.

If, as a result of any representation, South West Water Limited decides to vary any terms of the prohibition, a further notice will be published. Subject to this, the prohibitions will have effect from the stated date and will remain in force until further notice.

Any person who contravenes any of these prohibitions may be guilty of an offence, and liable, on summary conviction, to a fine not exceeding £1,000.

Table A3.9: TUB categories and exceptions, copied from UK Water Industry Research report 'Managing through drought: code of practice and guidance on water use restrictions - 2013' (report ref 14/WR/33/6, UKWIR, 2013)

TUB Category	Statutory Exception	Discretionary Universal Exception (granted by all water companies)	Suggested Discretionary Concessional Exception (granted by individual water companies)	Note
1) Watering a garden using a hosepipe	Using a hosepipe to water a garden for health or safety reasons. NB In this category, the definition of "a garden" includes "an area of grass used for sport or recreation". Therefore it should be noted that watering areas of grass, which are used for sport or recreation, is covered by a Statutory Exception for health & safety <u>only</u> in relation to the active strip/playing area, not the entire ground.	<ul style="list-style-type: none"> To Blue Badge holders on the grounds of disability Use of an approved drip or trickle irrigation system fitted with a pressure reducing valve (PRV) and timer 	<ul style="list-style-type: none"> To customers on the company's Vulnerable Customers List who have mobility issues but are not in possession of a Blue Badge To water newly bought plants for first 14 days To water food crops at domestic premises or private allotments To water newly laid turf for first 28 days 	The whole of the sports pitch can still be watered using other methods. Some companies may wish to grant a Discretionary Concessional Exception to allow the use of a hosepipe to water other grassed areas used for sport where there is no health and safety risk.
2) Cleaning a private motor-vehicle using a hosepipe	A "private motor-vehicle" does not include (1) a public service vehicle, as defined in section 1 of the Public Passenger Vehicles Act 1981(c), and (2) a goods vehicle, as defined in section 192 of the Road Traffic Act 1988(d)	<ul style="list-style-type: none"> To Blue Badge holders on the grounds of disability Use of a hosepipe in the course of a business to clean private motor vehicles where this is done as a service to customers 	<ul style="list-style-type: none"> To customers on the company's Vulnerable Customers List who have mobility issues but are not in possession of a Blue Badge Use of specific low water use apparatus, such as pressure washers 	Taxis and minicabs are not considered to be public service vehicles and so are subject to bans ¹ .
3) Watering plants on domestic or other non-commercial premises using a hosepipe	Does not include watering plants that are (1) grown or kept for sale or commercial use, or (2) that are part of a National Plant Collection or temporary garden or flower display.	<ul style="list-style-type: none"> To Blue Badge holders on the grounds of disability Use of an approved drip or trickle irrigation system fitted with a PRV and timer 	<ul style="list-style-type: none"> To customers on the company's Vulnerable Customers List who have mobility issues but are not in possession of a Blue Badge To water newly-bought plants for first 14 days To water newly laid turf for first 28 days 	The water restriction does not apply to the watering of plants that are grown or kept for sale or commercial use by horticultural businesses e.g. plant nurseries etc.
4) Cleaning a private leisure boat using a hosepipe	(1) <u>cleaning</u> any area of a private leisure boat which, except for doors or windows, is enclosed by a roof and walls. (2) Using a hosepipe to clean a private leisure boat for health or safety reasons	<ul style="list-style-type: none"> Commercial cleaning Vessels of primary residence Cases where fouling is causing increased fuel consumption Engines designed to be cleaned with a hosepipe. 	<ul style="list-style-type: none"> To remove graffiti To prevent or control the spread of non-native and/or invasive species 	

TUB Category	Statutory Exception	Discretionary Universal Exception (granted by all water companies)	Suggested Discretionary Concessional Exception (granted by individual water companies)	Note
5) Filling or maintaining a domestic swimming or paddling pool	(1) filling or maintaining a pool where necessary in the course of its construction (2) filling or maintaining a pool using a hand-held container which is filled with water drawn directly from a tap (3) filling or maintaining a pool that is designed, constructed or adapted for use in the course of a programme of medical treatment (4) filling or maintaining a pool that is used for the purpose of decontaminating animals from infections or disease (5) filling or maintaining a pool used in the course of a programme of veterinary treatment (6) filling or maintaining a pool in which fish or other aquatic animals are being reared or kept in captivity	None	<ul style="list-style-type: none"> • Pools with covers used to minimise evaporative losses when not in use • Pools with water conservation and/or recycling systems approved by the water company • Paddling pools at early stages of a drought • Pools that are subject to significant repair and renovation • Filling new pools 	<ul style="list-style-type: none"> • Hot tubs are not classed as pools • Pools with religious significance are not domestic pools • Pools used by school pupils for swimming lessons should be excluded: they are covered by Drought Order legislation
6) Drawing water, using a hosepipe, for domestic recreational use	None	None	<ul style="list-style-type: none"> • Pools with covers used to minimise evaporative losses when not in use • Pools with water conservation and/or recycling systems approved by the water company 	
7) Filling or maintaining a domestic pond using a hosepipe	Filling or maintaining a domestic pond in which fish or other aquatic animals are being reared or kept in captivity	<ul style="list-style-type: none"> • Blue Badge holders on the grounds of disability 	<ul style="list-style-type: none"> • To customers on the company's Vulnerable Customers List who have mobility issues but are not in possession of a Blue Badge 	<ul style="list-style-type: none"> • Filling and topping up of a pond by fixed and buried pipes is not restricted
8) Filling or maintaining an ornamental fountain	Filling or maintaining an ornamental fountain which is in or near a fish-pond and whose purpose is to supply sufficient oxygen to the water in the pond in order to keep the fish healthy	None	<ul style="list-style-type: none"> • To operate water features with religious significance 	

TUB Category	Statutory Exception	Discretionary Universal Exception (granted by all water companies)	Suggested Discretionary Concessional Exception (granted by individual water companies)	Note
9) Cleaning walls, or windows, of domestic premises using a hosepipe	Using a hosepipe to clean the walls or windows of domestic premises for health or safety reasons	<ul style="list-style-type: none"> To Blue Badge holders on the grounds of disability Commercial cleaning 	<ul style="list-style-type: none"> To customers on the company's Vulnerable Customers List who have mobility issues but are not in possession of a Blue Badge For the removal of graffiti Where very low water use technologies are employed and approved by the water company 	<ul style="list-style-type: none"> The use of water-fed poles for window cleaning at height is permitted under the H&S statutory exception The restrictions do not apply where the cleaning apparatus is not connected to mains supply
10) Cleaning paths or patios using a hosepipe	Using a hosepipe to clean paths or patios for health or safety reasons	<ul style="list-style-type: none"> To Blue Badge holders on the grounds of disability Commercial cleaning 	<ul style="list-style-type: none"> To customers on the company's Vulnerable Customers List who have mobility issues but are not in possession of a Blue Badge For the removal of graffiti Where very low water use technologies are employed and approved by the water company 	
11) Cleaning other artificial outdoor surfaces using a hosepipe	Using a hosepipe to clean an artificial outdoor surface for health or safety reasons	<ul style="list-style-type: none"> To Blue Badge holders on the grounds of disability Commercial cleaning 	<ul style="list-style-type: none"> To customers on the company's Vulnerable Customers List who have mobility issues but are not in possession of a Blue Badge For the removal of graffiti Where very low water use technologies are employed and approved by the water company 	<ul style="list-style-type: none"> The use of water-fed poles for window cleaning at height is permitted under the H&S statutory exception The restrictions do not apply where the cleaning apparatus is not connected to mains supply

A3.2 Supply-side drought management actions

A3.2.1 Level and order of implementation of supply-side drought actions

In line with the Drought Plan Guideline¹⁷, we produced an initial list of potential supply-side drought actions which were refined to the list in Table A3.10 below after considering the level of supply benefit, potential environmental impacts, practicality of delivery, the location of each potential drought action relative to existing supply system assets and whether or not third party agreement is required.

A high level summary of the order of implementation of supply-side drought actions is given below.

Level 1 to 3 supply-side drought actions

Our Level 1 to 3 supply-side actions are listed in Table A3.10. Tables summarising each individual drought action are also included in this Section. These option summary tables include details of the drought action, the trigger for implementation, time to implement, likely resource benefit, required infrastructure, constraints, barriers, quality risks, environmental risks and environmental monitoring required.

As shown in Table A3.10:

- In Colliford and Bournemouth WRZs we are only likely to require Level 1 to 3 supply-side drought actions in an extreme drought
- In Wimbleball WRZ we are likely to need our Level 1 supply-side drought action in a 1 in 200 to 1 in 500 year drought but are only likely to need Level 2 and 3 actions in an extreme drought
- In Roadford WRZ we are likely to need Level 1 and 2 supply-side drought actions in a 1 in 200 to 1 in 500 year drought but are only likely to need Level 3 actions in an extreme drought.

¹⁷ Water Company Drought Plan guideline_December 2020 UPDATE_FINAL, Environment Agency, Dec 2020

Table A3.10: Level 1 to 3 supply-side drought actions

WRZ	Option Number	Option Name	Drought Severity Level	Drought return period (years)	Action Type ¹⁸
Colliford	C1	Restormel licence	1	>1 in 500	Drought Permit
	C2	Stannon Lake licence	2	>1 in 500	Drought Permit
	C3	Porth Reservoir & Rialton Intake	3	>1 in 500	Disused Sources
Roadford	R1	Lyd to Roadford pumped storage (Jan-March)	1	1 in 200 – 1 in 500	Drought Permit
	R2	Slade Reservoir	2	1 in 200 – 1 in 500	Disused Source
	R3	Challacombe Reservoir	3	>1 in 500	Drought Permit
	R4	Meldon/Vellake to Roadford	3	>1 in 500	Drought Permit
	R5	Lee Moor unused quarries	3	>1 in 500	Drought Permit
Wimbleball	W1	Bramford Speke & Stoke Canon (North Exeter boreholes)	1	1 in 200 – 1 in 500	Disused Sources ¹⁹
	W2	Hook Springs licence	2	>1 in 500	Drought Permit
	W3	Wilmington Springs licence	2	>1 in 500	Drought Permit
	W4	Wimbleball compensation	3	>1 in 500	Drought Permit
Bournemouth	B1	Wimborne borehole	2	>1 in 500	Disused Source
	B2	Stanbridge licence	3	>1 in 500	Drought Permit

The assignment of Level 1, 2 or 3 to a particular drought action (and hence the order of selection in a particular drought) is detailed in Section A.3.2.2.

“More before 4” supply-side drought actions

If we are experiencing an extreme drought and the drought continues to intensify, after implementing Level 1 to 3 drought actions we may find that further drought actions are required in order to avoid the need to implement Level 4 actions (Emergency Drought Orders) such as standpipes and rota cuts. The demand-side and supply-side drought actions that would be implemented in this situation are referred to as “More before 4” drought actions and are listed in Appendix 4. On the supply-side, the rationale for categorising these actions as “More before 4” is that they are likely to have higher environmental impacts than Level 1 to 3 actions and/or require third party agreement to operate them.

¹⁸ Where a Drought Permit is indicated, it may be determined that a Drought Order is required.

¹⁹ We are in the process of applying for a licence variation to permit abstracting the water at the downstream WTW.

The order of selection of specific “More before 4” drought actions within the range of actions available at this level is indicated by the “Priority” field in the drought action summary tables in Appendix 4. The actual selection would depend on the specific drought and would include consideration of factors including:

- Where within the supply area additional water would be most beneficial
- Likely resource benefit of each action in the specific drought being experienced
- Whether any local areas are experiencing more or less intense environmental drought, which would influence the acceptability of specific drought actions.

Discounted supply-side drought actions

Our initial unconstrained list of supply-side drought actions included actions that have been implemented in previous droughts, previously licensed sources and changes to licence conditions at currently licensed sources. However, after reviewing each action, some were discounted from the feasible list because of some or all of the following reasons:

- With increased understanding of impacts of very low flows and related factors (e.g. water temperature) on the environment, it is likely that some drought actions that were implemented in previous droughts would no longer be acceptable due to the high environmental impacts they are likely to cause
- For historic drought actions, improvements in our supply system since these historic drought actions were last used (including new resources and greater supply network connectivity) have opened up new options for supply-side drought actions that have lower environmental impact risk and higher resource benefit (for example the “More before 4” Park Lake drought action – see Appendix 4 for details).
- The resource benefits are likely to be minimal because of the timing of likely use
- A different drought action in the same catchment is preferable in terms of resource benefit, existing infrastructure and/or environmental impact level

A list of discounted supply-side drought actions is given in Table A3.11 below.

Table A3.11: Discounted supply-side drought actions

WRZ	Drought action	Reasons for discounting
Colliford	River Cober at Trenear - reduce prescribed flow	Likely to be needed late in a severe drought when river flows would be very low and hence even with reduced prescribed flows there would be little or no water available to abstract.
	River Kennal at Kennel Vale - reduce prescribed flow	
	River Fowey at Restormel - reduce prescribed flow	
	Withey Brook at Bastreet - reduce prescribed flow	Environmental impacts are likely to be high.
	River Fowey at Trekeivesteps - reduce prescribed flow	

WRZ	Drought action	Reasons for discounting
Roadford	River Torridge - restart abstraction at site of disused WTW at Torrington	Temporary pipelines and WTW needed at disused WTW site. Intake refurbishment needed. Torridge catchment is key site for Freshwater Pearl Mussel (critically endangered) conservation work. 2 projects on Taw & Torridge, so a drought action on the lower Torridge is unlikely to be environmentally acceptable.
	Wimbleball Reservoir to River Taw – abstract released water at Exebridge and transfer into River Taw for abstraction at temporary WTW downstream	Transfer limited by storage in Wimbleball. Temporary river intake, pipelines and WTW needed at disused WTW site. Better option likely to be increasing temporary treated water transfer capability.
	Rydon Springs	In a very severe drought these springs would dry up
	Bala Brook - restart abstraction from disused source	In a very severe drought there is likely to be no water available to abstract
	River Bray at Leehamford - reduce prescribed flow	Likely to be needed late in a very severe drought when river flows would be very low and hence even with reduced prescribed flows there would be little or no water available to abstract. Environmental impacts are likely to be high.
	River Swincombe - reduce prescribed flow	
	River Dart at Littlehempston - reduce prescribed flow	
	River Erme - reduce prescribed flow	
	River Tavy at Lopwell - reduce prescribed flow	
	River Tamar at Gunnislake - reduce prescribed flow	
Wimbleball	-	-
Bournemouth	-	-

A3.2.2 Order of implementation of Level 1 to 3 supply-side drought actions

Colliford WRZ

The Level 1 to 3 drought actions in Colliford WRZ have been ordered in this way because:

- Level 1 (Restormel annual licence): although requiring a Drought Permit, this action has a high yield with high confidence and is a winter action when river flows are high so environmental impacts are likely to be minimal. It provides resilience in the following season by supplementing Colliford Reservoir natural winter refill, thus reducing the risk of needing summer drought actions which are likely to have higher environmental impact. No new infrastructure is required.
- Level 2 (Stannon Lake): this action provides good levels of resource benefit from water in storage. Located in a high summer demand area. A Drought Permit is required for Stannon Lake.
- Level 3 (Porth/Rialton): this action provides good levels of resource benefit from water in storage. Located in a high summer demand area. The Porth/Rialton drought action, although licensed, requires intake structure refurbishment, temporary pipelines and a temporary WTW.

Roadford WRZ

The Level 1 to 3 drought actions in Roadford WRZ have been ordered in this way because:

- Level 1 (Lyd to Roadford Reservoir winter pumped storage, January to March): although requiring a Drought Permit, this action has a high yield with high confidence and is a winter action when river flows are high so environmental impacts are likely to be minimal. It provides resilience in the following season by supplementing Roadford Reservoir natural winter refill, thus reducing the risk of needing summer drought actions which are likely to have higher environmental impact. No new infrastructure is required.
- Level 2 (Slade Reservoir): Whilst this is a licensed source, the resource benefit is much lower than the Level 1 drought action and the risk of environmental impact is higher because Slade Reservoir is a summer drought action. Its small capacity limits resource benefit in during the lowest flow period however when flows start to recover, Slade Reservoir is likely to refill whilst other local sources would take longer to recover. Hence there is potential for ongoing small resource benefit to support the local area until these other local sources recover. No new infrastructure is required.
- Level 3 (Challacombe, Meldon/Vellake, Lee Moor): all three drought actions require Drought Permits. Order of implementation within Level 3 is based on the time to implement due to the amount of infrastructure required and whether third party agreement is required:
 - No new infrastructure is required for Challacombe
 - A temporary pipeline is required for Meldon/Vellake

- Temporary pipelines and a temporary WTW are required for Lee Moor. Third party agreement is required for Lee Moor.

Wimbleball WRZ

The Level 1 to 3 drought actions in Wimbleball WRZ have been ordered in this way because:

- Level 1 (Bramford Speke and Stoke Canon): disused, licensed source so no Drought Permit required. No new infrastructure required. Good level of resource benefit, conveniently located with respect to other SWW assets.
- Level 2 (Hook Springs, Wilmington Springs): very similar sources. Both likely to be implemented at the same time. Drought Permit required to change licence conditions. Small resource benefit but available over a long period.
- Level 3 (abstracting Wimbleball Reservoir compensation flow when making supply releases): Drought Permit required. Potential for environmental impacts downstream of abstraction point but this is close to the tidal limit. However, there could be impacts on fish migration upstream depending on timing of action.

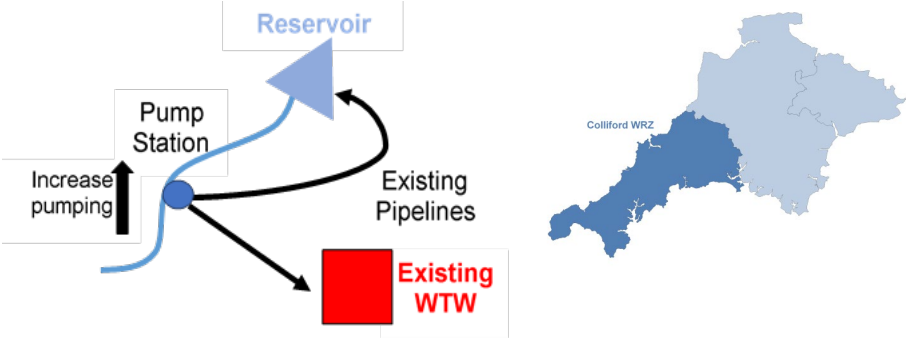
Bournemouth WRZ:

The Level 1 to 3 drought actions in Bournemouth WRZ have been ordered in this way because:

- Level 1 (none): no supply-side drought actions proposed because this WRZ is more at risk from short, extreme spikes in demand which would require immediate action to address. Hence demand-side actions are more appropriate at Level 1 (see Table 3.4 and Appendix 3.1).
- Level 2 (Wimborne borehole): disused, licensed source. Good level of resource benefit. Temporary pipeline required. Unlikely to be any environmental impact.
- Level 3 (Stanbridge boreholes): Drought Permit required to increase daily abstraction limit. Good level of resource benefit. Even though this action would be required in the peak summer demand period when flows would be low in a drought, because this is a groundwater source and of short duration of operation of this action, environmental impacts are likely to be minimal.

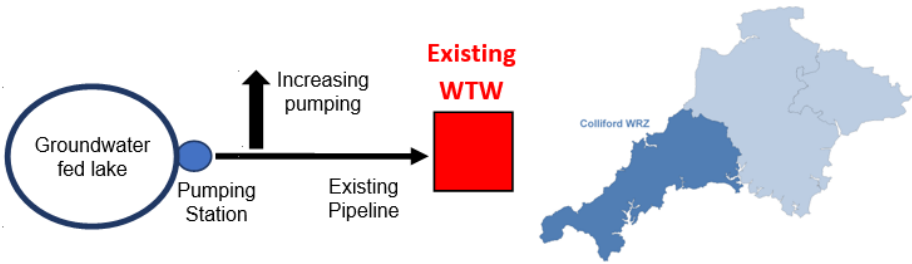
A3.2.3 Level 1 to 3 supply-side drought action summary tables

Option C1: Restormel Licence

Area of benefit:	Colliford WRZ
Action level:	Level 1
Drought return period	>1 in 500 years (extreme drought)
Trigger:	Storage in Colliford Reservoir
Resource benefit:	5 – 10 MI/d as an annual average. See calculation of resource benefit below.
Time to implement:	4 weeks
Currently licensed:	Yes, but Drought Permit required to increase annual abstraction limit
Description of the option:	<p>The scheme entails increasing the annual abstraction licence limit in order to enable greater winter pumped storage abstraction, to aid Colliford Reservoir refill which increases resilience in the following season.</p> 
Method of Implementation:	Abstraction from existing river intake. No changes to existing infrastructure needed.
Calculation of resource benefit:	Hydrological modelling confirms water available. The resource benefit depends on the amount of water available for abstraction in the river and depending on the situation, the increase in the calendar year annual licence limit may apply to the current or following year. The range quoted above has been calculated as 20 MI/d for 3 months to 40 MI/d for 3 months, as an annual average.
Opportunities/benefits:	Reliable water resource: there is a high level of confidence associated with the anticipated resource benefits. No new infrastructure is required for this option.
Constraints:	An existing abstraction licence is held for Restormel but a Drought Permit is needed to allow for abstraction in excess of the licensed annual abstraction limit.
Risks associated with option:	Additional abstraction requires a Drought Permit. Need to prove exceptional shortage of rainfall.

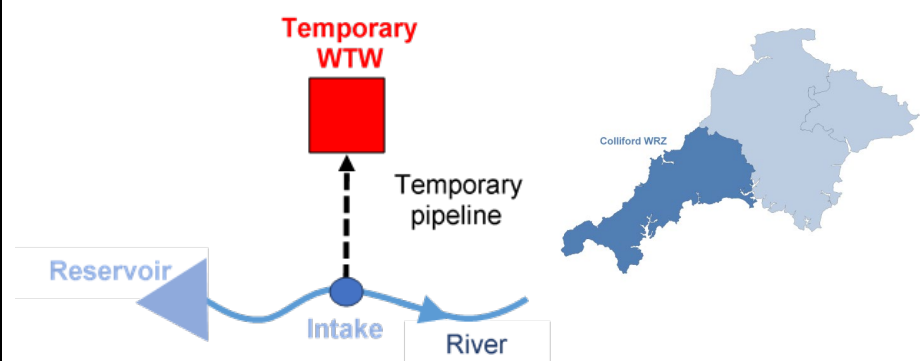
Water quality risk:	As this is an existing abstraction, water quality is known and the existing WTW has been designed to manage the water it is receiving.
Environmental risk:	<p>This scheme could have an effect on the downstream ecology due to reduced downstream flows from increased abstraction, however as abstraction is in the high flow winter period any impacts should be minimal.</p> <p>There will be no construction related impacts as the required infrastructure is already present.</p>
Environmental monitoring:	<p>We will undertake appropriate environmental monitoring before, during and after potential implementation of this scheme.</p> <p>Physical (Habitats and Geomorphology) and Ecological (Protected species, Fisheries, INNS, Macroinvertebrates and Macrophytes) receptors will need to be considered on a site by site basis. Site-specific characteristics and receptor sensitivities will determine scale and detail of monitoring required.</p> <p>Hydrometric monitoring will include the following:</p> <p><u>Pre-scheme:</u></p> <ul style="list-style-type: none"> • Colliford and Siblyback Reservoir level monitoring [SWW] • Continuous Colliford & Siblyback Reservoir compensation and supply release flow monitoring [SWW] • Continuous abstraction rate measurement at Restormel [SWW] • Continuous river flow monitoring on the River Fowey at Restormel [Environment Agency]. <p><u>Scheme (supplementary):</u></p> <ul style="list-style-type: none"> • No additional requirement

Option C2: Stannon Lake

Area of benefit:	Colliford WRZ
Action level:	Level 2
Drought return period	>1 in 500 years (extreme drought)
Trigger:	Storage in Colliford Reservoir
Resource benefit:	4 MI/day for up to 2 - 4 months
Time to implement:	4-6 weeks
Currently licensed:	Yes, but requires Drought Permit to increase daily abstraction rate
Description of the option:	<p>The scheme entails increasing the abstraction rate at Stannon Lake by 4 MI/d by installing temporary pumps. All other licence conditions remain including the lake level condition.</p> 
Method of Implementation:	Installation of temporary pumps at Stannon Lake.
Calculation of resource benefit:	This Drought Permit has been set at an additional 4 MI/d above the existing licensed abstraction rate of 4 MI/d because the existing pipeline capacity is 8 MI/d. There is a high level of certainty of this resource benefit due to the known volume of water in storage. However, the amount of benefit will be constrained by the lake level licence condition.
Opportunities/benefits:	Reliable water resource: there is a high level of confidence associated with the anticipated resource benefits. Minimal infrastructure changes required.
Constraints:	An existing licence is held for Stannon Lake but a Drought Permit is needed to increase the daily abstraction rate.
Risks associated with option:	This option requires a Drought Permit. Need to prove exceptional shortage of rainfall.
Water quality risk:	There is a high level of confidence that water quality will not be of concern.
Environmental risk:	<p>No significant risk to the environment is expected.</p> <p>Catchment modelling confirms that increasing the abstraction rate from 4 MI/d to 8 MI/d has minimal environmental impact. Although a reduced volume in Stannon Lake due to increased abstraction could impact the downstream environment, as this is a groundwater fed lake with limited hydraulic</p>

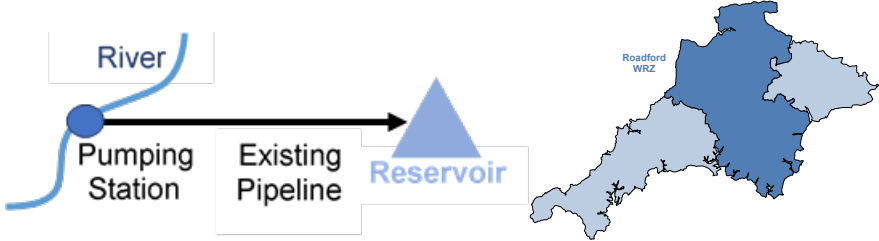
	<p>connectivity with the downstream river any impacts are likely to be minimal. The lake level licence condition also provides environmental protection.</p> <p>The site is adjacent to North Bodmin Moor SSSI however, due to limited hydraulic connectivity, the level of risk is likely to be minimal.</p> <p>Existing infrastructure, so there is no environmental risk from construction.</p>
<p>Environmental monitoring:</p>	<p>We will undertake appropriate environmental monitoring before, during and after potential implementation of this scheme.</p> <p>Physical (Habitats and Geomorphology) and Ecological (Protected species, Fisheries, INNS, Macroinvertebrates and Macrophytes) receptors will need to be considered on a site by site basis. Site-specific characteristics and receptor sensitivities will determine scale and detail of monitoring required.</p> <p>Hydrometric monitoring will include the following:</p> <p><u>Pre-scheme:</u></p> <ul style="list-style-type: none"> • Ongoing licence monitoring including Stannon Lake level, Stannon Lake outflow, Stannon Stream flow, New North leat flow & Dragons Teeth leat flow • Continuous Stannon abstraction rate measurement. • Crowdy Reservoir level and compensation flow into Crowdy Brook. <p><u>Scheme (supplementary):</u></p> <ul style="list-style-type: none"> • Potentially monitoring groundwater level and/or river flow at additional locations as agreed with the Environment Agency.

Option C3: Porth Reservoir and Rialton Intake

Area of benefit:	Colliford WRZ
Action level:	Level 3
Drought return period	>1 in 500 years (extreme drought)
Trigger:	Storage in Colliford Reservoir
Resource benefit:	5 - 6 Ml/day for up to 6 – 12 months
Time to implement:	6 - 12 weeks
Currently licensed:	Yes
Description of the option:	<p>The scheme entails re-commencing abstraction from a licensed resource. Releases are made from Porth Reservoir into Rialton Stream and abstracted at the existing Rialton Intake. Abstracted water will be treated at a temporary WTW.</p>  <p>The diagram illustrates the water flow process. On the left, a blue arrow labeled 'Reservoir' points to a blue circle labeled 'Intake'. From the 'Intake', a blue arrow labeled 'River' points to the right. A dashed black arrow labeled 'Temporary pipeline' connects the 'Intake' to a red square labeled 'Temporary WTW'. To the right of the diagram is a map of the Colliford WRZ area, with the relevant region highlighted in blue.</p>
Method of Implementation:	No treatment process is present at the abstraction site. The abstracted water will be transferred to a temporary WTW for treatment. A temporary WTW, eel screen, laying of pipelines and installation of pumps are required to gain the benefits of this option.
Calculation of resource benefit:	Hydrological analysis, taking into consideration the likely need for increased prescribed flow and compensation flow beyond those specified on the abstraction licences. A WINEP investigation is currently under way to consider likely environmental impacts of the current licences and what changes to licence conditions may be required. A resource benefit range has been provided to allow for different yields being available at different times of year.
Opportunities/benefits:	<p>No new abstraction licences are required for this option.</p> <p>Reliable water resource: there is a high level of confidence associated with the anticipated resource benefits.</p> <p>Close to a major summer demand centre (Newquay).</p>
Constraints:	Since there is no treatment infrastructure on site, pipelines, pumps and a temporary WTW need to be installed. Due to requiring a temporary pipeline,

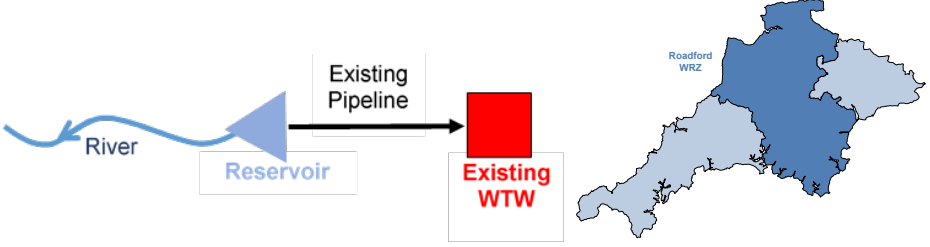
	an agreement from landowners will be needed and any planning concerns addressed.
Risks associated with option:	<p>This source is currently subject to an AMP7 WINEP investigation. Should the results of the investigation show that the licence needs to be changed or revoked, the water available from this scheme may be reduced, or some or all the water would need to be accessed through a Drought Permit or Drought Order.</p> <p>Licence unused for several years so risk that the Environment Agency may revoke licence.</p> <p>Risk of access issues on land not owned by SWW.</p>
Water quality risk:	Water quality needs to be tested on site.
Environmental risk:	<p>St Columb Minor Marsh CWS is located around 50m downstream of Rialton abstraction point. Porth Reservoir is within Porth Reservoir and Fir Hill CWS. Previous communications with Cornwall Wildlife Trust have suggested slight lowering of levels may benefit migrant wading birds. Both areas are within the scope of an AMP7 WINEP investigation.</p> <p>No significant environmental impact is expected. The intake from a headwater stream may impact localised and downstream flows, habitat, water chemistry and ecology and will require further investigation and assessment. This is included in the AMP7 WINEP investigation.</p> <p>Any construction would need to follow best practice and established guidelines.</p>
Environmental monitoring:	<p>We will undertake appropriate environmental monitoring before, during and after potential implementation of this scheme.</p> <p>Physical (Habitats and Geomorphology) and Ecological (Protected species, Fisheries, INNS, Macroinvertebrates and Macrophytes) receptors will need to be considered on a site by site basis. Site-specific characteristics and receptor sensitivities will determine scale and detail of monitoring required.</p> <p>Hydrometric monitoring will include the following:</p> <p><u>Pre-scheme:</u></p> <ul style="list-style-type: none"> • Porth Reservoir level monitoring [SWW] • Continuous Porth Reservoir compensation / supply release flow monitoring [SWW] • Continuous abstraction rate measurement at Rialton [SWW] • Spot river flow gauging at abstraction point on the Rialton Stream and review potential for continuous flow monitoring [SWW]. <p><u>Scheme (supplementary):</u></p> <ul style="list-style-type: none"> • No additional requirement

Option R1: River Lyd to Roadford Reservoir pumped storage (January to March)

Area of benefit:	Roadford WRZ
Action level:	Level 1
Drought return period	1 in 200 to 1 in 500 years
Trigger:	Storage in Roadford Reservoir
Resource benefit:	20 Ml/day for 6 months in the following season
Time to implement:	4 - 6 weeks
Currently licensed:	No
Description of the option:	<p>Winter pumped storage scheme (January to March)</p> <p>The scheme entails abstracting up to 40 Ml/d during January to March inclusive from the River Lyd via an existing intake and pumping the abstracted water into Roadford Reservoir via an existing pipeline.</p> 
Method of Implementation:	Work has recently been undertaken at this site to ensure that this scheme is ready for operational use.
Calculation of resource benefit:	Hydrological modelling confirmed the water available to abstract. This scheme increases Roadford Reservoir refill and hence provides more water for the following season, reducing drought risk.
Opportunities/benefits:	<p>This option will supplement the natural refill of Roadford Reservoir which will increase drought resilience in the following year.</p> <p>Reliable water resource: there is a high level of confidence associated with the anticipated resource benefits. No infrastructure changes required.</p>
Constraints:	Liaison with stakeholders is required.
Risks associated with option:	This option requires a Drought Permit. Need to prove exceptional shortage of rainfall.
Water quality risk:	<p>Water quality needs to be tested on site. Operational procedures need to be put in place to minimise water quality risk of standing water in pipe by draining the pipe between periods of abstraction (this is standard practice for pipes that are used intermittently).</p> <p>Intake needs to be kept free of sediment and contaminant deposition.</p>
Environmental risk:	Abstracting from this source results in reduced volumes downstream which has a risk of impacting in-river ecology. This Drought Permit is timed to

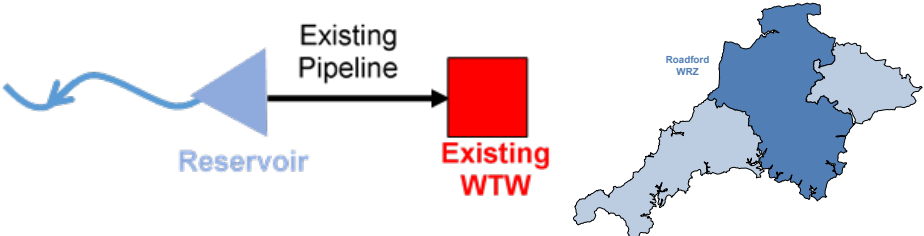
	<p>minimise potential impacts on salmonids and eels. The environmental risks have been documented thoroughly in an EAR undertaken by external consultants APEM (EAR available on request) and is also summarised within Appendix 6.</p> <p>The intake is Eel and Salmonid Regulations compliant.</p> <p>Potential risk to INNS transfers within or across catchment. Surveys have been undertaken at Roadford Reservoir and at Lyd Intake. Appropriate control and/or eradication would be undertaken as and when required. A cap has been put on the Roadford Reservoir discharge point when not in use to stop signal crayfish movement. More information is provided in the EAR (APEM) and in the monitoring and mitigation plan (produced for the Level 1 Lyd to Roadford winter pumped storage (January to March) Drought Permit) (see Appendix 6).</p> <p>Existing infrastructure, so there is no environmental risk from construction.</p> <p>Risks to historic environment/features: no risk of impacts because no new infrastructure is required for this action and because this drought action operates during the winter when river flows are high.</p>
<p>Environmental monitoring:</p>	<p>We will undertake appropriate environmental monitoring before, during and after potential implementation of this scheme, as specified in the EAR report (available on request).</p> <p>Hydrometric monitoring will include the following:</p> <p><u>Pre-scheme:</u></p> <ul style="list-style-type: none"> • Continuous Roadford Lake abstraction, level and outflow monitoring [SWW] • Continuous level and flow monitoring at the abstraction point on the River Lyd, spot flow gauging on the River Lyd and/or key tributaries tbc [SWW] • Water quality sampling [SWW]. <p><u>Scheme (supplementary):</u></p> <ul style="list-style-type: none"> • Continuous water quality monitoring on the River Lyd tbc [SWW] • Continuous River Lyd abstraction rate measurement [SWW].

Option R2: Slade Reservoir

Area of benefit:	Roadford WRZ
Action level:	Level 2
Drought return period	1 in 200 to 1 in 500 years
Trigger:	Storage in Roadford Reservoir
Resource benefit:	1 - 2 Ml/day for 2 - 4 months
Time to implement:	4 - 6 weeks
Currently licensed:	Yes
Description of the option:	<p>The scheme entails re-introducing a disused licensed reservoir source, installing temporary pumps to abstract the water and transferring the abstracted water to an existing WTW via an existing pipeline.</p> 
Method of Implementation:	Abstraction via existing pipeline to existing WTW.
Calculation of resource benefit:	Hydrological analysis, taking into consideration the likely need for a compensation release (to be agreed with the Environment Agency) when abstracting and until the reservoir refills and spills after abstraction ceases. A resource benefit range has been provided to allow for different yields being available at different times of year.
Opportunities/benefits:	This option does not require a Drought Permit.
Constraints:	None
Risks associated with option:	Licence unused for several years so risk that the Environment Agency may revoke licence.
Water quality risk:	Water quality needs to be tested on site.
Environmental risk:	<p>Abstraction from this source may pose a risk to the ecology, habitats and water chemistry downstream due to lower downstream flow and hence likely to need to introduce an appropriate compensation release to provide protection downstream.</p> <p>The reservoir is within the North Devon AONB. The stream is not a WFD waterbody.</p> <p>Existing infrastructure, so there is no environmental risk from construction.</p>

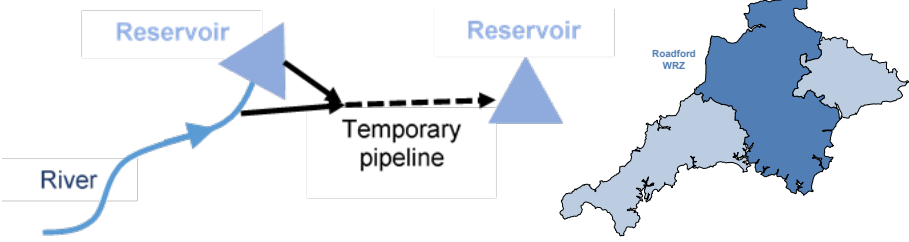
	<p>Risks to historic environment/features: no risk of impacts because no new infrastructure is required for this action and because this drought action will not result in river flows being lower than when this scheme was operated in historic droughts.</p>
<p>Environmental monitoring:</p>	<p>We will undertake appropriate environmental monitoring before, during and after potential implementation of this scheme.</p> <p>Physical (Habitats and Geomorphology) and Ecological (Protected species, Fisheries, INNS, Macroinvertebrates and Macrophytes) receptors will need to be considered on a site by site basis. Site-specific characteristics and receptor sensitivities will determine scale and detail of monitoring required.</p> <p>Hydrometric monitoring will include the following:</p> <p><u>Pre-scheme:</u></p> <ul style="list-style-type: none"> • Slade Reservoir level monitoring [SWW] • Continuous Slade compensation release monitoring [SWW] • Review need for additional spot stream flow gauging to assess impact on downstream watercourse [SWW] • Water quality sampling [SWW]. <p><u>Scheme (supplementary):</u></p> <ul style="list-style-type: none"> • Continuous Slade Reservoir abstraction rate measurement [SWW].

Option R3: Challacombe Reservoir

Area of benefit:	Roadford WRZ
Action level:	Level 3
Drought return period	>1 in 500 years (extreme drought)
Trigger:	Storage in Roadford Reservoir
Resource benefit:	1 - 2 MI/d for 2 months
Time to implement:	6 - 8 weeks
Currently licensed:	No
Description of the option:	<p>The scheme entails re-introducing a disused reservoir source and transferring the abstracted water to an existing WTW via an existing raw water pipeline.</p> 
Method of Implementation:	Abstraction via existing pipeline to existing WTW.
Calculation of resource benefit:	Likely to only be used during lowest flow period, so resource benefit is based on percentage of reservoir capacity available for abstraction and an assumption of minimal inflow, hence 1 – 2 MI/d for 2 months.
Opportunities/benefits:	The reservoir is already connected via existing pipework to an existing WTW. High quality water.
Constraints:	None.
Risks associated with option:	A Drought Permit will be required for this option. Need to prove exceptional shortage of rainfall.
Water quality risk:	Water quality needs to be tested on site.
Environmental risk:	<p>Abstraction from this source will reduce downstream flow and this may impact in-river habitat, ecology and water quality. A compensation release has been agreed with the Environment Agency to minimise any potential environmental impact of this abstraction. The compensation release would be made when abstracting and until the reservoir refills and spills after abstraction ceases.</p> <p>INNS (curly water-weed) risk present will be mitigated by transferring raw water directly to WTW via existing raw water transfer pipeline.</p> <p>Existing infrastructure, so there is no environmental risk from construction.</p>
Environmental monitoring:	We will undertake appropriate environmental monitoring before, during and after potential implementation of this scheme.

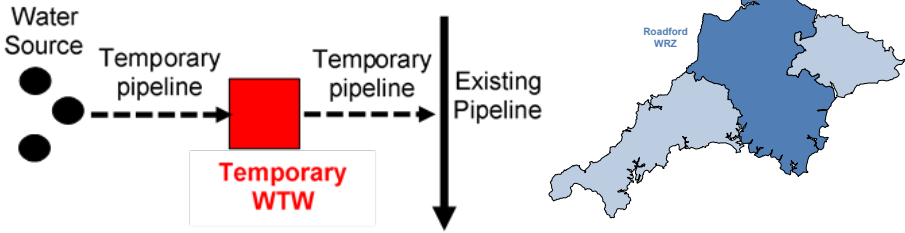
	<p>Hydrometric monitoring will include the following:</p> <p><u>Pre-scheme:</u></p> <ul style="list-style-type: none">• Challacombe Reservoir level monitoring [SWW]• Continuous Challacombe compensation/outflow [SWW]• Additional spot flow gauging to assess impact on downstream watercourse [SWW]• Water quality sampling [SWW]. <p><u>Scheme (supplementary):</u></p> <ul style="list-style-type: none">• Continuous Challacombe abstraction rate measurement [SWW].
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Option R4: Meldon/Vellake to Roadford

Area of benefit:	Roadford WRZ
Action level:	Level 3
Drought return period	>1 in 500 years (extreme drought)
Trigger:	Storage in Roadford Reservoir
Resource benefit:	3 - 5 Ml/day for 6 months in the following season
Time to implement:	6 - 12 weeks
Currently licensed:	No
Description of the option:	<p>The scheme entails abstracting from an existing reservoir abstraction point (Meldon) and/or an existing river intake (Vellake) and laying a temporary pipeline to transfer the abstracted water from Vellake and/or Meldon to Roadford Reservoir.</p> 
Method of Implementation:	Laying of temporary pipeline is required to gain the benefits of this option.
Calculation of resource benefit:	Hydrological modelling confirmed the water available to abstract. This scheme increases Roadford refill and hence provides more water for the following season, reducing drought risk.
Opportunities/benefits:	There is a high level of confidence associated with the anticipated resource benefits.
Constraints:	Due to requiring a temporary pipeline, an agreement from landowners will be needed and any planning concerns addressed.
Risks associated with option:	Although abstraction licences exist at Vellake river intake and Meldon Reservoir, a Drought Permit is required to increase abstraction above the daily licensed limit.
Water quality risk:	Water quality risks include manganese, geosmin, taste and odour, but all should be treatable at Northcombe WTW and are unlikely to be a problem during high flow periods when this Drought Permit would apply.
Environmental risk:	Meldon Reservoir is adjacent to North Dartmoor SSSI and Dartmoor SAC. However, they are unlikely to be impacted because reduced spill volume from Meldon Reservoir due to increased abstraction will affect downstream (not upstream/adjacent to the reservoir). Reduction in downstream flow is likely to

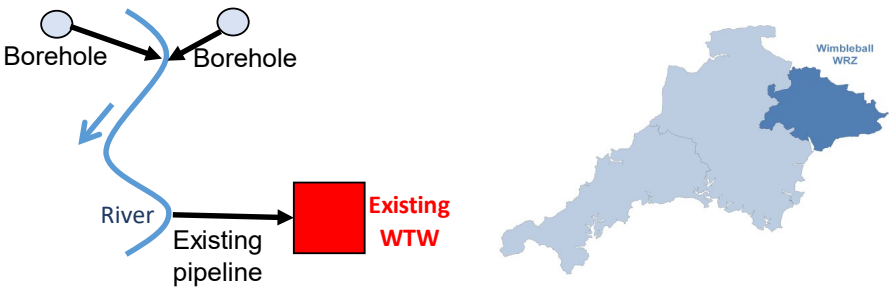
	<p>be minimal due to abstracting only when Meldon Reservoir is spilling or close to spilling, in high flow periods.</p> <p>Downstream SSSIs include Meldon Aplite Quarry and Meldon Quarry however these are geologically designated and not water dependent.</p> <p>Any construction of a temporary pipeline would need to follow best practice and established guidelines.</p>
<p>Environmental monitoring:</p>	<p>We will undertake appropriate environmental monitoring before, during and after potential implementation of this scheme.</p> <p>Physical (Habitats and Geomorphology) and Ecological (Protected species, Fisheries, INNS, Macroinvertebrates and Macrophytes) receptors will need to be considered on a site by site basis. Site-specific characteristics and receptor sensitivities will determine scale and detail of monitoring required.</p> <p>Hydrometric monitoring will include the following:</p> <p><u>Pre-scheme:</u></p> <ul style="list-style-type: none"> • Continuous Meldon Reservoir abstraction, level and outflow monitoring [SWW] • Continuous level and flow monitoring on the West Okement River at Vellake gauging station [Environment Agency] • Water quality sampling [SWW]. <p><u>Scheme (supplementary):</u></p> <ul style="list-style-type: none"> • Continuous abstraction rate measurement from the West Okement River at Vellake [SWW].

Option R5: Lee Moor Quarries

Area of benefit:	Roadford WRZ
Action level:	Level 3
Drought return period	>1 in 500 years (extreme drought)
Trigger:	Storage in Roadford Reservoir
Resource benefit:	2 - 4 Ml/d for up to 3 – 6 months
Time to implement:	8 - 12 weeks
Currently licensed:	No
Description of the option:	<p>The scheme entails abstracting from three quarries, treating the abstracted water at a temporary WTW on site and laying a temporary treated water main to connect with the existing treated water network.</p> 
Method of Implementation:	No treatment process is present at the abstraction site. Laying a new raw pipeline, installing pumps, a temporary WTW and laying a new treated water pipeline are required to gain the benefits of this option.
Calculation of resource benefit:	Initial resource benefit based on measurements of current discharge rates, quarry volumes and likely permitted abstraction based on experience at other disused quarries. Benefit fairly certain because volume of stored water is known, and a conservative estimate of resource benefit has been given here.
Opportunities/ benefits:	Good quality water.
Constraints:	Due to no treatment infrastructure on site, temporary pipelines, pumps and WTW need to be installed. SWW do not own the land so an agreement with the landowners is needed.
Risks associated with option:	Requires a Drought Permit. Need to prove exceptional shortage of rainfall. Limited knowledge of the aquifer properties means that the modelled yield is low confidence.
Water quality risk:	Water quality needs to be tested on site.
Environmental risk:	Area is 1.5 – 2 km south of Dartmoor National Park (SAC, SSSI) but given the distance and hydrological disconnection there is minimal/no risk.

	<p>No environmental risks have been identified from initial inspections. However, further environmental investigation and assessment may be needed including consideration of this option in the context of CAMS.</p> <p>Any construction would need to follow best practice and established guidelines around planning and development.</p>
<p>Environmental monitoring:</p>	<p>We will undertake appropriate environmental monitoring before, during and after potential implementation of this scheme.</p> <p>Physical (Habitats and Geomorphology) and Ecological (Protected species, Fisheries, INNS, Macroinvertebrates and Macrophytes) receptors will need to be considered on a site by site basis. Site-specific characteristics and receptor sensitivities will determine scale and detail of monitoring required.</p> <p>Hydrometric monitoring will include the following:</p> <p><u>Pre-scheme:</u></p> <ul style="list-style-type: none"> • Continuous level monitoring of each quarry [SWW] • Continuous outflow monitoring [SWW] • Additional spot flow gaugings to assess impact on downstream watercourse [SWW] • Water quality sampling [SWW]. <p><u>Scheme (supplementary):</u></p> <ul style="list-style-type: none"> • Continuous abstraction rate measurement from quarries [SWW].


Option W1: Bramford Speke and Stoke Canon boreholes

Area of benefit:	Wimbleball WRZ
Action level:	Level 1
Drought return period	1 in 200 to 1 in 500 years
Trigger:	Storage in Wimbleball Reservoir
Resource benefit:	8 Ml/d for approx. 4 months
Time to implement:	6 - 8 weeks
Currently licensed:	<p>Bramford Speke: Yes</p> <p>Stoke Canon: Yes</p> <p>We are in the process of applying for a licence variation to permit abstracting the water from the River Exe at the downstream WTW.</p>
Description of the option:	<p>This scheme entails abstracting from disused, licensed groundwater sources, releasing the abstracted water into the River Exe and abstracting this water at an existing WTW.</p>  <p>The diagram illustrates the water flow: two boreholes (represented by circles) are shown with arrows pointing to a blue line representing the River Exe. From the river, an arrow points to a red box labeled 'Existing WTW'. A map to the right shows the geographical area of the Wimbleball WRZ in a light blue color.</p>
Method of Implementation:	Abstracting from existing licensed sources via existing infrastructure.
Calculation of resource benefit:	Hydrological modelling to confirm yield, combined with knowledge of when supply releases would be required from Wimbleball Reservoir during a drought – this scheme would only be operated when supply releases are being made.
Opportunities/benefits:	<p>Reduces the amount of water that needs to be released from Wimbleball Reservoir to support abstraction downstream, which:</p> <ul style="list-style-type: none"> (a) Conserves more water in Wimbleball Reservoir for supply in the current reservoir drawdown period (b) Reduces the likelihood of needing Level 2 or 3 supply options (c) Reduces the likely amount of required winter pumped storage (reducing the carbon impact on the environment). <p>A high level of confidence can be associated with the anticipated resource benefit, due to the known reliable yield of these sources.</p>

Constraints:	We are in the process of applying for a licence variation to permit abstracting the water at the downstream WTW.
Risks associated with option:	<p>Existing abstraction licences for abstraction from the boreholes. However, agreement is required with the Environment Agency to abstract this water at the existing WTW. We are in the process of applying for a licence variation to permit abstracting the water at the downstream WTW. There is a risk that this variation might not be granted, in which case we would need to apply for a Drought Permit.</p> <p>This source is currently subject to an AMP7 WINEP investigation. Should the results of the investigation show that the licence needs to be changed or revoked, the water available from this scheme may be reduced, or some or all the water would need to be accessed through a Drought Permit or Drought Order.</p>
Water quality risk:	Low risk.
Environmental risk:	<p>Abstraction from these sources could impact on the groundwater catchment.</p> <p>Abstraction may reduce downstream flows below the river abstraction point and therefore there may be a risk of impacting localised aquatic ecology and potential fish movements (to be investigated by the AMP7 WINEP investigation). The abstraction point is close to the tidal limit so any impacts are likely to be minimal.</p> <p>The groundwater abstraction points are in the vicinity of Brampford Speke and Stoke Woods SSSI (risks will be covered in the AMP7 WINEP investigation).</p> <p>Existing infrastructure, so there is no environmental risk from construction.</p> <p>Risks to historic environment/features: no risk of impacts because no new infrastructure is required for this action and because this drought action will not result in groundwater level being lower than when this scheme was operated in historic droughts.</p>
Environmental monitoring:	<p>We will undertake appropriate environmental monitoring before, during and after potential implementation of this scheme.</p> <p>We will utilise historical/existing datasets from the regulator and other local stakeholders and supplement with our own monitoring.</p> <p>The active AMP7 WINEP investigation (completion in March 2022) will clarify site specific details around relevant environmental receptors (elements) to monitor and monitoring locations.</p> <p>Hydrometric monitoring will include the following (subject to current WINEP Investigation):</p> <p><u>Pre-scheme:</u></p> <ul style="list-style-type: none"> • Wimbleball compensation and supply release flow monitoring [SWW] • Thorverton gauging station – continuous surface water level and flow data [Environment Agency] • Continuous groundwater level monitoring of Stoke Canon and Brampford Speke observation boreholes [SWW]


	<ul style="list-style-type: none">• Continuous abstraction rate measurement at Northbridge Intake (River Exe) [SWW]. <p><u>Scheme (supplementary):</u></p> <ul style="list-style-type: none">• Continuous abstraction/discharge rate measurement from Stoke Canon and Bramford Speke boreholes into River Exe [SWW]• Continuous groundwater level monitoring of Stoke Canon and Bramford Speke abstraction boreholes [SWW].• Instantaneous groundwater level at local boreholes/wells [SWW]*.• Spot flow measurement on River Exe and River Culm [SWW]*. <p><i>*Requirement and locations currently being assessed as part of the ongoing AMP7 WINEP investigation.</i></p>
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Option W2: Hook Springs

Area of benefit:	East Devon
Action level:	Level 2
Drought return period	>1 in 500 years (extreme drought)
Trigger:	Storage in Wimbleball Reservoir
Resource benefit:	0.4 MI/day
Time to implement:	4 weeks
Currently licensed:	Yes, but require Drought Permit to increase abstraction above current licence limit
Description of the option:	<p>The scheme entails removing the annual licence limit, to enable abstraction at the daily licence limit throughout the year.</p> 
Method of Implementation:	Abstracting from an existing source and treating at an existing WTW.
Calculation of resource benefit:	Hydrological modelling to confirm yield. Removing the annual limit allows an extra 0.4 MI/d to be abstracted throughout the year. As we would expect to require this scheme later in the year, any risk of low flows is minimal.
Opportunities/benefits:	In a surface water drought, spring sources may be sufficiently resilient to allow abstraction at the current daily licensed rate. In a groundwater drought, yield would be lower but as we would expect to require this scheme later in the year, any risk of low flows is minimal.
Constraints:	None.
Risks associated with option:	This option requires a Drought Permit. Need to prove exceptional shortage of rainfall.
Water quality risk:	Low risk as this is a currently licenced source, however spring sources are vulnerable to surface water contamination.
Environmental risk:	No additional environmental risk from increasing abstraction from this source under this Drought Permit. Existing infrastructure, so there is no environmental risk from construction.
Environmental monitoring:	We will undertake appropriate environmental monitoring before, during and after potential implementation of this scheme.

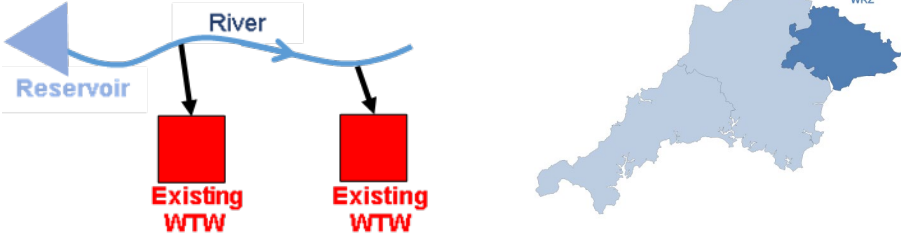
	<p>Physical (Habitats and Geomorphology) and Ecological (Protected species, Fisheries, INNS, Macroinvertebrates and Macrophytes) receptors will need to be considered on a site by site basis. Site-specific characteristics and receptor sensitivities will determine scale and detail of monitoring required.</p> <p>Hydrometric monitoring will include the following:</p> <p><u>Pre-scheme:</u></p> <ul style="list-style-type: none">• Hook Springs abstraction rate measurement [SWW]• Spot flow measurement on receiving stream upstream and downstream of discharge point(s) [SWW]. <p><u>Scheme (supplementary):</u></p> <ul style="list-style-type: none">• No additional requirement.
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Option W3: Wilmington Springs

Area of benefit:	Wimbleball Reservoir
Action level:	Level 2
Drought return period	>1 in 500 years (extreme drought)
Trigger:	Storage in Wimbleball Reservoir
Resource benefit:	0.4 MI/d
Time to implement:	4 weeks
Currently licensed:	Yes, but require Drought Permit to increase abstraction above current licence limit
Description of the option:	<p>The scheme entails removing the annual licence limit.</p> 
Method of Implementation:	Abstracting from an existing source and treating at an existing WTW.
Calculation of resource benefit:	Hydrological modelling to confirm yield. Removing the annual limit allows an extra 0.4 MI/d to be abstracted throughout the year. As we would expect to require this scheme later in the year, any risk of low flows is minimal.
Opportunities/benefits:	In a surface water drought, spring sources may be sufficiently resilient to allow abstraction at the current daily licensed rate. In a groundwater drought, yield would be lower but as we would expect to require this scheme later in the year, any risk of low flows is minimal.
Constraints:	None.
Risks associated with option:	This option requires a Drought Permit. Need to prove exceptional shortage of rainfall.
Water quality risk:	Low risk as this is a currently licenced source, however spring sources are vulnerable to surface water contamination.
Environmental risk:	No additional environmental risk from increasing abstraction from this source under this Drought Permit. Existing infrastructure, so there is no environmental risk from construction.
Environmental monitoring:	We will undertake appropriate environmental monitoring before, during and after potential implementation of this scheme. Physical (Habitats and Geomorphology) and Ecological (Protected species, Fisheries, INNS, Macroinvertebrates and Macrophytes) receptors will need to

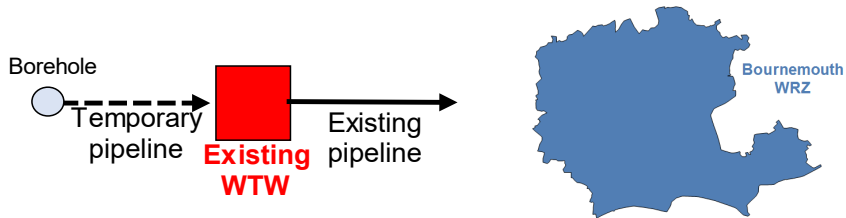
	<p>be considered on a site by site basis. Site-specific characteristics and receptor sensitivities will determine scale and detail of monitoring required.</p> <p>Hydrometric monitoring will include the following:</p> <p><u>Pre-scheme:</u></p> <ul style="list-style-type: none">• Wilmington Springs abstraction rate measurement [SWW]• Spot flow measurement on receiving stream upstream and downstream of discharge point(s) [SWW]. <p><u>Scheme (supplementary):</u></p> <ul style="list-style-type: none">• No additional requirement.
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Option R4: Wimbleball compensation flow

Area of benefit:	Wimbleball WRZ
Action level:	Level 3
Drought return period	>1 in 500 years (extreme drought)
Trigger:	Storage in Wimbleball Reservoir
Resource benefit:	9 Ml/d for approx. 4 months
Time to implement:	3 – 4 weeks
Currently licensed:	Change to current licence conditions
Description of the option:	<p>The scheme entails abstracting the Wimbleball Reservoir compensation release when making supply releases.</p> 
Method of Implementation:	Change to operating procedures and controls to manage the reservoir releases when this Drought Permit is active and when supply releases are required to support downstream abstraction.
Calculation of resource benefit:	Hydrological modelling to confirm yield, combined with knowledge of when supply releases would be required from Wimbleball Reservoir during a drought – this scheme would only be operated when supply releases are being made.
Opportunities/benefits:	<p>When supply releases are being made, the flow downstream of the reservoir would be closer to natural due to a lower total release being required.</p> <p>Conserves water in storage for supply in the current drawdown period, reducing the likely winter pumped storage volume required (reducing the carbon impact on the environment).</p> <p>Reduces the likelihood of needing Drought Permits with a higher environmental impact risk.</p> <p>There is a high level of confidence associated with the anticipated benefits.</p>
Constraints:	None.
Risks associated with option:	This option requires a Drought Permit. Need to prove exceptional shortage of rainfall.
Water quality risk:	There are no water quality risks due to this being an operational source.

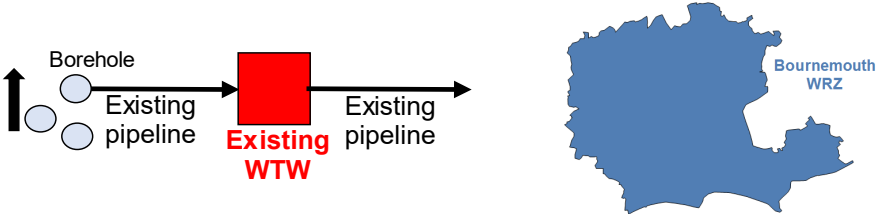
<p>Environmental risk:</p>	<p>Possible environmental impact due to reduced flow downstream of the lowest abstraction point. However, this abstraction point is close to the tidal limit, so any impacts are likely to be minimal.</p> <p>Existing infrastructure, so there is no environmental risk from construction.</p>
<p>Environmental monitoring:</p>	<p>We will undertake appropriate environmental monitoring before, during and after potential implementation of this scheme.</p> <p>Physical (Habitats and Geomorphology) and Ecological (Protected species, Fisheries, INNS, Macroinvertebrates and Macrophytes) receptors will need to be considered on a site by site basis. Site-specific characteristics and receptor sensitivities will determine scale and detail of monitoring required.</p> <p>Hydrometric monitoring will include the following:</p> <p><u>Pre-scheme:</u></p> <ul style="list-style-type: none"> • Wimbleball compensation and supply release flow monitoring [SWW] • Thorverton gauging station – continuous surface water level and flow data [Environment Agency] • Continuous abstraction rate measurement at Northbridge Intake (River Exe) [SWW]. <p><u>Scheme (supplementary):</u></p> <ul style="list-style-type: none"> • No additional requirement.

Option B1: Wimborne WTW

Area of benefit:	Bournemouth
Action level:	Level 2
Drought return period	>1 in 500 years (extreme drought)
Trigger:	High demand trigger level
Resource benefit:	2 Ml/day for up to 1 - 3 months
Time to implement:	Up to 12 weeks
Currently licensed:	Yes
Description of the option:	<p>This scheme entails abstracting from a disused, licensed groundwater source and pumping the abstracted water to an existing WTW.</p> 
Method of Implementation:	Abstracting from a previously licensed source, laying temporary raw water pipeline to an existing WTW.
Calculation of resource benefit:	Estimated hydrological yield during drought.
Opportunities/benefits:	<p>Minimal infrastructure changes required.</p> <p>No new abstraction licences are required for this option.</p>
Constraints:	Operability of the existing WTW needs confirming - may require some refurbishment.
Risks associated with option:	AMP7 WINEP investigation may result in abstraction licence conditions being reviewed.
Water quality risk:	Water quality needs to be tested on site.
Environmental risk:	<p>No significant risk to the environment is expected.</p> <p>Any construction would need to follow best practice and established guidelines around planning and development.</p>
Environmental monitoring:	<p>We will undertake appropriate environmental monitoring before, during and after potential implementation of this scheme.</p> <p>Physical (Habitats and Geomorphology) and Ecological (Protected species, Fisheries, INNS, Macroinvertebrates and Macrophytes) receptors will need to be considered on a site by site basis. Site-specific characteristics and receptor sensitivities will determine scale and detail of monitoring required.</p>

	<p>Hydrometric monitoring will include the following (subject to current WINEP investigation):</p> <p><u>Pre-scheme:</u></p> <ul style="list-style-type: none">• Walford Mill gauging station (River Allen) – continuous surface water level and flow data [Environment Agency]• Spot flow measurement on River Allen [SWW]• Continuous groundwater level monitoring of Wimborne supply borehole [SWW]• Groundwater level spot measurement for local observation boreholes tbc [SWW].• Water quality spot sampling [SWW]. <p><u>Scheme (supplementary):</u></p> <ul style="list-style-type: none">• Continuous abstraction rate measurement from Wimborne supply borehole [SWW]• Continuous water quality sampling tbc [SWW].
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Option B2: Stanbridge

Area of benefit:	Bournemouth
Action level:	Level 3
Drought return period	>1 in 500 years (extreme drought)
Trigger:	High demand trigger level
Resource benefit:	Up to 12.5 MI/day for 2 – 6 weeks depending on demand level
Time to implement:	4 weeks
Currently licensed:	Yes, but require Drought Permit to increase abstraction above current daily licence limit
Description of the option:	<p>The scheme entails increasing the daily licence limit, to enable abstraction above the current daily licence limit for a specified period.</p>  <p>The diagram illustrates the water supply process. On the left, a vertical arrow points upwards to a 'Borehole' (represented by a blue circle). Below it, two more blue circles are labeled 'Existing pipeline'. An arrow points from the borehole area to a red square labeled 'Existing WTW'. Another arrow points from the WTW to a blue map of the Bournemouth Water Resource Zone (WRZ) on the right.</p>
Method of Implementation:	Abstraction from existing source and treatment at existing WTW.
Calculation of resource benefit:	Assumes daily licence limit increased by 12.5 MI/d to 25 MI/d (which was the licensed rate prior to the sustainability reduction).
Opportunities/benefits:	Good quality water. Increases water resources capacity during peak demand periods.
Constraints:	None.
Risks associated with option:	This option requires a Drought Permit. Need to prove exceptional shortage of rainfall.
Water quality risk:	Low risk as this is a currently licensed source.
Environmental risk:	<p>Unlikely to be any enduring environmental impacts from short-term increases in abstraction from this source under this Drought Permit.</p> <p>Existing infrastructure, so there is no environmental risk from construction.</p>
Environmental monitoring:	<p>We will undertake appropriate environmental monitoring before, during and after potential implementation of this scheme.</p> <p>Physical (Habitats and Geomorphology) and Ecological (Protected species, Fisheries, INNS, Macroinvertebrates and Macrophytes) receptors will need to be considered on a site by site basis. Site-specific characteristics and receptor sensitivities will determine scale and detail of monitoring required.</p>

	<p>Hydrometric monitoring will include the following:</p> <p><u>Pre-scheme:</u></p> <ul style="list-style-type: none">• Loverley Mill gauging station (River Allen) – continuous surface water level and flow data [Environment Agency]• Continuous groundwater level data for West Woodyates and Horton Inn boreholes [Environment Agency]• Continuous abstraction rate measurement from Stanbridge supply boreholes [SWW]• Continuous groundwater level monitoring of Stanbridge supply boreholes [SWW]• Water quality sampling [SWW]. <p><u>Scheme (supplementary):</u></p> <ul style="list-style-type: none">• No additional requirement.
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Appendix 4: Extreme drought management actions

A4.1 Demand-side extreme drought management actions

Table A4.1 summarises the extreme drought (“more before 4”) demand-side drought management actions. Tables summarising each individual drought action are also included in this Section.

Demand-side extreme drought management actions are the same for all WRZs, although the trigger for implementation differs between the SWW supply area and the BW supply area.

Table A4.1: Extreme (“More before 4”) demand-side drought actions

Action Number	Name	Description	Drought return period (years)
GD1/E	Blitz media campaign	Intense, saturated campaign targeting key areas at most risk	> 1 in 500
GD2/E	Aggressive media campaign	Media campaign focussing on the risks to water supply without customer restraint	> 1 in 500
GD3/E	Restriction exception removal	Restriction exception removal	> 1 in 500
GD4/E	Free water-saving devices	Provide free water saving devices to commercial and domestic customers	> 1 in 500
GD5/E	Further reduction in planned maintenance	Reduce or stop planned maintenance on company assets as appropriate	> 1 in 500
GD6/E	Stop mains flushing	Stop flushing of mains water pipes	> 1 in 500
GD7/E	Reduced water consumption by large commercial customers	Speak to large commercial customers about reducing their water consumption or changing their maintenance schedule	> 1 in 500

Option GD1/E: Blitz media campaign

WRZ:	All
Type of action:	Demand
Priority:	Variable
Trigger:	SWW supply area: strategic reservoir storage approaching Level 4 trigger BW supply area: underlying demand approaching Level 1 trigger before peak demand periods
Likely benefit:	Fairly confident that some savings can be achieved, although there is uncertainty over the extent of these savings, especially because this option has not been used before.
Time to implement:	Less than 1 week
Previous drought plan:	No
Summary of action:	An intensive, saturated campaign targeting key areas at most risk
Barriers:	None
Environmental impacts:	No direct impact on the environment but will have benefits due to water saving

Option GD2/E: Aggressive media campaign

WRZ:	All
Type of action:	Demand
Priority:	Variable
Trigger:	SWW supply area: strategic reservoir storage approaching Level 4 trigger BW supply area: underlying demand approaching Level 1 trigger before peak demand periods
Likely benefit:	Fairly confident that some savings can be achieved, although there is uncertainty over the extent of these savings, especially because this option has not been used before.
Time to implement:	Less than 1 week
Previous drought plan:	No
Summary of action:	A media campaign focussing on the risks to water supply without customer restraint
Barriers:	None
Environmental impacts:	No direct impact on the environment but will have benefits due to water saving

Option GD3/E: Restriction exception removal

WRZ:	All
Type of action:	Demand
Priority:	Variable
Trigger:	SWW supply area: strategic reservoir storage approaching Level 4 trigger BW supply area: underlying demand approaching Level 1 trigger before peak demand periods
Likely benefit:	Unable to estimate due to option not used before
Time to implement:	Less than 1 week
Previous drought plan:	No
Summary of action:	Restriction exception removal
Barriers:	Unacceptability
Environmental impacts:	No direct impact on the environment but will have benefits due to water saving

Option GD4/E: Free water-saving devices

WRZ:	All
Type of action:	Demand
Priority:	Variable
Trigger:	SWW supply area: strategic reservoir storage approaching Level 4 trigger BW supply area: underlying demand approaching Level 1 trigger before peak demand periods
Likely benefit:	Uncertain – likely uptake of option by customers unknown
Time to implement:	Less than 1 week
Previous drought plan:	No
Summary of action:	Provide free water saving devices to commercial and domestic customers
Barriers:	Availability of stock. Customer willingness to install devices
Environmental impacts:	No direct impact on the environment but will have benefits due to water saving

Option GD5/E: Further reduction in planned maintenance

WRZ:	All
Type of action:	Demand
Priority:	Variable
Trigger:	SWW supply area: strategic reservoir storage approaching Level 4 trigger BW supply area: underlying demand approaching Level 1 trigger before peak demand periods
Likely benefit:	Uncertain. Most planned maintenance would have been reduced earlier in the drought, although there may be some opportunities at this Level
Time to implement:	Less than 1 week
Previous drought plan:	Not listed as a drought option in previous drought plans but this activity would have been undertaken as part of the Company's response in a previous severe drought situation
Summary of action:	Reduce or stop planned maintenance on company assets as appropriate
Barriers:	Demand level may not allow asset operation to be reduced to allow for maintenance to be undertaken
Environmental impacts:	No direct impact on the environment but will have benefits due to water saving

Option GD6/E: Stop mains flushing

WRZ:	All
Type of action:	Demand
Priority:	Variable
Trigger:	SWW supply area: strategic reservoir storage approaching Level 4 trigger BW supply area: underlying demand approaching Level 1 trigger before peak demand periods
Likely benefit:	Limited opportunity for benefits beyond those realised under Level 1 company actions
Time to implement:	Less than 1 week
Previous drought plan:	Not listed as a drought option in previous drought plans but this activity would have been undertaken as part of the Company's response in a previous severe drought situation
Summary of action:	Stop flushing of mains water pipes
Barriers:	Build-up of natural sediments which could pose water quality risks
Environmental impacts:	No direct impact on the environment but will have benefits due to water saving

Option GD7/E: Reduced water consumption by large commercial customers

WRZ:	All
Type of action:	Demand
Priority:	Variable
Trigger:	SWW supply area: strategic reservoir storage approaching Level 4 trigger BW supply area: underlying demand approaching Level 1 trigger before peak demand periods
Likely benefit:	Uncertain. Level of benefit dependent on commercial considerations
Time to implement:	2 weeks
Previous drought plan:	Not listed as a drought option in previous drought plans but this activity would have been undertaken as part of the Company's response in a previous severe drought situation
Summary of action:	Speak to large commercial customers about reducing their water consumption or changing their maintenance schedule
Barriers:	Lack of willingness due to business risk
Environmental impacts:	No direct impact on the environment but will have benefits due to water saving

A4.2 Supply-side “More before 4” extreme drought management actions

Tables A4.2 to A4.5 summarise the extreme drought (“more before 4”) supply-side drought actions in each WRZ. Tables summarising each individual drought action are also included in this Section.

Table A4.2: Colliford WRZ extreme (“More before 4”) supply-side drought actions

Action Number	Name	Description	Action Type*	Drought return period (years)
CS1/E	Colliford compensation flow	Abstract Colliford compensation release at Restormel when making supply releases	Drought Permit	> 1 in 500
CS2/E	Park Lake	Increase daily abstraction limit	Drought Permit	> 1 in 500
CS3/E	Blackpool Pit	Abstract from Pit, transfer to existing WTW	Drought Permit	> 1 in 500
CS4/E	Crowdy compensation flow	Reduce Crowdy compensation release rate	Drought Permit	> 1 in 500
CS5/E	Drift compensation flow	Reduce Drift compensation release rate	Drought Permit	> 1 in 500
CS6/E	Hawk’s Tor Pit	Abstract from Hawk’s Tor Pit, transfer to existing WTW	Drought Permit	> 1 in 500
CS7/E	Leswidden Pool	Abstract from Leswidden Pool, transfer to existing WTW	Drought Permit	> 1 in 500
CS8/E	Porth Reservoir compensation flow	Reduce Porth compensation release rate	Drought Permit	> 1 in 500
CS9/E	R Fowey at Trekeivesteps	Remove maintenance flow condition	Drought Permit	> 1 in 500
CS10/E	R Hayle	Abstract from R Hayle at disused intake, treat at temporary WTW	Drought Permit	> 1 in 500
CS11/E	Siblyback compensation flow	Reduce Siblyback compensation release rate	Drought Permit	> 1 in 500
CS12/E	Stithians compensation flow	Reduce Stithians compensation release rate	Drought Permit	> 1 in 500
CS13/E	Boswyn Stream, Cargenwyn Reservoir and Carwynnen Stream	Abstract from Boswyn stream, Cargenwyn reservoir and Carwynnen stream, transfer to temporary treatment plant.	Drought Permit	> 1 in 500

* Where a Drought Permit is indicated, it may be determined that a Drought Order is required.

Table A4.3: Roadford WRZ extreme (“More before 4”) supply-side drought actions

Action Number	Name	Description	Action Type*	Drought return period (years)
RS1/E	River Lyd (summer)	Abstract from River Lyd into Roadford Reservoir during the summer	Drought Permit	1 in 200 – 1 in 500
RS2/E	Duckaller	Lower the groundwater level constraint	Drought Permit	1 in 200 – 1 in 500
RS3/E	Metherell Quarry	Abstract from quarry into Fernworthy Reservoir	Drought Permit	> 1 in 500
RS4/E	R Erme	Remove monthly and annual licence limits	Drought Permit	> 1 in 500
RS5/E	R Yealm	Remove monthly and annual licence limits	Drought Permit	> 1 in 500
RS6/E	Gammaton Reservoir	Abstract from Gammaton, treat at temporary WTW	Drought Permit	> 1 in 500
RS7/E	Meldon Pond	Transfer water to river to part replace compensation release from Meldon Reservoir	Drought Permit	> 1 in 500
RS8/E	Red Lake & Left Lake	Transfer water into R Erme for abstraction at Erme Intake	Drought Permit	> 1 in 500
RS9/E	R Thrushel	Abstraction from river into Roadford Reservoir	Drought Permit	> 1 in 500
RS10/E	Avon Reservoir	Reduce Avon compensation release rate	Drought Permit	> 1 in 500
RS11/E	Burrator Reservoir	Reduce Burrator compensation release rate	Drought Permit	> 1 in 500
RS12/E	Fernworthy Reservoir	Reduce Fernworthy compensation release rate	Drought Permit	> 1 in 500
RS13/E	Trenchford Reservoir	Reduce Trenchford compensation release rate	Drought Permit	> 1 in 500
RS14/E	Meldon Reservoir	Reduce Meldon compensation release rate	Drought Permit	> 1 in 500
RS15/E	Roadford Reservoir	Reduce Roadford compensation release rate	Drought Permit	> 1 in 500
RS16/E	Upper Tamar Lake	Reduce Upper Tamar Lake compensation release rate	Drought Permit	> 1 in 500
RS17/E	Venford Reservoir	Reduce Venford compensation release rate	Drought Permit	> 1 in 500
RS18/E	River Lyd (Nov-Dec)	Abstract from River Lyd into Roadford Reservoir in November and December ²⁰	Drought Permit	> 1 in 500

* Where a Drought Permit is indicated, it may be determined that a Drought Order is required.

²⁰ This “More before 4” Drought Permit would be in addition to the River Lyd to Roadford Reservoir winter pumped storage Level 1 (January to March) Drought Permit (Option R1)

Table A4.4: Wimbleball WRZ extreme (“More before 4”) supply-side drought actions

Action Number	Name	Description	Action Type*	Drought return period (years)
WS1/E	Otter Valley	Remove Otter Valley groundwater licence limits	Drought Permit	1 in 200 – 1 in 500
WS2/E	Greatwell stream support suspension	Suspend Greatwell abstraction for stream support, abstract for supply instead	Drought Permit	> 1 in 500
WS3/E	Wimbleball Reservoir	Extension of winter pumped storage season	Drought Permit	> 1 in 500
WS4/E	Coleford borehole	Abstract from disused borehole, treat at temporary WTW	Drought Permit	> 1 in 500
WS5/E	Knowle borehole	Abstract from disused borehole, treat at temporary WTW	Drought Permit	> 1 in 500
WS6/E	R Exe at Bolham	Reduce prescribed flow licence condition	Drought Permit	> 1 in 500
WS7/E	R Exe at Northbridge	Reduce prescribed flow licence condition	Drought Permit	> 1 in 500
WS8/E	Squabmoor Reservoir	Abstract from Squabmoor, treat at temporary WTW	Drought Permit	> 1 in 500

* Where a Drought Permit is indicated, it may be determined that a Drought Order is required.

Table A4.5: Bournemouth WRZ extreme (“More before 4”) supply-side drought actions

Action Number	Name	Description	Action Type*	Drought return period (years)
BS1/E	Ibsley Lake ²¹	Transfer water from Ibsley Lake into R Avon for abstraction downstream	Drought Permit	> 1 in 500
BS2/E	R Stour at Longham	Remove low flow constraint from licence	Drought Permit	> 1 in 500

* Where a Drought Permit is indicated, it may be determined that a Drought Order is required.

²¹ We will not use this extreme drought action until we have completed the Lower Avon HRA Appropriate Assessment and the conclusions have been agreed with the regulators.

A4.2.1 Colliford WRZ

Option CS1/E: Colliford compensation flow

WRZ:	Colliford
Type of action:	Supply
Priority:	High
Trigger:	Colliford Reservoir storage approaching Level 4 trigger
Likely benefit:	5.7 Ml/d for up to 5 - 6 months
Time to implement:	4 weeks
Previous drought plan:	No
Summary of action:	Abstracting Colliford Reservoir compensation release at Restormel river intake when making supply releases.
Barriers:	None because required infrastructure and controls already in place
Environmental impacts:	<p>Activity has the potential to affect</p> <ul style="list-style-type: none"> • Water levels and flows • Habitat quality, connectivity, quantity • Water chemistry, dilution ability • Ecological quality and biodiversity through reduced downstream flow. <p>This would require appropriate monitoring/modelling to gauge impact, informing options appraisal and mitigation following established Environment Agency Drought Plan Environmental Assessment Guidelines (2020).</p> <p>When operating, this drought action would result in river flow between Colliford Reservoir and Restormel river intake being closer to natural (because the total reservoir release would be the supply release, not the supply release plus compensation release). However, river flow downstream of Restormel river intake would be lower due to having abstracted the compensation release. Hence any negative environmental impacts would be downstream of Restormel river intake.</p>

Option CS2/E: Park Lake

WRZ:	Colliford
Type of action:	Supply
Priority:	High
Trigger:	Colliford Reservoir storage approaching Level 4 trigger
Likely benefit:	4 MI/d for up to 6 months
Time to implement:	4 weeks
Previous drought plan:	2007
Summary of action:	Increase the daily abstraction limit at Park Lake from 8 MI/d to 12 MI/d
Barriers:	Additional pumps required to increase abstraction flow rate
Environmental impacts:	<p>Activity has the potential to affect</p> <ul style="list-style-type: none"> • Water levels and flows • Habitat quality, connectivity, quantity • Water chemistry, dilution ability • Ecological quality and biodiversity through increased abstraction, reduced storage, or reduced downstream flow. <p>This would require appropriate monitoring/modelling to gauge impact, informing options appraisal and mitigation following established Environment Agency Drought Plan Environmental Assessment Guidelines (2020).</p> <p>Development and construction will need to follow best practice and appropriate techniques including but not limited to <i>CIRIA</i>²² <i>C741 Environmental Good Practice on Site</i> and relevant policies and procedures e.g. CEMPs²³.</p>

²² Construction Industry Research and Information Association (CIRIA)

²³ Construction and Environmental Management Plan (CEMP). The purpose of a CEMP is to outline how a construction project will avoid, minimise or mitigate impacts to the environment.

Option CS3/E: Blackpool Pit

WRZ:	Colliford
Type of action:	Supply
Priority:	Low
Trigger:	Colliford Reservoir storage approaching Level 4 trigger
Likely benefit:	10 Ml/d for 3 months
Time to implement:	12 weeks
Previous drought plan:	No
Summary of action:	Transfer abstraction from Blackpool Pit to Restormel WTW
Barriers:	Currently no infrastructure is in place. Requires abstraction infrastructure and a temporary raw water pipeline. Permission from landowner is required to implement this option.
Environmental impacts:	<p>Within Cornwall AONB and Penwith Heritage Coast.</p> <p>Within Bostraze and Leswidden SSSI with two discrete parts approx 8 km west of Penzance supporting internationally rare liverwort - Western Rustwort (<i>Marsupella Profunda</i>). Lower Bostraze supports largest British population outside St Austell Clay pits and is the only surviving site in West Cornwall following extinction of other populations.</p> <p>Requires exposure of china clay to help colonisation with site abandonment leading to growth and out-competition of other vegetation. Specialist Bryophyte ecologist would be required. Does not appear to be impacted by hydrology. If this source is used, potential contributing mitigation to overall site management may be via vegetation management by SWW.</p> <p>Update on current status and condition would be required by Natural England.</p> <p>Activity has the potential to affect</p> <ul style="list-style-type: none"> • Water levels and flows • Habitat quality, connectivity, quantity • Water chemistry, dilution ability • Ecological quality and biodiversity through increased abstraction, reduced storage or altered flow regime. <p>This would require appropriate monitoring/modelling to gauge impact, informing options appraisal and mitigation following established Environment Agency Drought Plan Environmental Assessment Guidelines (2020).</p> <p>Development and construction will need to follow best practice and appropriate techniques including but not limited to <i>CIRIA</i>²⁴ <i>C741</i></p>

²⁴ *Ibid.* 20

	<p><i>Environmental Good Practice on Site</i> and relevant policies and procedures e.g. CEMPs²⁵.</p> <p>Requires investigation and assessment against Eel and Salmonids Regulations.</p> <p>Potential risk to INNS transfer within or across catchment will require investigation and/or options appraisal for mitigation.</p>
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²⁵ *Ibid.* 21

Option CS4/E: Crowdy Reservoir compensation flow

WRZ:	Colliford
Type of action:	Supply
Priority:	Low
Trigger:	Colliford Reservoir storage approaching Level 4 trigger
Likely benefit:	0.7 MI/d if 50% reduction in compensation flow
Time to implement:	4 weeks
Previous drought plan:	No
Summary of action:	Reduce Crowdy Reservoir compensation flow by up to 50%
Barriers:	None because required infrastructure and controls already in place
Environmental impacts:	<p>Activity has the potential to affect</p> <ul style="list-style-type: none"> • Water levels and flows • Habitat quality, connectivity, quantity • Water chemistry, dilution ability • Ecological quality and biodiversity through reduced downstream flow. <p>This would require appropriate monitoring/modelling to gauge impact informing options appraisal and mitigation following established Environment Agency Drought Plan Environmental Assessment Guidelines (2020).</p>

Option CS5/E: Drift Reservoir compensation flow

WRZ:	Colliford
Type of action:	Supply
Priority:	Low
Trigger:	Colliford Reservoir storage approaching Level 4 trigger
Likely benefit:	0.7 Ml/d if 50% reduction in compensation flow
Time to implement:	4 weeks
Previous drought plan:	No
Summary of action:	Reduce Drift Reservoir compensation flow by up to 50%
Barriers:	None because required infrastructure and controls already in place
Environmental impacts:	<p>Activity has the potential to affect</p> <ul style="list-style-type: none"> • Water levels and flows • Habitat quality, connectivity, quantity • Water chemistry, dilution ability • Ecological quality and biodiversity through reduced downstream flow. <p>This would require appropriate monitoring/modelling to gauge impact informing options appraisal and mitigation following established Environment Agency Drought Plan Environmental Assessment Guidelines (2020).</p>

Option CS6/E: Hawk's Tor Pit

WRZ:	Colliford
Type of action:	Supply
Priority:	Low
Trigger:	Colliford Reservoir storage approaching Level 4 trigger
Likely benefit:	6 MI/d for 6 months
Time to implement:	4-6 weeks
Previous drought plan:	2000, 2003, 2007
Summary of action:	Transfer 6 MI/d from Hawk's Tor Pit (former quarry) to Colliford Reservoir or local treatment works.
Barriers:	Currently limited infrastructure is in place. Permission from land owner is needed to implement this option. Potential environmental risks due to SSSI's. A potential geotechnical risk due to nature of the quarry.
Environmental impacts:	<p>Northern area of pit designated as a SSSI site due to Palynological (prehistoric pollen) dating back to 13,000 BP (Before Present).</p> <p>Potential risk to Colliford hatchery.</p> <p>Activity has the potential to affect</p> <ul style="list-style-type: none"> • Water levels and flows • Habitat quality, connectivity, quantity • Water chemistry, dilution ability • Ecological quality and biodiversity through increased abstraction, reduced storage or altered flow regime. <p>Requires investigation and assessment against Eel and Salmonids Regulations.</p> <p>Potential risk to INNS transfer within or across catchment will require investigation and/or options appraisal for mitigation.</p>

Option CS7/E: Leswidden Pool

WRZ:	Colliford
Type of action:	Supply
Priority:	Low
Trigger:	Colliford Reservoir storage approaching Level 4 trigger
Likely benefit:	3 MI/d for 6 months
Time to implement:	4 weeks
Previous drought plan:	2000, 2003, 2007
Summary of action:	Transfer 3 MI/d from Leswidden Pool (former quarry) to Drift Reservoir via Sancreed Stream.
Barriers:	Currently no infrastructure is in place. Permission from land owner is needed to implement this option.
Environmental impacts:	<p>Within Bostraze & Leswidden SSSI with 2 discrete parts approx. 8km west of Penzance supporting internationally rare liverwort - Western Rustwort (<i>Marsupella Profunda</i>). Lower Bostraze supports largest British population outside St Austell Clay pits and is only surviving site in W. Cornwall following extinction of other populations.</p> <p>Requires exposure of china clay to help colonisation with site abandonment leading to growth and out competitions of other vegetation. Specialist Bryophyte ecologist would be required but does not appear to be impacted by Hydrology. SWW potential contributing mitigation to overall site management via vegetation management tbc.</p> <p>Update on current status and condition would be required by relevant Natural England contact.</p> <p>Also, within Cornwall AONB and Penwith Heritage Coast.</p> <p>Activity has the potential to affect</p> <ul style="list-style-type: none"> • Water levels and flows • Habitat quality, connectivity, quantity • Water chemistry, dilution ability • Ecological quality and biodiversity through increased abstraction, reduced storage or altered flow regime. <p>This would require appropriate monitoring/modelling to gauge impact informing options appraisal and mitigation following established Environment Agency Drought Plan Environmental Assessment Guidelines (2020).</p> <p>Development and construction will need to follow best practice and appropriate techniques including but not limited to <i>CIRIA</i>²⁶ C741</p>

²⁶ *Ibid.* 20

	<p><i>Environmental Good Practice on Site</i> and relevant policies and procedures e.g. CEMPs²⁷.</p> <p>Requires investigation and assessment against Eel and Salmonids Regulations.</p> <p>Potential risk to INNS transfer within or across catchment will require investigation and/or options appraisal for mitigation.</p>
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²⁷ Ibid. 21

Option CS8/E: Porth Reservoir compensation flow

WRZ:	Colliford
Type of action:	Supply
Priority:	Low
Trigger:	Colliford Reservoir storage approaching Level 4 trigger
Likely benefit:	0.8 MI/d if 50% reduction in compensation flow
Time to implement:	4 weeks
Previous drought plan:	No
Summary of action:	Reduce Porth Reservoir compensation flow by up to 50%
Barriers:	None because required infrastructure and controls will have already been put in place for Level 3 Porth Reservoir and Rialton Intake Drought Permit (Option C3)
Environmental impacts:	<p>Activity has the potential to affect</p> <ul style="list-style-type: none"> • Water levels and flows • Habitat quality, connectivity, quantity • Water chemistry, dilution ability • Ecological quality and biodiversity through reduced downstream flow. <p>This would require appropriate monitoring/modelling to gauge impact, informing options appraisal and mitigation following established Environment Agency Drought Plan Environmental Assessment Guidelines (2020).</p>

Option CS9/E: River Fowey at Trekeivesteps

WRZ:	Colliford
Type of action:	Supply
Priority:	Low
Trigger:	Colliford Reservoir storage approaching Level 4 trigger
Likely benefit:	Up to 1 MI/d for 2 months
Time to implement:	4 weeks
Previous drought plan:	No
Summary of action:	Remove maintenance flow condition from Trekeivesteps licence. All other licence conditions still apply.
Barriers:	None because required infrastructure and controls already in place
Environmental impacts:	<p>This option is downstream of the Upper Fowey Valley SSSI and upstream of Draynes Wood SSSI and Golitha Falls National Nature Reserve (NNR).</p> <p>Activity has the potential to affect</p> <ul style="list-style-type: none"> • Water levels and flows • Habitat quality, connectivity, quantity • Water chemistry, dilution ability • Ecological quality and biodiversity through reduced downstream flow. <p>This would require appropriate monitoring/modelling to gauge impact, informing options appraisal and mitigation following established Environment Agency Drought Plan Environmental Assessment Guidelines (2020).</p>

Option CS10/E: River Hayle

WRZ:	Colliford
Type of action:	Supply
Priority:	Low
Trigger:	Colliford Reservoir storage approaching Level 4 trigger
Likely benefit:	Up to 2 MI/d for up to 5 - 6 months
Time to implement:	8 weeks
Previous drought plan:	2000, 2003
Summary of action:	Abstraction from River Hayle at existing, disused intake, treat abstracted water at temporary treatment works
Barriers:	Uncertainty regarding potential yield Refurbishment of disused intake required Temporary infrastructure required
Environmental impacts:	<p>Saline wedge affecting fish farms and causing fish mortality.</p> <p>Activity has the potential to affect</p> <ul style="list-style-type: none"> • Water levels and flows • Habitat quality, connectivity, quantity • Water chemistry, dilution ability • Ecological quality and biodiversity through reduced downstream flow. <p>This would require appropriate monitoring/modelling to gauge impact, informing options appraisal and mitigation following established Environment Agency Drought Plan Environmental Assessment Guidelines (2020).</p> <p>Development and construction will need to follow best practice and appropriate techniques including but not limited to <i>CIRIA</i>²⁸ <i>C741 Environmental Good Practice on Site</i> and relevant policies and procedures e.g. CEMPs²⁹.</p> <p>Disused intake will require investigation and assessment against Eel Regulations or risk to Salmonids to develop appropriate solution.</p> <p>Potential risk to INNS transfer within or across catchment will require investigation and/or options appraisal for mitigation.</p>

²⁸ *Ibid.* 20

²⁹ *Ibid.* 21

Option CS11/E: Siblyback Reservoir compensation flow

WRZ:	Colliford
Type of action:	Supply
Priority:	Low
Trigger:	Colliford Reservoir storage approaching Level 4 trigger
Likely benefit:	1.55 Ml/d if 50% reduction in compensation flow for 1 – 4 months in late summer to autumn
Time to implement:	4 weeks
Previous drought plan:	No
Summary of action:	Reduce Siblyback Reservoir compensation flow by up to 50%
Barriers:	None because required infrastructure and controls already in place
Environmental impacts:	<p>Activity has the potential to affect</p> <ul style="list-style-type: none"> • Water levels and flows • Habitat quality, connectivity, quantity • Water chemistry, dilution ability • Ecological quality and biodiversity through reduced downstream flow. <p>This would require appropriate monitoring/modelling to gauge impact, informing options appraisal and mitigation following established Environment Agency Drought Plan Environmental Assessment Guidelines (2020).</p>

Option CS12/E: Stithians Reservoir compensation flow

WRZ:	Colliford
Type of action:	Supply
Priority:	Low
Trigger:	Colliford Reservoir storage approaching Level 4 trigger
Likely benefit:	1.4 MI/d if 50% reduction in compensation flow for 1 – 4 months in late summer to autumn
Time to implement:	4 weeks
Previous drought plan:	No
Summary of action:	Reduce Stithians Reservoir compensation flow by up to 50%
Barriers:	None because required infrastructure and controls already in place
Environmental impacts:	<p>Activity has the potential to affect</p> <ul style="list-style-type: none"> • Water levels and flows • Habitat quality, connectivity, quantity • Water chemistry, dilution ability • Ecological quality and biodiversity through reduced downstream flow. <p>This would require appropriate monitoring/modelling to gauge impact, informing options appraisal and mitigation following established Environment Agency Drought Plan Environmental Assessment Guidelines (2020).</p>

Option CS13/E: Boswyn Stream, Cargenwyn Reservoir and Carwynnen Stream

Area of benefit:	Colliford WRZ
Type of action:	Supply
Priority:	High
Trigger:	Colliford Reservoir storage approaching Level 4 trigger
Likely benefit:	2 - 4 Ml/day for up to 6 months
Time to implement:	8 - 12 weeks
Previous drought plan:	Boswyn Stream: Yes Cargenwyn Reservoir: Yes Carwynnen Stream: Yes
Summary of action:	Abstraction from some or all of Boswyn Stream, Cargenwyn Reservoir and Carwynnen Stream to a temporary WTW via temporary pipelines.
Barriers:	Since there is no treatment infrastructure on site, pipelines, pumps and a temporary WTW need to be installed. Due to requiring a temporary pipeline, an agreement from landowners will be needed and any planning concerns addressed.
Environmental impacts:	<p>Activity has the potential to affect</p> <ul style="list-style-type: none"> • Water levels and flows • Habitat quality, connectivity, quantity • Water chemistry, dilution ability • Ecological quality and biodiversity through reduced downstream flow. <p>Cargenwyn is within Crowan Reservoir CWS. Carwynnen and Boswyn Stream have been identified as high priority for eels protection by the Environment Agency. Intakes will require investigation and assessment against Eel Regulations or risk to Salmonids to develop appropriate solution.</p> <p>This would require appropriate monitoring/modelling to gauge impact, informing options appraisal and mitigation following established Environment Agency Drought Plan Environmental Assessment Guidelines (2020). Site-specific characteristics and receptor sensitivities will determine scale and detail of monitoring required. Potential risk to INNS transfer within or across catchment will require investigation and/or options appraisal for mitigation.</p> <p>Development and construction will need to follow best practice and appropriate techniques including but not limited to <i>CIRIA³⁰ C741 Environmental Good Practice on Site</i> and relevant policies and procedures e.g. CEMPs³¹.</p>

³⁰ *Ibid.* 20

³¹ *Ibid.* 21

A4.2.2 Roadford WRZ

Option RS1/E: River Lyd (summer)

WRZ:	Roadford
Type of action:	Supply
Priority:	High
Trigger:	Roadford Reservoir storage approaching Level 4 trigger
Likely benefit:	Uncertain - up to 40 Ml/d can be transferred to Roadford Reservoir, but little water available in low flow periods
Time to implement:	4 weeks
Previous drought plan:	2000, 2003, 2007
Summary of action:	Abstract from the River Lyd and transfer into Roadford Reservoir during the summer months via existing pipeline, subject to a prescribed flow agreed with the Environment Agency
Barriers:	Local fishing stakeholders
Environmental impacts:	<p>Activity has the potential to affect</p> <ul style="list-style-type: none"> • Water levels and flows • Habitat quality, connectivity, quantity • Water chemistry, dilution ability • Ecological quality and biodiversity through reduced downstream flow. <p>This would require appropriate monitoring/modelling to gauge impact, informing options appraisal and mitigation following established Environment Agency Drought Plan Environmental Assessment Guidelines (2020).</p> <p>Development and construction will need to follow best practice and appropriate techniques including but not limited to <i>CIRIA³² C741 Environmental Good Practice on Site</i> and relevant policies and procedures e.g. CEMPs³³.</p> <p>Intake is Eel and Salmonid Regulations compliant.</p> <p>Potential risk to INNS transfers within or across catchment. Surveys have been undertaken at Roadford Reservoir and at Lyd Intake. Appropriate control and/or eradication would be undertaken as and when required. A cap has been put on the Roadford discharge point when not in use to stop signal crayfish movement. More information is provided in the EAR (APEM) and in the monitoring and mitigation plan (produced for the Level 1 River Lyd to Roadford Reservoir winter pumped storage (January to March) Drought Permit) (see Appendix 6).</p>

³² *Ibid.* 20

³³ *Ibid.* 21

Option RS2/E: Duckaller

WRZ:	Roadford
Type of action:	Supply
Priority:	Medium
Trigger:	Roadford Reservoir storage approaching Level 4 trigger
Likely benefit:	1 MI/d
Time to implement:	4 weeks
Previous drought plan:	No
Summary of action:	Change the licence at Duckaller to lower the groundwater level constraint
Barriers:	Potential derogation of third-party source
Environmental impacts:	<p>Activity has the potential to affect:</p> <ul style="list-style-type: none"> • Water levels and flows • Habitat quality, connectivity, quantity • Water chemistry, dilution ability • Ecological quality and biodiversity through lowered groundwater level. <p>This would require appropriate monitoring/modelling to gauge impact, informing options appraisal and mitigation following established Environment Agency Drought Plan Environmental Assessment Guidelines (2020).</p>

Option RS3/E: Metherall Quarry

WRZ:	Roadford
Type of action:	Supply
Priority:	Medium
Trigger:	Roadford Reservoir storage approaching Level 4 trigger
Likely benefit:	1 Ml/d for 1 month
Time to implement:	6 - 8 weeks
Previous drought plan:	2000, 2003
Summary of action:	Transfer water from Metherall Quarry into Fernworthy Reservoir
Barriers:	Temporary abstraction and transfer infrastructure would need to be installed Access difficult due to remote location
Environmental impacts:	<p>Activity has the potential to affect</p> <ul style="list-style-type: none"> • Water levels and flows • Habitat quality, connectivity, quantity • Water chemistry, dilution ability • Ecological quality and biodiversity through increased abstraction, reduced storage or altered flow regime. <p>This would require appropriate monitoring/modelling to gauge impact, informing options appraisal and mitigation following established Environment Agency Drought Plan Environmental Assessment Guidelines (2020).</p> <p>Development and construction will need to follow best practice and appropriate techniques including but not limited to <i>CIRIA³⁴ C741 Environmental Good Practice on Site</i> and relevant policies and procedures e.g. CEMPs³⁵.</p> <p>Requires investigation and assessment against Eel and Salmonids Regulations.</p> <p>Potential risk to INNS transfer within or across catchment will require investigation and/or options appraisal for mitigation.</p>

³⁴ *Ibid.* 20

³⁵ *Ibid.* 21

Option RS4/E: River Erme

WRZ:	Roadford
Type of action:	Supply
Priority:	Medium
Trigger:	Roadford Reservoir storage approaching Level 4 trigger
Likely benefit:	2 - 2.5 MI/d outside of driest period
Time to implement:	4 weeks
Previous drought plan:	No
Summary of action:	Remove the monthly licence limits and increase the annual licence limit. All other licence conditions still apply.
Barriers:	None because required infrastructure and controls already in place
Environmental impacts:	<p>Activity has the potential to affect</p> <ul style="list-style-type: none"> • Water levels and flows • Habitat quality, connectivity, quantity • Water chemistry, dilution ability • Ecological quality and biodiversity through reduced downstream flow. <p>This would require appropriate monitoring/modelling to gauge impact, informing options appraisal and mitigation following established Environment Agency Drought Plan Environmental Assessment Guidelines (2020).</p>

Option RS5/E: River Yealm

WRZ:	Roadford
Type of action:	Supply
Priority:	Medium
Trigger:	Roadford Reservoir storage approaching Level 4 trigger
Likely benefit:	1.5 - 2 MI/d outside of driest period
Time to implement:	4 weeks
Previous drought plan:	No
Summary of action:	Remove the monthly licence limits and increase the annual licence limit. All other licence conditions still apply.
Barriers:	None because required infrastructure and controls already in place
Environmental impacts:	<p>Activity has the potential to affect</p> <ul style="list-style-type: none"> • Water levels and flows • Habitat quality, connectivity, quantity • Water chemistry, dilution ability • Ecological quality and biodiversity through reduced downstream flow. <p>This would require appropriate monitoring/modelling to gauge impact, informing options appraisal and mitigation following established Environment Agency Drought Plan Environmental Assessment Guidelines (2020).</p>

Option RS6/E: Gammaton Reservoir

WRZ:	Roadford
Type of action:	Supply
Priority:	Low
Trigger:	Roadford Reservoir storage approaching Level 4 trigger
Likely benefit:	1 - 2 Ml/d for 2 - 4 months
Time to implement:	12 weeks
Previous drought plan:	No – it is a disused but licensed source
Summary of action:	<p>Install temporary water treatment plant, raw and treated water temporary pipelines to enable abstraction of water from reservoir, treatment and connection into the treated water network.</p> <p>Agree an appropriate compensation flow with the Environment Agency. This compensation flow will be made when abstracting and until the reservoir refills and spills after abstraction ceases.</p>
Barriers:	A temporary treatment works and temporary pipelines are needed to gain the benefits of this option
Environmental impacts:	<p>Gammaton Reservoirs are County Wildlife Sites. Taw-Torridge SSSI at tidal limit of the Horwood Stream.</p> <p>Activity has the potential to affect</p> <ul style="list-style-type: none"> • Water levels and flows • Habitat quality, connectivity, quantity • Water chemistry, dilution ability • Ecological quality and biodiversity through increased abstraction, reduced storage or reduced downstream flow. <p>This would require appropriate monitoring/modelling to gauge impact, informing options appraisal and mitigation following established Environment Agency Drought Plan Environmental Assessment Guidelines (2020).</p> <p>Development and construction will need to follow best practice and appropriate techniques including but not limited to <i>CIRIA³⁶ C741 Environmental Good Practice on Site</i> and relevant policies and procedures e.g. CEMPs³⁷.</p> <p>Existing, disused, draw-off infrastructure will require investigation and assessment against Eel Regulations or risk to Salmonids to develop appropriate solution.</p>

³⁶ *Ibid.* 20

³⁷ *Ibid.* 21

	Potential risk to INNS transfers within or across catchment will require investigation and/or options appraisal for mitigation.
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Option RS7/E: Meldon Pond

WRZ:	Roadford
Type of action:	Supply
Priority:	Low
Trigger:	Roadford Reservoir storage approaching Level 4 trigger
Likely benefit:	2 Ml/d for up to 3 months
Time to implement:	4 weeks
Previous drought plan:	No
Summary of action:	Transfer water from Meldon Pond into West Okement River to part replace compensation flow from Meldon Reservoir
Barriers:	Permission from land owners is needed to gain the benefit of this option. Temporary pumps and a raw water pipeline would be required.
Environmental impacts:	<p>Adjacent to Dartmoor National Park.</p> <p>Activity has the potential to affect</p> <ul style="list-style-type: none"> • Water levels and flows • Habitat quality, connectivity, quantity • Water chemistry, dilution ability • Ecological quality and biodiversity through reduced storage and/or reduced river flow between Meldon Reservoir and the temporary discharge point from Meldon Pond. <p>This would require appropriate monitoring/modelling to gauge impact, informing options appraisal and mitigation following established Environment Agency Drought Plan Environmental Assessment Guidelines (2020).</p> <p>Development and construction will need to follow best practice and appropriate techniques including but not limited to <i>CIRIA³⁸ C741 Environmental Good Practice on Site</i> and relevant policies and procedures e.g. CEMPs³⁹.</p> <p>Requires investigation and assessment against Eel and Salmonids Regulations.</p> <p>Potential risk to INNS transfer within or across catchment will require investigation and/or options appraisal for mitigation.</p>

³⁸ *Ibid.* 20

³⁹ *Ibid.* 21

Option RS8/E: Red Lake and Left lake

WRZ:	Roadford
Type of action:	Supply
Priority:	Low
Trigger:	Roadford Reservoir storage, time of year, current demand
Likely benefit:	2-3 MI/d for 2-3 months
Time to implement:	4-6 weeks
Previous drought plan:	2000, 2003, 2007
Summary of action:	Transfer from Red Lake and Left Lake into the River Erme for abstraction at Erme Intake
Barriers:	Temporary pumps and temporary raw water pipelines are required to enable abstraction
Environmental impacts:	<p>Activity has the potential to affect</p> <ul style="list-style-type: none"> • Water levels and flows • Habitat quality, connectivity, quantity • Water chemistry, dilution ability • Ecological quality and biodiversity through increased abstraction, reduced storage or altered flow regime. <p>This would require appropriate monitoring/modelling to gauge impact, informing options appraisal and mitigation following established Environment Agency Drought Plan Environmental Assessment Guidelines (2020).</p> <p>Development and construction will need to follow best practice and appropriate techniques including but not limited to <i>CIRIA⁴⁰ C741 Environmental Good Practice on Site</i> and relevant policies and procedures e.g. CEMPs⁴¹.</p> <p>Require investigation and assessment against Eel and Salmonids Regulations.</p> <p>Potential risk to INNS transfer within or across catchment will require investigation and/or options appraisal for mitigation.</p>

⁴⁰ *Ibid.* 20

⁴¹ *Ibid.* 21

Option RS9/E: River Thrushel

WRZ:	Roadford
Type of action:	Supply
Priority:	Low
Trigger:	Roadford Reservoir storage, time of year, current demand
Likely benefit:	Up to 20 Ml/d can be transferred to Roadford Reservoir, but little water available in low flow periods
Time to implement:	8 weeks
Previous drought plan:	2000, 2003, 2007
Summary of action:	Abstract from the River Thrushel and transfer into Roadford Reservoir via existing pipeline, subject to a prescribed flow agreed with the Environment Agency
Barriers:	Local fishing stakeholders Water quality may be an issue. Disused source: abstraction infrastructure will require refurbishment/ replacement
Environmental impacts:	<p>Activity has the potential to affect</p> <ul style="list-style-type: none"> • Water levels and flows • Habitat quality, connectivity, quantity • Water chemistry, dilution ability • Ecological quality and biodiversity through reduced downstream flow. <p>This would require appropriate monitoring/modelling to gauge impact, informing options appraisal and mitigation following established Environment Agency Drought Plan Environmental Assessment Guidelines (2020).</p> <p>Development and construction will need to follow best practice and appropriate techniques including but not limited to <i>CIRIA</i>⁴² <i>C741 Environmental Good Practice on Site</i> and relevant policies and procedures e.g. CEMPs⁴³.</p> <p>Existing (disused) intake will require investigation and assessment against Eel Regulations or risk to Salmonids to develop appropriate solution.</p> <p>Potential risk to INNS transfer within or across catchment will require investigation and/or options appraisal for mitigation. Process being developed as part of SWW INNS WINEP.</p>

⁴² *Ibid.* 20

⁴³ *Ibid.* 21

Option RS10/E: Avon Reservoir

WRZ:	Roadford
Type of action:	Supply
Priority:	Medium
Trigger:	Roadford Reservoir storage, time of year, current demand
Likely benefit:	2.95 Ml/d if 50% reduction in compensation flow
Time to implement:	4 weeks
Previous drought plan:	No
Summary of action:	Reduce Avon Reservoir compensation flow by up to 50% for 1 – 4 months in late summer to autumn
Barriers:	None because required infrastructure and controls already in place
Environmental impacts:	<p>Activity has the potential to affect</p> <ul style="list-style-type: none"> • Water levels and flows • Habitat quality, connectivity, quantity • Water chemistry, dilution ability • Ecological quality and biodiversity through reduced downstream flow. <p>This would require appropriate monitoring/modelling to gauge impact, informing options appraisal and mitigation following established Environment Agency Drought Plan Environmental Assessment Guidelines (2020).</p>

Option RS11/E: Burrator Reservoir

WRZ:	Roadford
Type of action:	Supply
Priority:	Medium
Trigger:	Roadford Reservoir storage, time of year, current demand
Likely benefit:	1.3 Ml/d if 50% reduction in compensation flow
Time to implement:	4 weeks
Previous drought plan:	No
Summary of action:	Reduce the compensation flow at Burrator Reservoir by up to 50% for 1 – 4 months in late summer to autumn
Barriers:	None because required infrastructure and controls already in place
Environmental impacts:	<p>Activity has the potential to affect</p> <ul style="list-style-type: none"> • Water levels and flows • Habitat quality, connectivity, quantity • Water chemistry, dilution ability • Ecological quality and biodiversity through reduced downstream flow. <p>This would require appropriate monitoring/modelling to gauge impact, informing options appraisal and mitigation following established Environment Agency Drought Plan Environmental Assessment Guidelines (2020).</p>

Option RS12/E: Fernworthy Reservoir

WRZ:	Roadford
Type of action:	Supply
Priority:	Medium
Trigger:	Roadford Reservoir storage, time of year, current demand
Likely benefit:	2.85 Ml/d if 50% reduction in compensation flow
Time to implement:	4 weeks
Previous drought plan:	No
Summary of action:	Reduce the compensation flow at Fernworthy Reservoir by up to 50% for 1 – 4 months in late summer to autumn
Barriers:	None because required infrastructure and controls already in place
Environmental impacts:	<p>Activity has the potential to affect</p> <ul style="list-style-type: none"> • Water levels and flows • Habitat quality, connectivity, quantity • Water chemistry, dilution ability • Ecological quality and biodiversity through reduced downstream flow. <p>This would require appropriate monitoring/modelling to gauge impact, informing options appraisal and mitigation following established Environment Agency Drought Plan Environmental Assessment Guidelines (2020).</p>

Option RS13/E: Trenchford Reservoir

WRZ:	Roadford
Type of action:	Supply
Priority:	Medium
Trigger:	Roadford Reservoir storage, time of year, current demand
Likely benefit:	1.08 Ml/d if 50% reduction in compensation flow
Time to implement:	4 weeks
Previous drought plan:	No
Summary of action:	Reduce the compensation at Trenchford Reservoir by up to 50% for 1 – 4 months in late summer to autumn
Barriers:	None because required infrastructure and controls already in place
Environmental impacts:	<p>Activity has the potential to affect</p> <ul style="list-style-type: none"> • Water levels and flows • Habitat quality, connectivity, quantity • Water chemistry, dilution ability • Ecological quality and biodiversity through reduced downstream flow. <p>This would require appropriate monitoring/modelling to gauge impact, informing options appraisal and mitigation following established Environment Agency Drought Plan Environmental Assessment Guidelines (2020).</p>

Option RS14/E: Meldon Reservoir

WRZ:	Roadford
Type of action:	Supply
Priority:	Medium
Trigger:	Roadford Reservoir storage, time of year, current demand
Likely benefit:	3.85 Ml/d if 50% reduction in compensation flow
Time to implement:	4 weeks
Previous drought plan:	No
Summary of action:	Reduce the compensation flow at Meldon Reservoir by up to 50% for 1 – 4 months in late summer to autumn
Barriers:	None because required infrastructure and controls already in place
Environmental impacts:	<p>Activity has the potential to affect</p> <ul style="list-style-type: none"> • Water levels and flows • Habitat quality, connectivity, quantity • Water chemistry, dilution ability • Ecological quality and biodiversity through reduced downstream flow. <p>This would require appropriate monitoring/modelling to gauge impact, informing options appraisal and mitigation following established Environment Agency Drought Plan Environmental Assessment Guidelines (2020).</p>

Option RS15/E: Roadford Reservoir compensation flow

WRZ:	Roadford
Type of action:	Supply
Priority:	Medium
Trigger:	Roadford Reservoir storage, time of year, current demand
Likely benefit:	9 Ml/d for up to 5 - 6 months
Time to implement:	4 weeks
Previous drought plan:	No
Summary of action:	Abstracting Roadford Reservoir compensation release at Gunnislake river intake when making supply releases.
Barriers:	None because required infrastructure and controls already in place
Environmental impacts:	<p>Activity has the potential to affect</p> <ul style="list-style-type: none"> • Water levels and flows • Habitat quality, connectivity, quantity • Water chemistry, dilution ability • Ecological quality and biodiversity through reduced river flow downstream of Gunnislake Intake. <p>This would require appropriate monitoring/modelling to gauge impact, informing options appraisal and mitigation following established Environment Agency Drought Plan Environmental Assessment Guidelines (2020).</p> <p>When operating, this drought action would result in river flow between Roadford Reservoir and Gunnislake river intake being closer to natural (because the total reservoir release would be the supply release, not the supply release plus compensation release). However, river flow downstream of Gunnislake river intake would be lower due to having abstracted the compensation release. Hence any negative environmental impacts would be downstream of Gunnislake river intake.</p>

Option RS16/E: Upper Tamar Lake

WRZ:	Roadford
Type of action:	Supply
Priority:	Medium
Trigger:	Roadford Reservoir storage, time of year, current demand
Likely benefit:	1.4 Ml/d if 50% reduction in compensation flow
Time to implement:	4 weeks
Previous drought plan:	No
Summary of action:	Reduce the compensation flow at Upper Tamar Lake by up to 50% for 1 – 4 months in late summer to autumn
Barriers:	None because required infrastructure and controls already in place
Environmental impacts:	<p>Activity has the potential to affect</p> <ul style="list-style-type: none"> • Water levels and flows • Habitat quality, connectivity, quantity • Water chemistry, dilution ability • Ecological quality and biodiversity through reduced downstream flow. <p>This would require appropriate monitoring/modelling to gauge impact, informing options appraisal and mitigation following established Environment Agency Drought Plan Environmental Assessment Guidelines (2020).</p>

Option RS17/E: Venford Reservoir

WRZ:	Roadford
Type of action:	Supply
Priority:	Medium
Trigger:	Roadford Reservoir storage, time of year, current demand
Likely benefit:	0.9 Ml/d if 50% reduction in compensation flow
Time to implement:	4 weeks
Previous drought plan:	No
Summary of action:	Reduce the compensation flow at Venford Reservoir by up to 50% for 1 – 4 months in late summer to autumn
Barriers:	None because required infrastructure and controls already in place
Environmental impacts:	<p>Activity has the potential to affect</p> <ul style="list-style-type: none"> • Water levels and flows • Habitat quality, connectivity, quantity • Water chemistry, dilution ability • Ecological quality and biodiversity through reduced downstream flow. <p>This would require appropriate monitoring/modelling to gauge impact, informing options appraisal and mitigation following established Environment Agency Drought Plan Environmental Assessment Guidelines (2020).</p>

Option RS18/E: River Lyd (Nov-Dec)

WRZ:	Roadford
Type of action:	Supply
Priority:	High
Trigger:	Roadford Reservoir storage approaching Level 4 trigger
Likely benefit:	Uncertain - up to 40 Ml/d can be transferred to Roadford Reservoir in November and December, but will be dependent on river flow conditions
Time to implement:	4 weeks
Previous drought plan:	2000, 2003, 2007
Summary of action:	Abstract from the River Lyd and transfer into Roadford Reservoir in November and December, extending the Level 1 Drought Permit (January to March) abstraction period. Using existing pipeline, subject to a prescribed flow agreed with the Environment Agency.
Barriers:	Local fishing stakeholders
Environmental impacts:	<p>Activity has the potential to affect</p> <ul style="list-style-type: none"> • Water levels and flows • Habitat quality, connectivity, quantity • Water chemistry, dilution ability • Ecological quality and biodiversity through reduced downstream flow. <p>This would require appropriate monitoring/modelling to gauge impact, informing options appraisal and mitigation following established Environment Agency Drought Plan Environmental Assessment Guidelines (2020).</p> <p>Development and construction will need to follow best practice and appropriate techniques including but not limited to <i>CIRIA⁴⁴ C741 Environmental Good Practice on Site</i> and relevant policies and procedures e.g. CEMPs⁴⁵.</p> <p>Intake is Eel and Salmonid Regulations compliant.</p> <p>Potential risk to INNS transfers within or across catchment. Surveys have been undertaken at Roadford Reservoir and at Lyd Intake. Appropriate control and/or eradication would be undertaken as and when required. A cap has been put on the Roadford discharge point when not in use to stop signal crayfish movement.</p> <p>More information on the environmental risks is provided in the EAR (APEM) and the monitoring and mitigation plan (produced for the Level 1 River Lyd to Roadford Reservoir winter pumped storage (January to March) Drought</p>

⁴⁴ *Ibid.* 20

⁴⁵ *Ibid.* 21

	Permit) (see Appendix 6). The EAR is currently being revised to also cover the November to March period.
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A4.2.3 Wimbleball WRZ

Option WS1/E: Otter Valley

WRZ:	Wimbleball
Type of action:	Supply
Priority:	High
Trigger:	Wimbleball Reservoir storage, time of year, current demand
Likely benefit:	2 MI/d
Time to implement:	4 weeks
Previous drought plan:	No
Summary of action:	Increase annual licence limit on Otter Valley groundwater licences to enable increased abstraction. All other licence conditions still apply.
Barriers:	None because required infrastructure and controls already in place
Environmental impacts:	<p>Activity has the potential to affect</p> <ul style="list-style-type: none"> • Water levels and flows • Habitat quality, connectivity, quantity • Water chemistry, dilution ability • Ecological quality and biodiversity through increased abstraction, lowered groundwater level and resultant reduced river flows. <p>This would require appropriate monitoring/modelling to gauge impact, informing options appraisal and mitigation following established Environment Agency Drought Plan Environmental Assessment Guidelines (2020).</p>

Option WS2/E: Greatwell stream support suspension

WRZ:	Wimbleball
Type of action:	Supply
Priority:	High
Trigger:	Wimbleball Reservoir storage, time of year, current demand
Likely benefit:	1.5 Ml/d for up to 4 months
Time to implement:	4 weeks
Previous drought plan:	No
Summary of action:	Suspend abstraction for stream support at Greatwell and abstract to supply instead.
Barriers:	None because required infrastructure and controls already in place
Environmental impacts:	<p>Stream support stopping will result in lower river flow downstream of the discharge point. Therefore, this option has the potential to affect</p> <ul style="list-style-type: none"> • Water levels and flows • Habitat quality, connectivity, quantity • Water chemistry, dilution ability • Ecological quality and biodiversity through increased abstraction, lowered groundwater level and resultant reduced river flows. <p>This would require appropriate monitoring/modelling to gauge potential impact, informing options appraisal and mitigation following established Environment Agency Drought Plan Environmental Assessment Guidelines (2020)</p>

Option WS3/E: Wimbleball Reservoir

WRZ:	Wimbleball
Type of action:	Supply
Priority:	High
Trigger:	Wimbleball Reservoir storage, time of year, current demand
Likely benefit:	15-20 Ml/d for 1 - 3 months
Time to implement:	4 weeks
Previous drought plan:	No
Summary of action:	Extension of winter pumped storage season beyond 31 March. All other licence conditions still apply.
Barriers:	None because required infrastructure and controls already in place
Environmental impacts:	<p>Activity has the potential to affect:</p> <ul style="list-style-type: none"> • Water levels and flows • Habitat quality, connectivity, quantity • Water chemistry, dilution ability • Ecological quality and biodiversity through reduced river flow downstream of abstraction point (Exebridge). <p>This would require appropriate monitoring/modelling to gauge impact, informing options appraisal and mitigation following established Environment Agency Drought Plan Environmental Assessment Guidelines (2020).</p>

Option WS4/E: Coleford borehole

WRZ:	Wimbleball
Type of action:	Supply
Priority:	Low
Trigger:	Wimbleball Reservoir storage, time of year, current demand
Likely benefit:	1.2 Ml/d for 3 to 6 months
Time to implement:	12 weeks
Previous drought plan:	2003, 2007, 2013, 2018
Summary of action:	Abstract from disused borehole, treat on site and input treated water into the local supply network
Barriers:	Requires a temporary borehole pump and refurbishing of the existing (disused) treatment works. Recommissioning of environmental monitoring network. Water quality needs to be tested before using this option.
Environmental impacts:	Activity has the potential to affect <ul style="list-style-type: none"> • Water levels and flows • Habitat quality, connectivity, quantity • Water chemistry, dilution ability • Ecological quality and biodiversity through increased abstraction, lowered groundwater level and resultant reduced river flows. <p>This would require appropriate monitoring/modelling to gauge impact, informing options appraisal and mitigation following established Environment Agency Drought Plan Environmental Assessment Guidelines (2020).</p> <p>Development and construction will need to follow best practice and appropriate techniques including but not limited to <i>CIRIA</i>⁴⁶ <i>C741 Environmental Good Practice on Site</i> and relevant policies and procedures e.g. CEMPs⁴⁷.</p>

⁴⁶ *Ibid.* 20

⁴⁷ *Ibid.* 21

Option WS5/E: Knowle borehole

WRZ:	Wimbleball
Type of action:	Supply
Priority:	Low
Trigger:	Wimbleball Reservoir storage, time of year, current demand
Likely benefit:	1.2 Ml/d for 3 to 6 months
Time to implement:	12 weeks
Previous drought plan:	2003, 2007, 2013, 2018
Summary of action:	Abstract from disused borehole, treat on site and input treated water into the local supply network
Barriers:	Requires a temporary borehole pump and refurbishing of the existing (disused) treatment works. Recommissioning of environmental monitoring network. Water quality needs to be tested before using this option.
Environmental impacts:	<p>Activity has the potential to affect</p> <ul style="list-style-type: none"> • Water levels and flows • Habitat quality, connectivity, quantity • Water chemistry, dilution ability • Ecological quality and biodiversity through increased abstraction, lowered groundwater level and resultant reduced river flows. <p>This would require appropriate monitoring/modelling to gauge impact, informing options appraisal and mitigation following established Environment Agency Drought Plan Environmental Assessment Guidelines (2020).</p> <p>Development and construction will need to follow best practice and appropriate techniques including but not limited to <i>CIRIA</i>⁴⁸ <i>C741 Environmental Good Practice on Site</i> and relevant policies and procedures e.g. CEMPs⁴⁹.</p>

⁴⁸ *Ibid.* 20

⁴⁹ *Ibid.* 21

Option WS6/E: River Exe at Bolham

WRZ:	Wimbleball
Type of action:	Supply
Priority:	Low
Trigger:	Wimbleball Reservoir storage, time of year, current demand
Likely benefit:	Uncertain. Potentially up to 109 Ml/d in total at Bolham and Northbridge intakes if prescribed flow is changed to Q95. However, no water likely to be available during drought periods. As flows start to recover after the driest period, some water likely to be available for abstraction.
Time to implement:	4 weeks
Previous drought plan:	No
Summary of action:	Reduction in prescribed flow condition on River Exe at Bolham licence
Barriers:	None because required infrastructure and controls already in place
Environmental impacts:	<p>Activity has the potential to affect:</p> <ul style="list-style-type: none"> • Water levels and flows • Habitat quality, connectivity, quantity • Water chemistry, dilution ability • Ecological quality and biodiversity through reduced downstream flow. <p>This would require appropriate monitoring/modelling to gauge impact, informing options appraisal and mitigation following established Environment Agency Drought Plan Environmental Assessment Guidelines (2020).</p>

Option WS7/E: River Exe at Northbridge

WRZ:	Wimbleball
Type of action:	Supply
Priority:	Low
Trigger:	Wimbleball Reservoir storage, time of year, current demand
Likely benefit:	Uncertain. Potentially up to 109 Ml/d in total at Bolham and Northbridge intakes if prescribed flow is changed to Q95. However, no water likely to be available during drought periods. As flows start to recover after the driest period, some water likely to be available for abstraction.
Time to implement:	4 weeks
Previous drought plan:	No
Summary of action:	Reduction in prescribed flow condition on River Exe at Northbridge licence
Barriers:	None because required infrastructure and controls already in place
Environmental impacts:	<p>Activity has the potential to affect:</p> <ul style="list-style-type: none"> • Water levels and flows • Habitat quality, connectivity, quantity • Water chemistry, dilution ability • Ecological quality and biodiversity through reduced downstream flow. <p>This would require appropriate monitoring/modelling to gauge impact, informing options appraisal and mitigation following established Environment Agency Drought Plan Environmental Assessment Guidelines (2020).</p>

Option WS8/E: Squabmoor Reservoir

WRZ:	Wimbleball
Type of action:	Supply
Priority:	Low
Trigger:	Wimbleball Reservoir storage, time of year, current demand
Likely benefit:	1 Ml/d for 1 - 3 months
Time to implement:	12 weeks
Previous drought plan:	No – Squabmoor Reservoir was a disused but licensed source, until 2019 when the licence was revoked
Summary of action:	Abstract from disused reservoir, treat on site and input treated water into the local supply network
Barriers:	Requires temporary abstraction infrastructure, temporary treatment works and temporary treated water pipeline Water quality needs to be tested before using this option
Environmental impacts:	<p>Activity has the potential to affect</p> <ul style="list-style-type: none"> • Water levels and flows • Habitat quality, connectivity, quantity • Water chemistry, dilution ability • Ecological quality and biodiversity through increased abstraction, reduced storage or altered flow regime. <p>This would require appropriate monitoring/modelling to gauge impact, informing options appraisal and mitigation following established Environment Agency Drought Plan Environmental Assessment Guidelines (2020).</p> <p>Development and construction will need to follow best practice and appropriate techniques including but not limited to <i>CIRIA⁵⁰ C741 Environmental Good Practice on Site</i> and relevant policies and procedures e.g. CEMPs⁵¹.</p> <p>Requires investigation and assessment against Eel and Salmonids Regulations.</p> <p>Potential risk to INNS transfer within or across catchment will require investigation and/or options appraisal for mitigation.</p>

⁵⁰ *Ibid.* 20

⁵¹ *Ibid.* 21

A4.2.4 Bournemouth WRZ

Option BS1/E: Ibsley Lake⁵²

WRZ:	Bournemouth
Type of action:	Supply
Priority:	Low
Trigger:	Depends on time of year and demand level
Likely benefit:	10 Ml/d for 6 weeks (estimated from testing in 2012)
Time to implement:	8 – 12 weeks
Previous drought plan:	No
Summary of action:	Transfer of water from Ibsley Lake into the Hampshire River Avon for abstraction at existing intake downstream
Barriers:	Requires abstraction infrastructure and temporary pipeline Stakeholder permission required to abstract from this source (previous stakeholder issues)
Environmental impacts:	<p>Activity has the potential to affect</p> <ul style="list-style-type: none"> • Water levels and flows • Habitat quality, connectivity, quantity • Water chemistry, dilution ability • Ecological quality and biodiversity through increased abstraction, reduced storage or altered flow regime. <p>This would require appropriate monitoring/modelling to gauge impact, informing options appraisal and mitigation following established Environment Agency Drought Plan Environmental Assessment Guidelines (2020).</p> <p>Development and construction will need to follow best practice and appropriate techniques including but not limited to <i>CIRIA</i>⁵³ <i>C741 Environmental Good Practice on Site</i> and relevant policies and procedures e.g. CEMPs⁵⁴.</p> <p>If the option were to be used, requires investigation and assessment against Eel and Salmonids Regulations, and Habitats and Species Regulations given the national and international designations of the lake (including being part of Avon Valley SSSI, SPA and Ramsar Site).</p>

⁵² We will not use this extreme drought action until we have completed the Lower Avon HRA Appropriate Assessment and the conclusions have been agreed with the regulators.

⁵³ *Ibid.* 20

⁵⁴ *Ibid.* 21

	Potential risk to INNS transfer within or across catchment will require investigation and/or options appraisal for mitigation.
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Option BS2/E: River Stour at Longham

WRZ:	Bournemouth
Type of action:	Supply
Priority:	High
Trigger:	Depends on time of year and demand level
Likely benefit:	20 MI/d for 1 – 3 months
Time to implement:	4 weeks
Previous drought plan:	No
Summary of action:	Suspension of low flow constraint on River Stour at Longham licence, allowing increased abstraction
Barriers:	None
Environmental impacts:	<p>Activity has the potential to affect:</p> <ul style="list-style-type: none"> • Water levels and flows • Habitat quality, connectivity, quantity • Water chemistry, dilution ability • Ecological quality and biodiversity through reduced downstream flow. <p>This would require appropriate monitoring/modelling to gauge impact, informing options appraisal and mitigation following established Environment Agency Drought Plan Environmental Assessment Guidelines (2020).</p> <p>Development and construction will need to follow best practice and appropriate techniques including but not limited to <i>CIRIA⁵⁵ C741 Environmental Good Practice on Site</i> and relevant policies and procedures e.g. CEMPs⁵⁶.</p>

⁵⁵ *Ibid.* 20

⁵⁶ *Ibid.* 21

Appendix 5: Communications plan

This Appendix contains examples of the type of communication we would use during a drought.

A5.1 Normal operation - Early awareness phase (example)

In 2018 we operated this phase of our communications plan due to the dry weather experienced. This included weekly outbound statements for the media. An example of the type of communication we would use in this phase of our communication plan is given below.

CUSTOMER DRY WEATHER MESSAGES

10 08 2018

Note: this weekly update will be issued proactively to SWW and BW media

Weekly dry weather update from South West Water: 10 August 2018

New figures released by South West Water show how demand for water skyrocketed in July, following a month of near record-breaking temperatures.

The company produced an extra 1,624 megalitres of water (1,624,000,000 litres – the equivalent of 650 Olympic-sized swimming pools) during the month compared to 2017.

Rob Scarrott, Head of Environment, said: "Demand for water during July peaked on Wednesday 25, when we produced 554 megalitres – compared to 486 megalitres on 25 July 2017.

"The biggest difference between July 2017 and 2018 was on 15 July, when we produced an extra 86 megalitres this year compared to last year, an increase of 21 per cent.

"We've been working hard behind the scenes during the recent prolonged period of hot and dry weather, staffing a number of our key treatment works 24 hours a day to meet the increased demand for water.

"We are also putting a lot of additional resource into detecting and repairing leaks, which have increased due to the hot, dry weather – as the ground dries and contracts it pulls pipes out of alignment.

"Overall reservoir storage is at a satisfactory level but we are still asking customers to use water wisely to help conserve supplies. The more water we all save now the more will be left for the rest of the summer."

The company is sharing its top tips for saving water in the garden and the home, which also saves money for customers on a meter:

In the garden:

- After the recent rainfall, the RHS advises that the best way to keep lawns looking healthy with more dry weather forecast is to keep it on the longer side if you do cut it and watch out for weeds appearing and taking over in bare patches
 - Use a watering can instead of a hose
 - If your garden needs watering, do so early morning or evening to reduce evaporation
 - Use a bucket and sponge instead of a hose to clean your car (or leave it for another week – it's only going to get dusty!)
 - Use any remaining water from your water butt first

In the home:

- Turn off the tap while brushing your teeth
- Keep a jug of water in the fridge so you don't have to run your tap cold
- Use a bowl for washing up / rinsing fruit and veg – then use this water for plants
- Have a shower instead of a bath

A5.2 Normal operation - Customer research

Prior to the media campaign we would test media messages. Below is an example of the customer research on media communications undertaken in 2020.

Figure A5.1: SWW water efficiency messaging - customer research

ICS

Which messages work best?

- Customers are drawn to **money saving tips** and messages
- Messages linked to **protecting the environment** resonated with some, particularly younger customers
 - Environmental messages need to clearly show how saving water helps protect the environment
- The 'Save 5 Litres A Day' campaign is generally supported as the preferred approach
 - People liked the challenge aspect of it
 - They considered that saving 5 litres a day was achievable **once they had been shown 5 litres in context of overall usage**
 - Customers want to see the message adjusted to show that it's save five litres **a day**, and to make it clear that it's about **saving water**

ICS

Save 5 Litres A Day

- Customers' favourite advert
- Messaging is relevant – "We can all do some of these"
- Positive response to facts and figures – link to water volumes and customer bills



"It makes you think. Next time there's a paddling pool in front of you, you think 'this uses loads of litres of water'."

Group 4, C2DE, 18-30, Female



"I would have read that if I saw it. If it was in a paper, I would definitely look at it."

Group 3, ABC1, 56+, Female



"It immediately grabs me. It's got pictures, it's to the point."

Group 2, C2DE, 31-55, Male



A5.3 Drought operation - Level 1 (media campaign)

Figure A5.2: Example stakeholder communication



West Country Water Resources

RHS / Georgi Mabete

West Country Water Resources is made up of four regional water companies and a range of supporting organisations in South West England. We are collaborating to produce a long-term, strategic plan for managing water resources, helping people save water and making sure there is enough for our local watercourses.

Our region

West Country Water Resources covers an area of South West England from Bristol to Wiltshire and down to Devon and Cornwall. Our region is home to more than 4.7 million people using 1,400 million litres of water every day. The water for drinking and use in our homes and gardens makes up 85% of this.

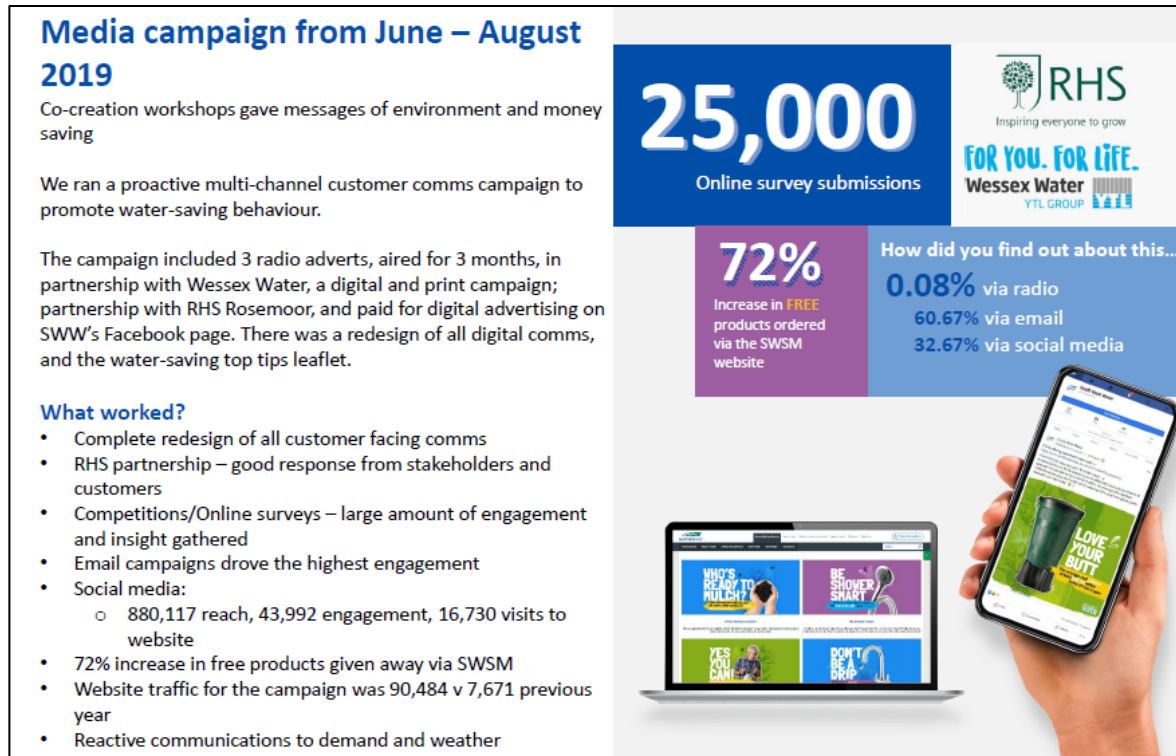
Challenges we face

- Population growth: between 2020 and 2050 population in the region is expected to grow by around 13%.
- Climate change: wetter winters and drier summers.
- Environmental needs: protecting and enhancing our natural environment and minimising the impact on it of the work we do.
- Resilience: planning to meet water needs in more extreme future droughts.

If you would like to be kept up to date with our work, feel that you can contribute, or would like to find out more, visit www.wcwr.org We'd love to hear from you.



Figure A5.3: Example media campaign analysis



Audience and key messages

Table A5.1: Key audiences and messages

Audience type	Audience	Key messages					Tailoring
		L0	L1	L2	L3	L4	
		(Normal)	(prolonged dry weather)		(Drought)	(Severe drought causing rota cuts)	
			(Weekly)	(Daily-weekly)	(Daily-weekly)	(Sub daily)	
Household customers	Household customers	Raise awareness of dry weather and request customers to use water wisely to conserve stocks	Provide information on the current and forecast resource position, what we are doing to manage resources and the importance of voluntarily conserving water to protect future supplies	Customers must act now to conserve water due to the severe dry weather Demand restrictions in place	The dry weather is exceptional requiring significant cuts in water consumption	Society-wide action needed to conserve water stocks Messaging would be developed as per the situation	By area from L1 if drought affecting specific locations
	Vulnerable customers		Specific messages for vulnerable customers	Specific messages for each customer type in Q&A	Specific messages for each customer type in Q&A	Specific messages for each customer	Yes
	Private water supplies		Q&A prepared	Q&A prepared	Q&A prepared	Messaging would be developed as per the situation	

Audience type	Audience	Key messages					Tailoring
		L0	L1	L2	L3	L4	
		(Normal)	(prolonged dry weather)		(Drought)	(Severe drought causing rota cuts)	
			(Weekly)	(Daily-weekly)	(Daily-weekly)	(Sub daily)	
Non-household customers	Retailers	As household	As household + agreed plan for non-household market segments	As household + agreed plan for non-household market segments	As household + tailored for market segments Standalone comms team to deal with queries and NEUB exceptions	Messaging would be developed as per the situation	Yes, from L1 start using market segmentation messages which will move to site specific arrangements into L3
	Non-households	As household	As above Market segmentation messages commence	As above Comms team in place to deal with queries	As above Comms team in place to deal with queries	As above	Yes, segmentation from L1
Customer bodies	Citizens Advice Bureaux	As household	As household + vulnerable customer approach	As household + vulnerable customer approach + non-household comms	As household + vulnerable customer approach + non-household comms	As above	Non-household comms included from L2 as restrictions begin to affect businesses

Audience type	Audience	Key messages					Tailoring
		L0	L1	L2	L3	L4	
		(Normal)	(prolonged dry weather)		(Drought)	(Severe drought causing rota cuts)	
			(Weekly)	(Daily-weekly)	(Daily-weekly)	(Sub daily)	
	Customer Challenge Group	Water Situation Report and media messages	As drought develops	Further briefing as drought develops	As household	As above	
Regulators	Environment Agency	Commence regular meetings	Weekly update	Weekly update	Daily update	As above	Yes, specific local technical updates
	Ofwat	As needed	Weekly update	Weekly update	Daily update	As above	Yes, as needed
	Defra	As needed	Weekly update	Weekly update	Daily update	As above	Yes, as needed
	Drinking Water Inspectorate	As needed	Weekly update	Weekly update	Daily update		Yes, if specific water quality issues
	Natural England	As needed	Weekly update	Weekly update	Daily update		
	Waterwise	As needed	Weekly update	Weekly update	Daily update		
	National Drought Group/ WaterUK	As needed	Weekly update or as needed	Weekly update or as needed	Daily update or as needed		Comms will adapt depending on information requested
Stakeholders	Devon and Cornwall Wildlife Trusts	As household	Weekly update	Weekly update	Weekly update		

Audience type	Audience	Key messages					Tailoring
		L0	L1	L2	L3	L4	
		(Normal)	(prolonged dry weather)		(Drought)	(Severe drought causing rota cuts)	
		(Weekly)	(Daily-weekly)	(Daily-weekly)	(Sub daily)		
	South West Lakes Trust	Existing weekly update in place with water situation reporting	Weekly update	Sub-weekly update	Daily update		
	WWF RSPB CPRE Angling Trust	As household	Weekly update	Weekly update	Weekly update		Will work with stakeholders from L1 to develop plan for outbound messaging using their channels
	Local fisheries bodies and groups	As household	Weekly update	Weekly update	Weekly update		Yes, depending on where conditions may affect local fisheries
	Canoe clubs	As household	Weekly update	Weekly update	Weekly update		Yes, depending on where conditions may affect local clubs

Audience type	Audience	Key messages					Tailoring
		L0	L1	L2	L3	L4	
		(Normal)	(prolonged dry weather)		(Drought)	(Severe drought causing rota cuts)	
			(Weekly)	(Daily-weekly)	(Daily-weekly)	(Sub daily)	
Stakeholders - MPs and local authorities	Councils and Parish Councils	As household	Weekly update +bespoke messaging as needed	Weekly to daily update +bespoke messaging as needed	Daily update +bespoke messaging as needed		
	MPs	As household	Weekly update + bespoke messaging as needed	Weekly to daily update + bespoke messaging as needed	Daily update + bespoke messaging as needed		
Public services	Fire Service Police services LRF	As household	Weekly update + bespoke messaging as needed (fire service updates started in 2018)	Weekly to daily update + bespoke messaging as needed	Daily update Information on exceptions for emergency services		Yes

Audience type	Audience	Key messages					Tailoring
		L0	L1	L2	L3	L4	
		(Normal)	(prolonged dry weather)		(Drought)	(Severe drought causing rota cuts)	
		(Weekly)	(Daily-weekly)	(Daily-weekly)	(Sub daily)		
	Health authorities	FAQs tailored information for health providers	Weekly update + bespoke messaging as needed	Weekly to daily update + bespoke messaging as needed	Daily update Information on site specific arrangements		Yes
Press and media	Newspapers TV Radio Online	Weekly update	Weekly update + media material	Daily to weekly update + briefings	Daily update + briefings		Yes, depending on area e.g. Devon or Cornwall BBC
Water companies	Wessex Water and Southern Water	See Section 5.25	See Section 5.25	See Section 5.25	See Section 5.25	See Section 5.25	
	Other water companies	See Section 5.23	See Section 5.23	See Section 5.23	See Section 5.23	See Section 5.23	
Waterways and navigation	Canal and Rivers Trust (formerly British Waterways) Other canal authorities	As needed (little canal network in our region)					

A5.4 Management structure

The detailed structure of the management groups is set out below.

A5.4.1 Normal operation - Water Resources Review Group

The Water Resources Review Group meetings are our normal operational management meetings for tracking our resource position.

The purpose of this group is to:

- Provide situation report on water resources for each operational area
- Ensure maintenance activity is planned and aligned with raw water availability risk
- Agree day to day water resource management actions
- Agree short term operating processes for local demands
- Tracking of investment for security of supply.

Membership and responsibilities of the Water Resources Review Group are listed in Table A5.2.

Table A5.2: Normal operation - management structure

Role	Responsibility
Water Resources Manager	Water situation reporting and operating strategy
Senior Water Resources specialist	Water resources modelling and forecasting
Resources and Production operational managers (all areas)	Management of day to day abstractions and WTW outputs needed
Strategic Networks manager	Strategic network operation

A5.4.2 Drought operation - Silver Drought Group

This Group will be implemented to deliver the company response as a Drought begins to escalate.

The key functions of the Silver Drought Group are to:

- Oversee the implementation of the Drought Plan
- Review strategy options, operating mode and oversee its implementation
- Co-ordinate operational and engineering activities
- Liaise with the Environment Agency and other interested parties
- Recommend strategic decisions to the Gold Drought Group when required
- Produce weekly situation reports and action tracking.

Membership and responsibilities of the Silver Drought Group are listed in Table A5.3. Specific roles will attend as required.

Table A5.3: Silver Drought Group - management structure

Role	Responsibility
Director of Drinking Water Services	Chair
Head of Water Resources	Overall situation report
Water Resources Manager*	Water resource situation reporting
Director/Head of Resources and Production	Water production management
Director/Head of Water Networks	Water network management
Head of Water Quality	Water quality issues and management
Head of Engineering Delivery	Engineering scheme delivery
Head of Customer Services	Customer Services
Head of Communications	Communications and media
Head of Drinking Water Asset Management	Water asset management scheme identification
Head of Wholesale Finance	Financial management
Senior Security and Resilience Advisor	Emergency planning and security, LRF liaison
Head of IT	IT management
Head of Legal	Legal management
Wholesale Service Desk	Non-household retailer engagement

*Link to the Water Resources Review Group

A5.4.3 Drought operation - Gold Drought Group

This Group will be activated to deliver the company response as a drought begins to escalate.

This Group is a Board level management group. The timings and frequency of the Group are given in Section 5.

The key functions of the Gold Drought Group are to:

- Hold overall accountability for the drought response
- Approve strategy for the drought response
- Make decisions on drought related policy issues e.g. TUBs
- Oversee communications and liaison with senior stakeholders
- Ensure departmental resources are made available for the drought response
- Liaise with the SWW Board on risks and actions to mitigate them.

Membership and responsibilities of the Gold Drought Group are listed in Table A5.4. Other specific roles will attend as required e.g. Health and Safety.

Table A5.4: Gold Drought Group - management structure

Role	Responsibility
CEO	Board liaison
Director of Drinking Water Services*	Chair
Head of Water Resources*	Water resource situation reporting
Director/Head of Resources and Production*	Water production management
Customer Services Director	Customer management
HR Director	Communications and HR management
Director of Wastewater Services	Wastewater management
Company Secretary	Legal management
Director/Head of Water Networks	Water network management
Regulation Director	Regulation management
Director of IT	IT management
Non-household retailer representative	Non-household retailer management

*Link to the Silver Drought Group.

A5.4.4 Drought operation - Platinum Drought Group

This group will operate under the most extreme droughts when the more severe restrictions to demand are needed.

The precise attendees of the group would be agreed for each event for the circumstances but the expected membership is listed in Table A5.5.

Table A5.5: Platinum Drought Group - management structure

Role	Responsibility
CEO*	Chair
Director of Drinking Water Services*	Water resource situation reporting
Customer Services Director*	Customer management
Company Secretary*	Legal management
CCW representative	Customer liaison
LRF attendance:	
Police	
Fire Service	
NHS	
Local authorities	
Environment Agency	
Electricity, Gas (WPD, Wales and West)	
Other as needed	

*Link to Gold Drought Group

A5.4.5 Drought operation - Communications Group

This Group will oversee the communications during a drought. The Group attendance is set out in Table A5.6.

Table A5.6: Communications Group - management structure

Role	Responsibility
Head of Corporate Communications	Chair
Head of Water Resources*	Water resource situation reporting
Head of Customer Call Centre	Customer management
Head of Legal*	Legal management
Digital Content and Communications specialist	Digital communications
Media and Campaigns Manager	Media management
Head of Public Affairs**	Public affairs management
Water Efficiency Manager	Water efficiency management

*Link to Silver Drought Group

**Provides MP liaison

A5.5 Standard Agenda

For Silver Drought Group and above we would look to adopt a standard agenda for the governance meetings. This would take the typical form as follows:

- Water Resource Situation Report (including regional update)
- Water quality update
- Supply-side actions progress
- Demand-side actions progress
- Household customer update
- Non-household customer update
- Communications update (detail in separate working group)
- LRF and Stakeholder update
- Legal update
- Escalations
- Action Log/Risk Log

If the drought was localised or had specific issues, we would adjust the agenda accordingly for any standard items.

A5.6 Document management

Documentation would be held on a company SharePoint site.

Appendix 6: Environment

A6.1 Maps of Designated Sites

Figure A6.1: Colliford WRZ Designated Sites

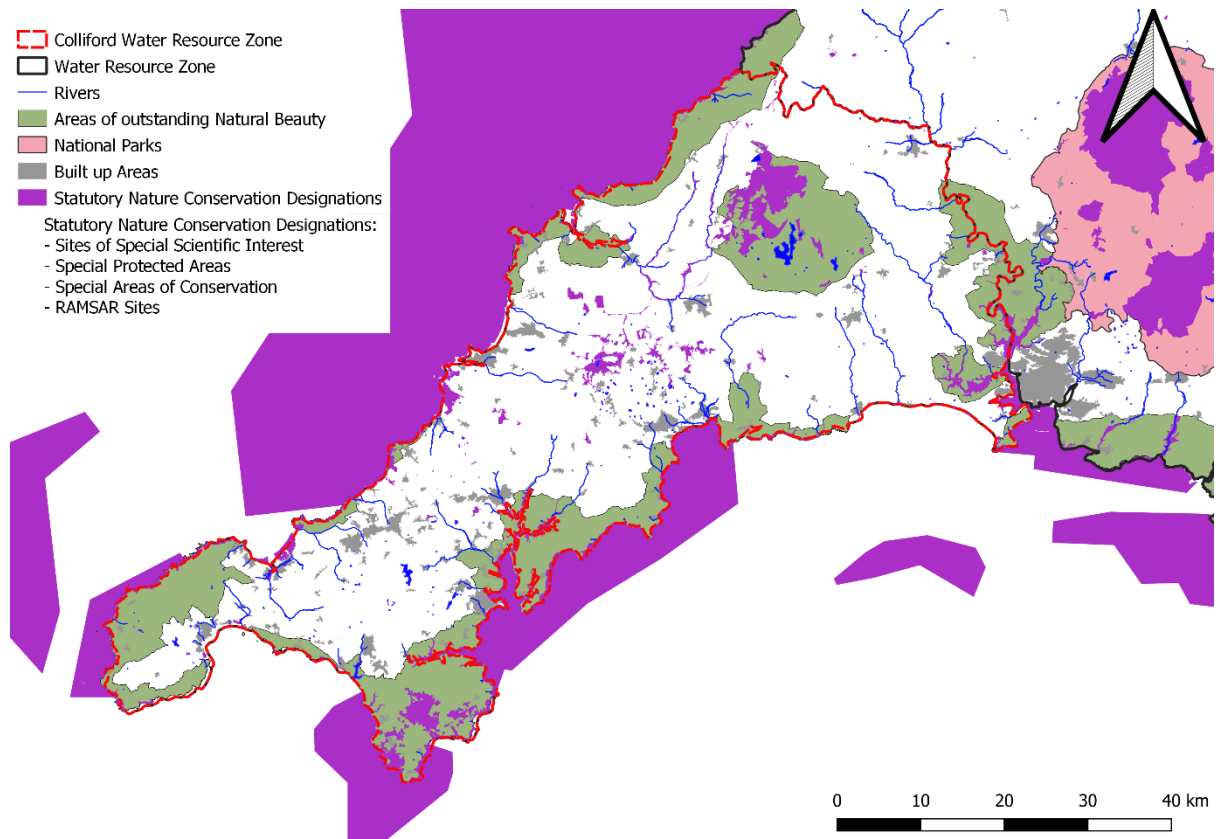


Figure A6.2: Roadford WRZ Designated Sites

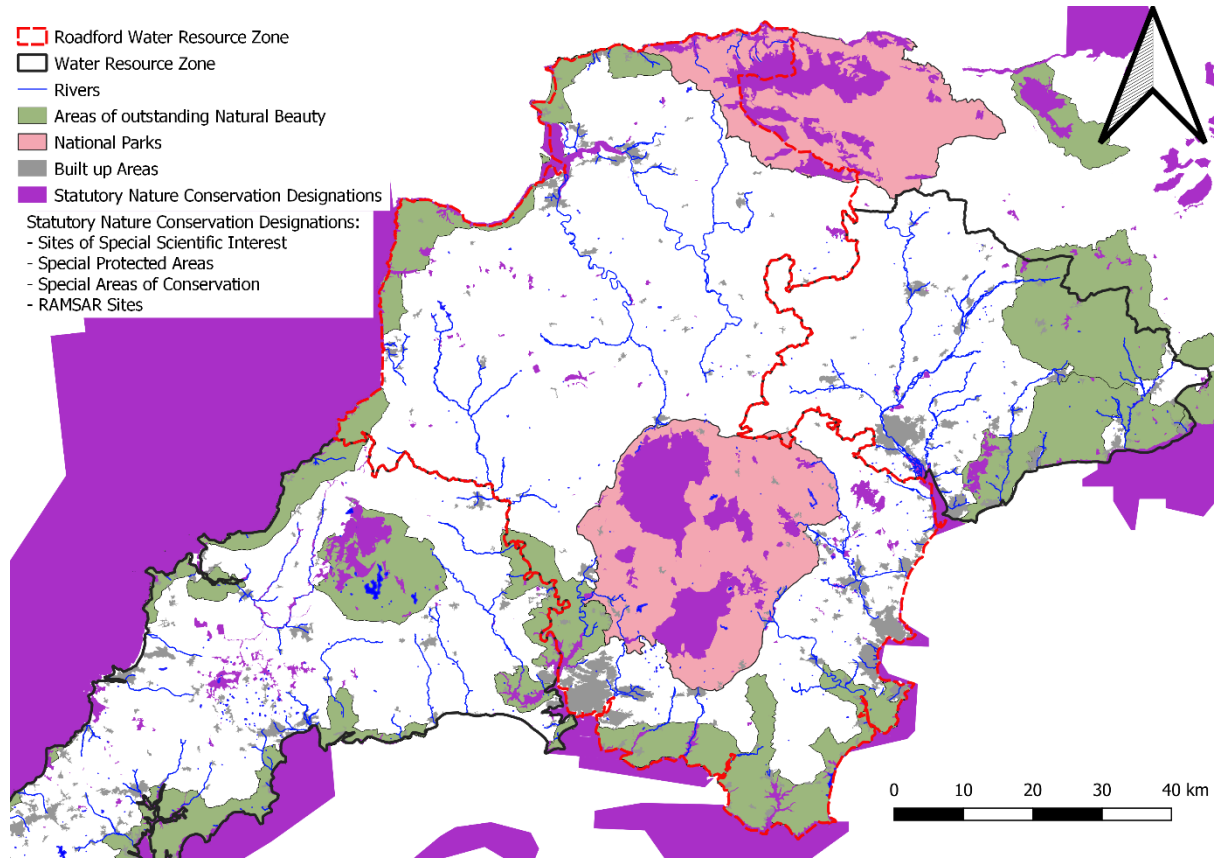


Figure A6.3: Wimbleball WRZ Designated Sites

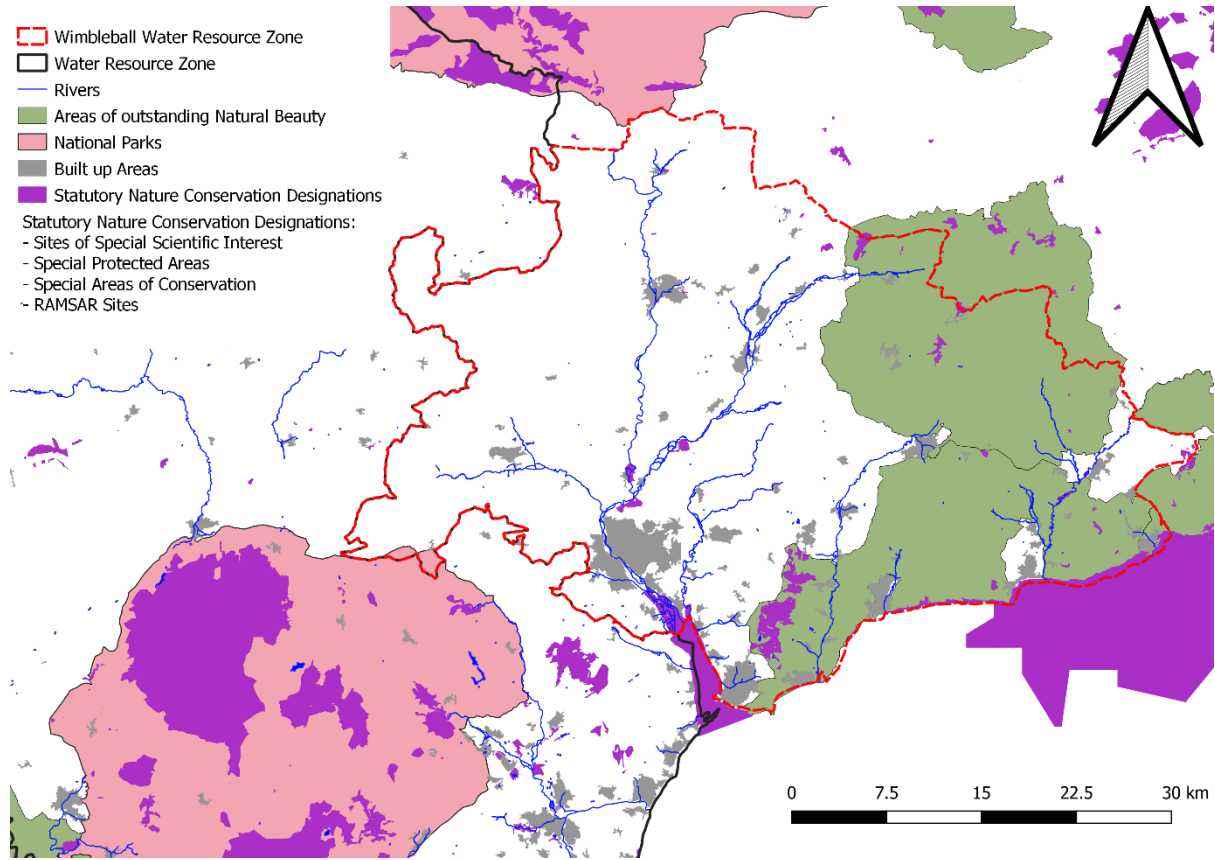
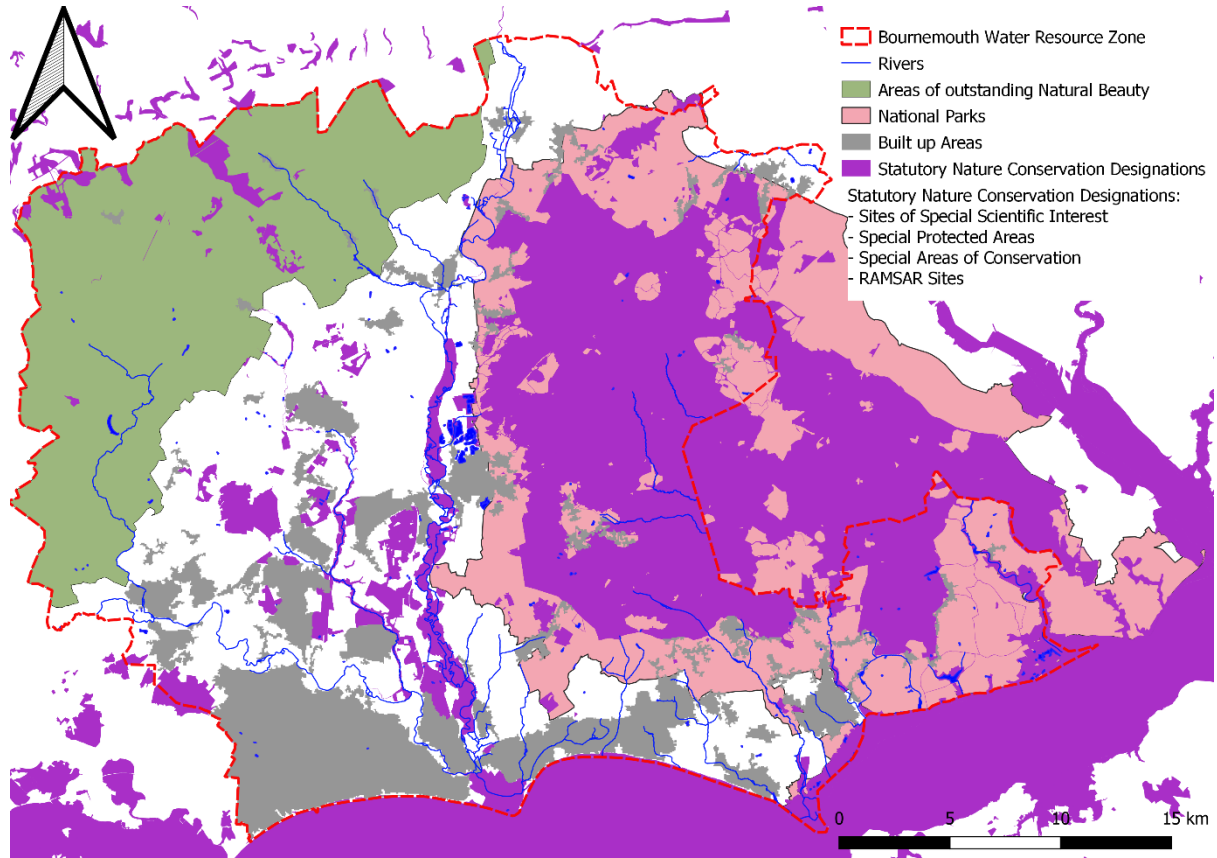


Figure A6.4: Bournemouth WRZ Designated Sites



A6.2 Assessment, Monitoring and Mitigation

A6.2.1 Introduction

The Environmental Assessment, Monitoring and Mitigation Plan (EAR/EMMP) accompanies SWW's Drought Plan providing a framework of activities to support the business's supply-side options.

SWW is responsible for understanding the environmental impacts of our Drought Plan and ensuring appropriate response to its utilisation. The EMMP will contribute to this and should be considered as a live document which is periodically reviewed to ensure it is current and fit for purpose.

It should also be noted that whilst SWW has 15 supply-side options proposed within the Drought Plan, all but a single option (the River Lyd to Roadford Reservoir winter pumped storage Level 1 (January to March) drought option) fall outside the 1 in 500 year drought event planning boundary and therefore a proportionate approach is required.

Following Environment Agency guidance *Environmental assessment for water company drought planning supplementary guidance (July 2020)* the following sections and tables outline SWW's approach to monitoring and mitigation.

A6.2.2 Monitoring and mitigation - general

A6.2.2.1 Monitoring

As per the above guidance the level of monitoring will be risk-based meaning certain sites or receptors may not require monitoring. Sensitive environmental receptors may include the following:

- Hydrology
- Geomorphology
- Water quality
- Macroinvertebrates
- Macrophytes
- Fish
- Terrestrial ecology including protected and priority species
- Invasive Non-Native Species (INNS).

Distinguishing the environmental impacts from the Drought Plan from "natural" drought driven environmental stress can be complex and relies on effective monitoring and collaboration with authorities.

A6.2.2.2 Mitigation

Table A6.1 lists mitigation actions that SWW may employ across our supply-side options during a drought event and post event to support mitigation of any resulting environmental impact.

It must be reiterated that Table A6.1 is intended to solely demonstrate the range of actions that *may* be employed as mitigation within a drought event. It is an awareness starting point for water resources and environmental practitioners to develop site specific measures which remain relevant as the drought progresses.

It should be recognised that certain actions will be more relevant and practical during the drought event (e.g. fish rescues) compared to post event (temporally). Post event mitigation may include further consideration and discussion with relevant stakeholders of more complex actions for potential medium-long term delivery. Similarly, mitigation actions will be relevant on a site by site basis (spatially) and dependent on the sensitivity of the receptor.

This will facilitate an adaptive “lessons learnt” approach as the business moves through and out of a drought event to increase future environmental resilience.

Table A6.1: Example mitigation actions and benefit for environmental receptors

Environmental receptor	Mitigation action	Example	Rationale and benefit
Hydrology	Increased reservoir releases	Compensation release Freshets	Subsequent benefits to other environmental receptors and system
	Reduced abstraction activity	River, reservoir, borehole	Subsequent benefits to other environmental receptors and system
Geomorphology and habitats	Riparian habitat restoration (planting, gravel augmentation, INNS control)	Gravel augmentation Tree and shrub planting INNS management River re-meandering Bank protection/reinforcement	Creates ecological habitat, refugia and feeding areas to improve local resilience
	In-channel habitat restoration	Gravel augmentation Woody debris installation INNS management Re-meandering Re-vegetation	Creates ecological habitat, refugia and feeding areas to improve local resilience
	Removal/easing of obstructions	Weir removal Weir notching Weir lowering Rock ramp construction	Assists with fisheries movement that may be made more difficult if flows are reduced

Environmental receptor	Mitigation action	Example	Rationale and benefit
		Fish pass maintenance	
	Cleaning of any spawning gravels		Restore silted/vegetated areas to improve spawning success and fish populations
	Offline habitat creation	Wetlands Floodplain scrapes	Creates ecological habitat, refugia and feeding areas to improve local resilience and improve connectivity
Water quality	Aeration		Maintains oxygenation levels benefitting ecology
	Effluent quality	WINEP programme	Reduced impact from chemical loading would mitigate potential impacts from reduced dilution ability arising from option use
	Catchment improvements	SWW Upstream Thinking	Reduced impact from chemical loading would mitigate potential impacts from reduced dilution ability arising from option use
Fisheries and ecology	Fish watching briefs		Periodic monitoring as pre-cursor to any future, escalated action
	Piscivorous bird deterrent		Prevent fish deaths in stressed populations
	Fish rescues		Prevent fish deaths in stressed populations
	Screen cleaning		Decrease screen blinding from spring/summer

Environmental receptor	Mitigation action	Example	Rationale and benefit
			vegetation growth ensuring efficient operation according to design perimeters
	Discussions with local stakeholders (Arundel Arms, TTFA) over temporary reduction/suspension to fishing activities	Local fishing businesses (e.g. Arundel Arms) Recreational groups (e.g. TTFA)	Reduce further stress to local fish populations
	INNS control/eradication and biosecurity activities	Targeted control activities where known and practical Check, Clean, Dry engagement and awareness	Manage invasive species which deteriorate environmental quality

A6.2.3 Drought Permits

The River Lyd to Roadford Reservoir Level 1 winter pumped storage (January to March) supply-side drought action requires a Drought Permit and is likely to be required in drought events with a 1 in 200 to 1 in 500 year return period. It therefore requires a comprehensive environmental assessment, monitoring and mitigation plan. Table A6.3 lists the monitoring plan for this drought action. Further information is available within the supporting Lyd EAR report (available on request).

We will liaise with the Environment Agency on a regular basis to ensure that we are aware of any Environment Agency plans to change their current monitoring programme. If any sites are to be removed from their programme, or frequency of monitoring reduced, SWW will amend our monitoring programme to collect this data.

A6.3 Summary environmental assessment and monitoring – Option R1

The full assessment is provided within the EAR report.

Table A6.2: Option R1 (River Lyd to Roadford Reservoir Level 1 winter pumped storage (January to March) Drought Permit) – Lyd impact assessment following conclusions of APEM (2021) Report

Receptor	Sensitivity (L, M, H, Not Sensitive, Uncertain)	Summary of likely impact (incl. if short, medium or long term)	Category of impact (Minor, Moderate, Major, Uncertain)	Confidence Level (L, M, H)
Designated features	L	Reduced water availability for any designated habitats and species Short-term	Minor	H
Habitats and geomorphology	L	Reduced water availability impacting natural processes (sediment erosion, transport and deposition) and therefore quantity and quality of habitats Short-term	Minor	M
Water quality	L	Reduced water flow downstream of intake reducing dilution ability Short-term	Minor	M
Hydrology (flows and levels)	L/M	Reduced water level and flow downstream of intake Short-term	Minor	M
Priority and protected species	L	Species directly/indirectly via above receptors Short-term	Minor	L* <i>*Based on records from multiple sources but deemed acceptable (APEM EAR)</i>
Ecology	L	Ecology directly/indirectly via above receptors Short-term	Minor	M
Salmonids and eels	H	Spawning and migration via above receptors Short-term	Minor	H
Invasive Non-Native Species (INNS)	H	Transport of any INNS present at intake into reservoir Short-term	Moderate	H
Other (economic, cultural, heritage)	L	Local fisheries groups (TTFA), businesses (Arundel Arms Hotel, Premier Foods Devon Creamery), from changes to flow	Minor	M

Table A6.3: Monitoring and mitigation for Option R1 River Lyd to Roadford Reservoir Level 1 winter pumped storage (January to March) Drought Permit

Potential mitigation options specific for the Lyd have been provided and further information is available in the EAR report.

Parameter / receptor	Location	By whom*	Brief scope	Baseline timing/frequency	During drought permit timing/frequency	Post drought permit timing/frequency	Notes	Mitigation
Habitat walkover	River reach between Lyd Intake and Tamar confluence	SWW	Walkover of the whole reach where access permits, following the method outlined in Hendry and Cragg-Hine (1997)	Once during low flow conditions (complete). A pre-implementation baseline walkover, as close to Drought Permit implementation as possible, is also recommended in order to establish baseline conditions	Fortnightly	-	Baseline surveys completed in summer 2019 Include assessment of evidence of salmon spawning	Habitat restoration measures such as refugia building, riparian heterogeneity improvements to provide ecological habitats/niches in low flows
Geomorphological walkover	River reach between Lyd Intake and Tamar confluence	SWW	Walkover of the whole reach where access permits to characterise the baseline geomorphological functioning of the potentially affected reaches	Once during low flow conditions	-	-	Baseline surveys completed in summer 2019	See above Gravel augmentation
River bathymetric surveys	River Lyd (downstream of abstraction)	SWW	Bathymetric survey to inform 2D hydraulic modelling at two representative reaches	Once during low flow conditions	-	-	Baseline surveys completed in summer 2019	-

Parameter / receptor	Location	By whom*	Brief scope	Baseline timing/frequency	During drought permit timing/frequency	Post drought permit timing/frequency	Notes	Mitigation
	River Lyd (downstream of River Thrushel confluence)							
Fish	River Lyd (downstream of abstraction) River Lyd (upstream of abstraction)	SWW	Semi-quantitative surveys	Optional, only as required to maintain existing Environment Agency baseline dataset	Same as baseline	Same as baseline	Baseline surveys undertaken by Environment Agency during summer 2019 Include assessment of evidence of salmon spawning	A 2mm screen has been installed Fish watching brief with escalated actions where necessary such as fish rescue and relocation completed within seasonal constraints Engage local stakeholders (TTFA, Arundel Arms) to ensure local environmental, commercial and recreational concerns are accounted for and inform subsequent actions
Macroinvertebrates	Upstream Ambrosia Creamery	SWW/EA	Sampling at all sites. Samples analysed to species level. Measurement of	Three times a year (spring/summer/autumn)	Same as baseline	Same as baseline	Baseline surveys completed in 2019	Habitat restoration measures such as refugia building, riparian heterogeneity improvements to provide

Parameter / receptor	Location	By whom*	Brief scope	Baseline timing/frequency	During drought permit timing/frequency	Post drought permit timing/frequency	Notes	Mitigation
	Lifton Bridge Greenlanes Bridge Spry Farm		physio-chemical variables (average water depth, average wetted width, substratum composition and electrical conductivity) at all sites and on all occasions					ecological habitats/niches in low flows
Phytobenthos	Upstream Ambrosia Creamery Downstream Ambrosia Creamery Lifton Bridge Greenlanes Bridge Spry Farm	SWW/EA	Surveys to follow Environment Agency sampling methodology for WFD	Spring/autumn only, as required to maintain baseline dataset	Same as baseline	Same as baseline	Baseline surveys completed in 2019	-

Parameter / receptor	Location	By whom*	Brief scope	Baseline timing/frequency	During drought permit timing/frequency	Post drought permit timing/frequency	Notes	Mitigation
INNS (invertebrate surveys)	Invertebrate surveys along a 200m reach at each macro invertebrate location.	SWW	Targeted INNS surveys	Summer, as required to maintain baseline dataset	Same as baseline	Same as baseline	Baseline surveys completed in summer 2019	Roadford discharge point capped when not operational INNS control activities
INNS (plant survey)	Plant surveys along a 1.5km reach at abstraction point and targeted locations adjacent to known settlements	SWW	Targeted INNS survey	Spring/summer to maintain baseline dataset	Same as baseline	Same as baseline	Baseline surveys completed in summer 2019	INNS control activities
River flows	Lifton Park	EA	Existing Environment Agency location	Continuous	Continuous	Continuous	-	-
Water quality: dissolved oxygen, pH, temperature, conductivity, suspended solids, orthophosphate, alkalinity and ammoniacal	From the following: Greenlanes Bridge River Lew	SWW	SWW will consider appropriate locations and frequencies for water quality monitoring based on previously utilised locations.	Tbc with EA	Tbc with EA	Tbc with EA	-	Progress Lyd catchment within UST programme

Parameter / receptor	Location	By whom*	Brief scope	Baseline timing/frequency	During drought permit timing/frequency	Post drought permit timing/frequency	Notes	Mitigation
nitrogen, nitrate/nitrite	Quither Brook Upstream Ambrosia Creamery cooling River Lyd at southern bridge Lifton Bridge							

* SWW will contact the Environment Agency and Natural England on an annual basis to discuss their routine monitoring programme and to ensure our approaches benefit from most recent data. If any monitoring sites are to be removed from their programme, or frequency of monitoring reduced, SWW will amend our monitoring programme to collect this data.

A6.4 Other options

The other supply-side options fall outside/beyond the in 1 in 500 year drought planning boundary and are therefore only utilised in extreme drought. A large number are also subject to current and ongoing WINEP investigations which will provide further supporting detail. A level of detail proportionate to the risk level and likelihood of use has therefore been provided for each option within Appendix 3.

A6.5 Data exchange

With regards to baseline, in-drought and post-drought monitoring data, we will ensure data exchange with relevant authorities (including Environment Agency and Natural England). This will identify agreed monitoring sites for the supply-side drought actions and relevant receptors and take the appropriate form (e.g. spreadsheet, Word document, shapefile, etc.). Data should be exchanged electronically and subject to appropriate quality assurance checks.

Outside of drought events, we will ensure that monitoring data relevant to the Plan will be shared with the relevant authorities (including Environment Agency and Natural England) on a regular basis.

Appendix 7: Glossary

AA	Appropriate Assessment
AMP	Asset Management Plan (five-year planning period, AMP7 = 2020 to 2025)
AONB	Area of Outstanding Natural Beauty
BS&SC	Bramford Speke and Stoke Canon boreholes
BW	Bournemouth Water
CAMS	Catchment Abstraction Management Strategy
CCWater	Consumer Council for Water
CEH	Centre for Ecology and Hydrology
CEMP	Construction and Environmental Management Plan
CEO	Chief Executive Officer
CIRIA	Construction Industry Research and Information Association
CPRE	The Countryside Charity (Campaign to Protect Rural England)
cSAC	candidate Special Area of Conservation
CWS	County Wildlife Site
Defra	Department of Environment, Food and Rural Affairs
DMF	Daily Mean Flow
DO	Drought Order
DP	Drought Permit
DWI	Drinking Water Inspectorate
EA	Environment Agency
EAR	Environmental Assessment Report
EMMP	Environmental Monitoring and Mitigation Plan
ESOR	Exceptional Shortage of Rainfall
EVA	Extreme Value Analysis
FAQ	Frequently Asked Questions
HRA	Habitats Regulation Assessment
INNS	Invasive Non-Native Species

KTT	Kennick, Tottiford and Trenchford reservoirs
l/d	Litres per day
LNR	Local Nature Reserve
LRF	Local Resilience Forum
LSE	Likely Significant Effects
LTA	Long-Term Average
MI/d	Megalitres per day (1,000,000 litres per day)
MP	Member of Parliament
NAV	New Appointment and Variations
NNR	National nature reserve
NEUB	Non-Essential Use Ban
NFU	National Farmers' Union
NRFA	National River Flow Archive
Ofwat	Water Services Regulation Authority (formerly the Office of Water Services)
PD	Plausible Drought scenario
PS	Pumped Storage
pSPA	potential Special Protection Area
pRamsar	proposed Ramsar site
Q&A	Questions and Answers
Q95	Flow statistic: the flow which was equalled or exceeded for 95% of the flow record
RHS	Royal Horticultural Society
RSPB	Royal Society for the Protection of Birds
SAC	Special Area of Conservation
SEA	Strategic Environmental Assessment
SMD	Soil Moisture Deficit
SME	Small and Medium Enterprises
SPA	Special Protection Area
SPI	Standardised Precipitation Index

SSSI	Site of Special Scientific Interest
SWW	South West Water
TTFA	Tamar Tributaries Fishing Association
TUB	Temporary Use Ban
UKWIR	UK Water Industry Research
UST	Upstream Thinking (SWW catchment water quality improvement programme)
WAFU	Water Available for Use
WCWRG	West Country Water Resources Group
WFD	Water Framework Directive
WINEP	Water Industry National Environment Programme
WMO	World Meteorological Organisation
WPD	Western Power Distribution
WRA	Water Resources Act
WRMP	Water Resources Management Plan
WRRG	Water Resources Review Group
WRZ	Water Resource Zone
WTW	Water Treatment Works
WWF	World Wide Fund for Nature