Drought Plan 2022
Main report

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from Southern Water

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Abbreviations

ADO	Average Deployable Output
ADPW	Average Day Peak Week
AFW	Affinity Water
BAU	Business-as-usual
CDW	Cholderton and District Water
CSMG	Common Standards Monitoring Guidance
Defra	Department for Environment and Rural Affairs

DI	Distribution Input
DO	Deployable Output
EA	Environment Agency
EAR	Environmental Assessment Report
EFI	Environmental Flow Indicator
EMP	Environmental Monitoring Plan
ESoR	Exceptional Shortage of Rainfall
HoF	Hands-off flow
HAZ	Hampshire Andover
HKZ	Hampshire Kingsclere
HRA	Habitats Regulations Assessment
HRZ	Hampshire Rural
HSE	Hampshire Southampton East
HSW	Hampshire Southampton West
HWZ	Hampshire Winchester
INNS	Invasive Non-Native Species
IOW	Isle of Wight
IROPI	Imperative Reason of Overriding Public Interest
KME	Kent Medway East
KMW	Kent Medway West
KTZ	Kent Thanet
LoS	Level of Service
MDO	Minimum Deployable Output
Ml/d	Megalitres per day (one megalitre is one million litres)
MRF	Minimum Residual Flow
NE	Natural England
NEUB	Non-Essential Use Ban
OBH	Observation Borehole
Ofwat	Water Services Regulation Authority
PDO	Peak Deployable Output
PET	Potential Evapotranspiration
PRT	Portsmouth Water
RSA	Restoring Sustainable Abstraction
RSPB	Royal Society for the Protection of Birds
SBZ	Sussex Brighton
SEA	Strategic Environmental Assessment
SES	SES Water
SEW	South East Water
SGI	Standardised Groundwater Index
SHZ	Sussex Hastings
SNZ	Sussex North
SoR	Statement of Response
SPA	Special Protection Area
SPEI	Standard Precipitation and Evapotranspiration Index
SPI	Standard Precipitation Index
SSSI	Site of Special Scientific Interest
SWS	Southern Water
SWW	South West Water
SWZ	Sussex Worthing
TTF	Test Total Flow
TUB	Temporary Use Ban

TWUL	Thames Water
WFD	Water Framework Directive
WINEP	Water Industry National Environment Programme
WRMP	Water Resources Management Plan
WRSE	Water Resources South East
WRZ	Water Resource Zone
WSW	Water Supply Works
WSX	Wessex Water

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[1] To arrange to view a paper copy of this document at our head office, please contact WRMP@southernwater.co.uk

Executive summary

This is Southern Water's 2022 Drought Plan to cover the period 2022 to 2027. It has been developed in compliance with sections 39B and 39C of the Water Industry Act 1991 and follows the Water Company Drought Plan Guideline issued by the Environment Agency in December 2020. This plan describes the position as it was on consultation in 2021 and is complementary to our current Water Resource Management Plan 2019 (WRMP19). Since our consultation, we have had to make a number of changes to the plan in response to regulatory feedback and we have re-submitted our draft plan to regulators in May 2022, September 2022 and February 2024. Following a letter received from Defra on 21 August 2024 we have made further changes to our draft plan and resubmitted it in January 2025. The most significant changes relate to the:

- River Test Drought Permit HRA – we have made changes to this report as well as to Annex 8 Habitats Regulation Assessment (HRA). These changes reflect the fact that, since the River Test Drought Permit HRA was produced in July 2024, a decision has been made to progress the HRA to stage 3 and, stage 4. For example, table 4-6 in this report shows an indicative timeline of the steps required to complete this HRA process.
- River Itchen drought triggers – we have made changes to this report and annex 4 to make the documents clearer and more consistent in how they describe drought triggers. For example, to make graphs showing the drought triggers easier to interpret, we include the current triggers but have removed the drought triggers from the 2019 drought plan. In addition, we have submitted a working draft note on drought triggers to regulators that contains an indicative timeline of future modelling work that will be carried out in conjunction with Portsmouth Water prior to the publication of the next steps of drought plans (expected by 2027). We commit to report progress on our joint programme with Portsmouth Water regarding the Portsmouth Water Lower Itchen abstraction licence drought order through the annual review process.
- Candover drought option – although this topic was not mentioned in the August 2024 letter from Defra, this topic arose during the ongoing discussions we have had with regulators. We have added section 3.3.8 to this report and mention this topic briefly in Annex 8 HRA non-technical summary. As described in section 3.3.8, we now do not anticipate this option being available until 2027 but, as that is within the time period covered by this plan, it appropriate to retain the Candover drought option within this plan.

In addition, we have made some edits to this plan and associated annexes in response to the directions from the Secretary of State set out in the letter that we received from Defra on 9 July 2025. For the rest of the plan, we have retained the text as it was in the plan we consulted on.

In developing this plan, we have sought views from the regulators, our neighbouring water companies and large users of water in our supply area. We have used insight and feedback from the customer and stakeholder engagement work that we carried out through our public consultation on this plan as well as building on previous work from developing our 2019 Drought Plan, 2019 Water Resources Management Plan and the PR19 Business Plan. All this work is described in detail in Annex 1.

As a drought develops, we will take steps to manage the impacts. These include measures to reduce demand as well as measures to increase supply.

The demand-side measures include promoting water efficiency to reduce the amount of water used by our customers and reducing leakage from our distribution system. We already have an industry leading water efficiency initiative – the Target 100 programme – whereby we are looking to reduce average per capita consumption of our domestic customers to 100 litres per person per day by 2040. At the same time, we are

also aiming to reduce our leakage by 50% by 2050. During droughts, we will look to make further savings but in the case of more severe and/or prolonged events, we may have to impose restrictions on our customers' water use.

On the supply-side, we would initially look to optimise the operation of our sources. This includes bringing unused sources back into supply, reducing outage and operating our sources in a way that maximises their output. This may mean resting some of our sources in the initial phases of a drought so they can be used later when other sources may no longer be available. As the drought progresses, we may need to apply for drought permits/orders that temporarily allow us to take more water from aquifers and rivers than we would normally be entitled to, subject to certain conditions.

The range of demand- and supply-side options available to us in the event of drought is covered in Annex 2.

As a result of the agreement, we signed with the Environment Agency under Section 20 of the Water Resources Act 1991, the amount of water we can take from the rivers Test and Itchen in our Western area during periods of low flow is severely reduced. None of the updates to this plan affect our continuing commitment to comply with this agreement. We are currently implementing a long-term solution to make up for the lost supplies from the two rivers. However, until the solution is implemented, we will need to apply for drought permits/orders more often in the Western area to meet our statutory obligations to our customers, than would otherwise be the case. For some drought options, the adverse impacts on the environment may be unavoidable. We will need to make a case of Imperative Reasons of Overriding Public Interest before we can exercise these options. This is described in Annex 3.

The nature and timing of both the demand-side and supply-side measures we will take will depend on the duration and severity of the drought. At the company level, most of our supplies come from groundwater with smaller contributions from rivers and reservoirs. However, the picture varies across our supply area and river abstractions and/or reservoirs are the principal sources of supply in some of our water resource zones (Section 1). As groundwater, rivers and reservoirs respond differently to shortages of rainfall that define a drought, the vulnerability of our water resource zones to drought varies with their relative dependence on the three principal source types. Groundwater dominated water resource zones are typically more resilient to droughts than those principally reliant on river flows for their supplies.

We have defined a range of triggers based on rainfall and evapotranspiration, groundwater levels in selected observation boreholes, river flows at certain gauging stations and reservoir levels during different parts of the year. These are used to identify the onset of a drought and its progression from impending drought (Level 1) to drought (Level 2) to severe drought (Level 3) in each of our three supply areas (Section 2). Our drought vulnerability assessment for each of our water resource zones and the triggers and indicators for drought and drought severity are described in detail in Annex 4. These triggers and indicators are continuously monitored by different teams within Southern Water and compiled into a dashboard for identifying and forecasting a drought. Bespoke drought management actions for Level 1, Level 2 and Level 3 droughts, as defined by these triggers and indicators, have been identified for each supply area (Section 3).

Demand management is a key intervention to protect supplies during droughts. Between 2010 and 2015 we implemented a universal metering programme whereby we metered over 87% of our domestic customers. This has led to a significant reduction in domestic water use and our per capita consumption levels are among the lowest in the UK water industry. This has also meant that demand-side measures are not as effective as they would have been in droughts pre-2015 as our customers are likely to already use less water. We carried out a study to look at the effectiveness of demand-side measures post universal metering. The results are presented in Annex 5.

Effective communication, both internally within the company and externally with our customers, regulators, neighbouring water companies and other stakeholders is of utmost importance in managing a drought. In the event of a drought, we will set up dedicated teams within the company with clearly defined roles and responsibilities to manage different aspects of the drought. We have developed a communication plan that we will put into place which has identified the key audiences and key messages that we will convey at each drought level using media and tools appropriate for our key audiences. Our drought management structure and communication plan are described in Annex 6.

We will work closely with other water companies in the South East to ensure consistency in defining drought levels and coordinating our actions and messaging.

Increasing supplies through drought permits/orders will unfortunately have an impact on the environment. We have already committed to a monitoring and mitigation plan in our Western area in our agreement with the Environment Agency under Section 20 of the Water Resources Act 1991. As part of our monitoring and mitigation obligations, we have identified the activities we will undertake both under normal conditions (i.e. baseline monitoring) and the activities we will carry out during a drought as well as the mitigation measures we will put in place to offset some of the environmental impacts of drought orders/permits (Section 4).

We have carried out detailed environmental assessments of our drought permit/order options as part of the requirements of the Habitats Regulations and Water Framework Directive. These have informed the Strategic Environmental Assessment of the Drought Plan. These are covered in Annexes 8 to Annex 10. It is important to stress that the detailed environmental assessments submitted as part of an application for a drought order or drought permit may not be entirely consistent with the plan level assessments. This is because the Environmental Assessment Reports (EARs) and Habitats Regulations Assessments (HRAs) are live documents. Should we need to make an application we will update these using the latest information available and if we are making more than one application, we will also update the relevant in-combination assessments. After the drought, as part of the lessons learned process, we will then make any appropriate updates to the plan level assessments.

Regardless of whether there is a drought, we will continue to have further discussions on these environmental reports with the EA and NE and, if appropriate, provide updates through the WRMP annual review process. Following our annual review of our WRMP19 our regulators (Defra, the EA and Ofwat) asked us to review our drought plan to check whether updates are required. We have concluded that we do not need to make changes to this plan, but we will update our emerging WRMP24 accordingly.

While the onset of a drought and its progression through different levels is defined by a shortage of rainfall, the resumption of rainfall does not necessarily mark the end of a drought. There will normally be a time lag between the onset of rainfall and recovery of groundwater levels and river flows to sufficient levels that will allow the scaling back of drought measures. This stage also needs to be managed carefully to make sure that drought measures are not de-escalated prematurely and communication with customers and other stakeholders will continue throughout this stage (Section 5).

We will carry out a review at the end of each drought to identify any areas that will need further improvement in managing a future drought.

1. Introduction

Welcome to Southern Water's (SWS's) Drought Plan. This plan describes the steps we will take to maintain adequate supplies of water to our customers and to protect the environment in the event of a drought. It has been prepared to comply with Sections 39B and 39C of the Water Industry Act 1991, as amended by the Water Act 2003[2] and in accordance with the Drought Plan Regulations 2005[3] , Drought Direction 2020 and follows the guideline issued by the Environment Agency (EA)[4].

1.1. Purpose of a Drought Plan

A drought is a naturally occurring event and is typically characterised by a prolonged period of abnormally low rainfall, leading to a shortage of water which may affect people, agriculture, industry and the environment.

Droughts range in duration and intensity from a short event caused by a hot, dry summer to an event spanning several years where persistent low rainfall over a long time can lead to shortage of water. The spatial extent of droughts can also vary widely from being concentrated in parts of a county to a much wider region (e.g. South East England) to the entire country. Therefore, to manage droughts of differing severity, water companies plan to use a range of drought management interventions, which include demand restrictions, supply-side measures and operational management of their sources. Some demand and supply side measures require us to apply for drought permits/orders from the regulator, so we need to demonstrate an Exceptional Shortage of Rain (ESoR).

The Drought Plan is a tactical plan that sets out the operational steps a water company will take before, during and after a drought to maintain essential water supplies to customers. Drought actions are the temporary actions taken beyond business-as-usual (BAU) activities to either increase supply or reduce demand for water. A Drought Plan must also identify the triggers that act as decision points for implementing the drought actions. Drought actions and their triggers vary across each Water Resource Zone (WRZ)[5] and can depend on conditions in each drought event. Our drought triggers and related actions are set out in Section 2.

The structure of this plan follows the recommendations set out in the EA drought planning guideline. It describes our drought measures in detail and includes the technical work we have undertaken to inform our plan. The technical reports covering specific sections of the plan are attached as annexes. We have in addition published a non-technical summary, which provides a high-level summary of our plan and focuses of the restrictions that our customers might face on their water use as a drought develops and progresses.

[2] https://www.legislation.gov.uk/ukpg a/2003/37/contents
[3] https://www.legislation.gov.uk/uksi/2005/1905/regulation/4
[4] Environment Agency, 2020. Water Company Drought Plan Guideline, April 2020.
[5] A water resource zone is the area where all customers have the same risk of loss of water supply.

1.2. Developing and consulting on our Drought Plan

The Drought Plan guideline requires us to undertake pre-consultation before developing the draft Drought Plan and then to undertake a public consultation on the draft Drought Plan. Full details of the pre-consultation are provided in Annex 1. However, the public consultation we ran in the summer of 2021 now supersedes the pre-consultation. The primary document resulting from the public consultation is the Statement of Response (SoR) which lists the changes to our draft Drought Plan. These changes are incorporated into this Drought Plan.

1.3. Our supply sources

In normal conditions, our supplies come from three main sources: groundwater abstractions, river abstractions and reservoirs (Table 1.1).

Table 1-1: Types of water resources and their responses to droughts.

Resource type	Water source	Water source type	Speed of response to rainfall events		Resilience level*
Groundwater	Underground water-bearing rocks (aquifers).	Chalk (83% of abstraction)	Generally slow Due to the time it takes for rain to percolate through the ground, there is typically a lag between rain and an increase in groundwater levels. An exception to this occurs when cracks (fissures) in the chalk aquifer allow rain to refill local sources more quickly.		Can be resilient for up to two dry winters in a row.
		Greensand (17% of abstraction)			
Rivers	Rivers rely on a mixture of groundwater and rainwater running off the land.	Groundwater dominated	e.g. River Test	Rivers that are predominantly fed by groundwater tend to respond slower to rainfall but maintain higher flows for longer.	Dependent upon ratio of surface water to groundwater flow. Generally resilient to one dry winter. Recover quickly when drought ends.
		Mix of groundwater and surface water	e.g. River Rother		
		Surface water dominated	e.g. River Medway	These rivers tend to be flashy, responding quickly to rainfall but they also enter low flow situations more quickly. We release water from Bewl Water reservoir into the Medway in the summer to allow our abstraction to continue during periods of low flows.	
Reservoirs	Reservoirs are filled using pumped water from rivers and by impounding natural catchments	Bewl Water Darwell Weir Wood Powdermill	Reservoirs, which are refilled through pumping from rivers and from natural catchment inflows, will respond more quickly than groundwater. Weir Wood, which is only refilled from surface water inflows, is dependent upon saturation of the surrounding catchments.		Dependent upon reservoir size, Bewl Water reservoir is resilient for up to two dry winters.

*We define resilience in this context as the ability of a water source to cope with and/or recover from lack of rain continue providing supplies now, and in the future, without harming the environment.

1.3.1. Groundwater abstractions

Our water supplies are predominantly reliant on the transmission and storage of water in underground reservoirs (i.e. aquifers). Groundwater accounts for 70% of our total water supplies. This water predominantly comes from the Chalk aquifer that underlies much of the region. The aquifer extends throughout parts of Kent, Sussex, Hampshire and the Isle of Wight. In several of our WRZs, all the water comes from groundwater.

1.3.2. River abstractions

River abstractions account for 23% of our water supplies, most notably the Eastern Yar and Medina on the Isle of Wight; the Test and Itchen in Hampshire; the Western Rother and Arun in West Sussex; the Eastern Rother and Brede in East Sussex; and the Teise and Medway in Kent.

1.3.3. Reservoirs

Four surface water storage reservoirs provide the remaining 7% of water supplies. These are Bewl Water, Darwell, Powdermill and Weir Wood[6]. The total storage capacity of these four reservoirs is 42,390 million litres. South East Water is entitled to 25% of the yield from the River Medway Scheme, which incorporates the storage within Bewl Water reservoir.

The South East is one of the driest regions in the UK and rainfall is integral to the maintenance of water supplies in the region. Annual rainfall averages 730 millimetres across our supply region. However, groundwater recharge primarily takes place during the winter rains. Rain infiltrates through the soil to recharge the natural storage in the underlying aquifer to support river baseflows for the following year. Rainfall experienced outside of winter is of less value to groundwater recharge as it is mostly lost to evaporation, plant transpiration or runs off directly into rivers from the land.

1.4. Our supply area

We provide water to nearly 2.6 million domestic and non-domestic customers across an area of 4,450 square kilometres, extending from Kent in the east to the Isle of Wight in the west, through parts of Sussex and Hampshire. Our supply area is divided into 14 WRZs. These are amalgamated into three larger supply areas (Western, Central and Eastern) based on the degree of interconnectivity between the WRZs (Figure 1.1). For the purposes of drought planning, we treat our three water supply areas as our drought management areas.

We share boundaries with other water companies. These include Affinity Water (AFW), Cholderton and District Water (CDW), Portsmouth Water (PRT), SES Water (SES), South East Water (SEW), South West

[6] We are currently upgrading the water treatment works at Weir Wood reservoir.

Water (SWW), Thames Water (TWUL) and Wessex Water (WSX). We have number of bulk supply agreements with our neighbouring water companies.

1.4.1. Western area

Our Western area consists of parts of Hampshire and the whole of the Isle of Wight. It consists of seven WRZs, namely Hampshire Andover (HAZ), Hampshire Kingsclere (HKZ), Hampshire Winchester (HWZ), Hampshire Rural (HRZ), Hampshire Southampton East (HSE), Hampshire Southampton West (HSW) and the Isle of Wight (IOW). HAZ, HKZ, HRZ and HWZ are all supplied from groundwater only. HSW is supplied by surface water from the River Test and HSE and the IOW WRZs depend on a mixture of surface and groundwater.

1.4.2. Eastern area

Our Eastern area is composed of three non-contiguous areas spread across Kent, Medway and East Sussex. It has four WRZs, namely Kent Medway East (KME), Kent Medway West (KMW) and Kent Thanet (KTZ) whereas Sussex Hastings (SHZ) is the WRZ located in East Sussex. The areas are supplied by a mixture of surface and groundwater with internal transfers from Bewl also supporting each of the WRZs.

1.4.3. Central area

Our Central area consists of parts of East and West Sussex and has three WRZs. These are Sussex North (SNZ), Sussex Worthing (SWZ) and Sussex Brighton (SBZ). The main influence on the timing and frequency of needing drought interventions in SNZ is the flow in the River Rother and the reductions in it during dry periods. The WRZs include a bi-directional inter-zonal transfer between SWZ and SNZ, as well as an inter-zonal transfer from SWZ to SBZ.

1.5. Distinguishing between normal operation and a drought

Under normal conditions, and when there is surplus water in the environment, we can operate more flexibly. For example, we could have a higher number of supply works or sources out of operation for planned maintenance (outage) without impacting our levels of service. The selection of water sources we use will also be optimised for expected demand and efficiency. However, it is vital that we enter a drought with water resources in a healthy position and we do not carry too high levels of risk. This is ensured through our Sustainable Abstraction Policy that aims to maximise natural storage of water in the environment so that yields can be maintained through a drought.

All of our water resources depend on rain for replenishment. The key difference between them is the time they take to respond to rain, or lack of it (Table 1.1).

As a drought develops, the way in which we operate can become constrained by the availability of water and the distribution of demand. For example, some sources may be unable to produce their normal volumes of water, the patterns of demand will also change in response to dry weather. These factors in combination reduce our ability to operate flexibly and efficiently and so as a drought develops, we need to take actions to secure supplies and reduce demand. These are summarised in Section 3 and described in Annex 2.

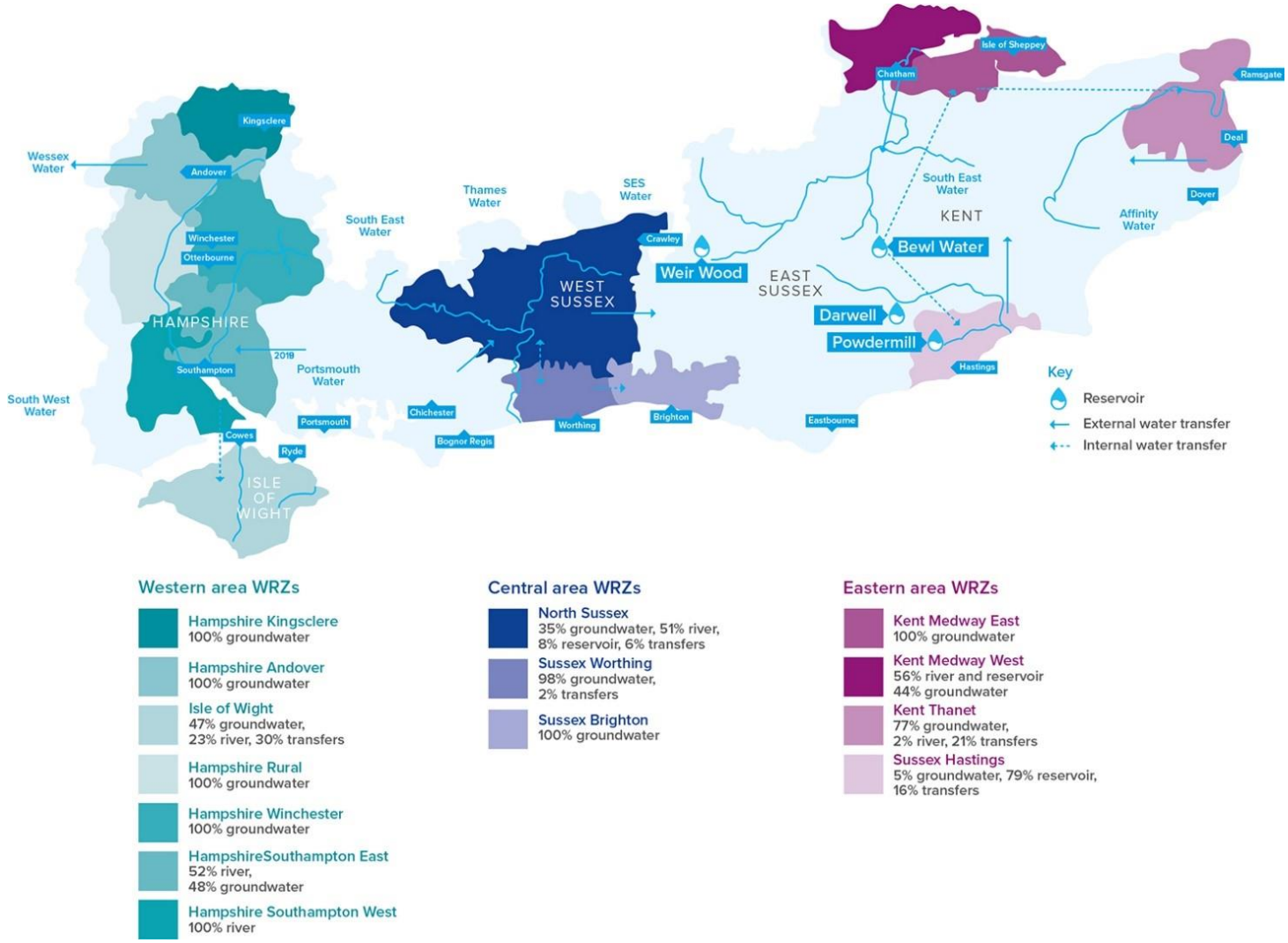


Figure 1-1: SWS supply area showing the three main supply areas and the WRZs.

Droughts vary in duration, intensity and geographical extent and the actions we take will be informed by each of these factors. The key stages in the development of a drought are as follows:

1. **Normal conditions:** This is the stage when we are experiencing normal weather conditions and groundwater levels and river flows are where we would expect them to be for the time of the year.
2. **Level 1 – Impending or developing drought:** This is the stage where we start moving from normal conditions towards a drought, but the drought is not yet fully established. Sometimes the dry weather conditions break at this point and we return to normal conditions. At other times the dry weather conditions continue to progress to the next stage. This stage typically has a return period of 1-in-5-years to 1-in-10 years.
3. **Level 2 - Drought:** This results from a continued period of dry weather beyond the impending drought stage. The weather pattern may change during a drought to bring more rain. When this occurs, we will continue to monitor the resource position and the drought classification might change back to impending drought or normal depending on the circumstances. The typical return period for this level is 1-in-10 years to 1-in-20 years. If the weather continues to remain dry, we move to next drought stage.
4. **Level 3 - Severe drought:** The third stage of the drought is severe drought with a return period of 1-in-20 years to 1-in-500 years. This is the final stage of a drought and covers those rare but severe events that we have seen in the past and could experience in the future.
5. **Level 4 - Emergency drought:** This is the most severe stage of drought that would require us to take emergency actions in order to manage supply and demand of water. The return period for this is greater than 1-in-500 years.

We have set out a series of drought triggers (Section 2.2) that we monitor to identify the development of a drought and inform the timing of the additional actions we need to take to ensure supplies are maintained.

1.6. Operation in normal times

The actions we take under normal water resource conditions determine our preparedness for managing a drought when it happens.

Table 1.2 lists the actions taken by various teams within SWS during normal conditions to ensure that we are in the best possible position should drought conditions start to develop.

Table 1-2: Actions to be taken by various SWS teams under normal conditions.

Drought Status		Actions	Wholesale Water Services	Environment & Corporate Affairs	Risk & Compliance	Asset Strategy & Planning	Executive Leadership Team
Normal	1	Drought monitoring reports	•		•	•	
	2	Reservoir refill	•				
	3	Distribution Input monitoring	•		•	•	
	4	Production planning	•				
	5	Managing outage	•		•		

Drought Status		Actions	Wholesale Water Services	Environment & Corporate Affairs	Risk & Compliance	Asset Strategy & Planning	Executive Leadership Team
	6	Sustainable abstraction policy	•		•	•	
	7	Leakage reduction	•			•	
	8	Asset risk assessment	•		•		
	9	Meet water efficiency targets	•	•	•	•	
	10	Communication & engagement		•	•	•	•

1.6.1. Drought monitoring reports

Responsibilities

Department	Team	Responsibility
Wholesale Water Services	Water Production	Update the dashboard on a monthly basis
Risk & Compliance	Water Resources Policy & Regulation	Decision making based on the dashboard

Monitoring data from boreholes, gauging stations and reservoirs is collected to populate the monthly 'drought dashboard' which is used to decide the drought stage by comparison against our drought triggers (see Section 2.2).

1.6.2. Reservoir refill

Responsibilities

Department	Team	Responsibility
Wholesale Water Services	Water Production	Weekly surface reservoir reporting
Wholesale Water Services	Water Production	Proposed reservoir abstraction and pumped refill volumes
Wholesale Water Services	Operational Services	Control of source operation and budget

All our reservoirs, except Weir Wood, rely on water abstracted from rivers to refill them. We have abstraction licences to pump water from the rivers to fill these reservoirs. These licences have Minimum Residual Flow

(MRF)[7] conditions, which means we cannot abstract water from the rivers when flows drop below a certain level. Flows are usually higher in the winter; therefore, this is the optimum time to refill our reservoirs.

We have generated 'refill curves' for each of the reservoirs to indicate the expected water level during different times of the year. If the water in the reservoir drops below the level on the curve, we should start pumping water from the river to bring the levels back up.

Bewl Water and Darwell reservoirs are also linked by a pipeline, which allows us to transfer water from Bewl Water to help refill Darwell. To support this operation, we have also generated refill curves to show when the Bewl to Darwell Transfer Pipeline should be used.

Pumping requires a lot of energy and can be expensive, so we only carry it out when required. However, it is essential that when we enter the end of the winter recharge season (typically Oct-April), we have maximised the amount of water we can abstract from the rivers to refill the reservoirs.

1.6.3. Distribution Input monitoring

Responsibilities

Department	Team	Responsibility
Wholesale Water Services	Water Production	DI reporting and updating
Risk & Compliance	Water Policy & Regulation	Monitoring demand figures

The Water Production Team is responsible for updating Distribution Input (DI)[8] spreadsheets each week with the daily figures for abstraction and output. These are then used to generate a DI figure for each of our WRZs, and for SWS as a whole, which is circulated to relevant teams on a weekly basis.

The DI figure is used as a proxy to show demand for water from our customers. It is another important measure of the state of our water resources. For example, rising demand for water coupled with reducing resources could threaten our ability to meet demand.

1.6.4. Production planning

Responsibilities

Department	Team	Responsibility
Wholesale Water Services	Water Production	Produce plans for operational volumes for all sources on a weekly basis

The role of the Water Production Team is to ensure that our water sources are managed in such a way that both protects them and ensures we can supply customers.

[7] MRF is a pre-defined minimum rate of water flow that must be left in a water course to support abstraction.
[8] Distribution Input (DI) is the total volume of treated water that we put into supply.

The team is also responsible for monitoring and enforcing:

- output from works;
- performance against outage; and
- performance against our sustainable abstraction policies.

To ensure we are in a good position ahead of a drought, the team also needs to carefully manage our conjunctive sources. These are sources which provide water from two or more places, such as at Pulborough Water Supply Works (WSW) in Sussex, where we can abstract water from groundwater, two rivers and also import water from PRT via a bulk supply.

Usually, we manage abstractions such that rivers are used in the winter when flows are higher and groundwater in the summer when river flows are lower.

1.6.5. Managing outage

Responsibilities

Department	Team	Responsibility
Wholesale Water Services	Operational Resilience & Response	Outage monitoring and reporting
Wholesale Water Services	Technical Planning & Scheduling	Source operation and management
Wholesale Water Services	Operational Resilience & Response	Delivering asset management schemes

Outage refers to events when we are not able to supply the planned Deployable Output (DO)[9] from a source. This may be full outage, when a site is out of action, or partial outage, when a site produces less than its DO. Outage events are different from those where a site shuts down for a period of time as a result of reduced demand, as evidenced by higher levels at the water service reservoir associated with that WSW.

Outage is planned for in our Water Resources Management Plan (WRMP) and is monitored to assess how closely we are operating to our planned levels.

1.6.6. Sustainable abstraction policy

Responsibilities

Department	Team	Responsibility
Wholesale Water Services	Water Production	Monitoring and monthly reporting
Asset Strategy & Planning	Water Asset Strategy & Planning	Waiver assessment

[9] DO can be defined as the reliable output of an active source or group of sources or of a bulk supply in view of the constraints imposed by one or more of the following: environment, licence, pumping capacity, hydrology, hydrogeology, transfer capacity, treatment capacity, water quality and levels of service.

Our sustainable abstraction policy seeks to ensure that sources are not operated above their DO, unless a waiver has been signed to allow this.

The Water Resources Policy & Regulation Team is responsible for making assessments for waivers and signing them off. When issued, waivers are temporary and need to be renewed if required.

The Water Production Team is responsible for monitoring abstraction and ensuring sources are operated sustainably in accordance with our policy.

1.6.7. Leakage reduction

Responsibilities

Department	Team	Responsibility
Wholesale Water Services	Demand Management	Monthly reporting, leakage detection and repair
		Implement leakage reduction plans

Our leakage target is set by our regulator Ofwat. Our target over AMP7 (the 7th Asset Management Period which is 2020-25) is to reduce by 15% compared to the last three years' average figure in AMP6 (2015-20). Our long-term goal is to reduce leakage by at least 50% by 2050.

Reductions in leakage are driven though more regular inspections and maintenance of our distribution network. As a drought progresses, we would expect to invest in increasing the frequency and scale of this work to further drive down leakage. We are also investing in new technology to help us reduce leakage.

By reducing leakage, we would reduce the volume of water we need to abstract from the environment. When we are imposing restrictions on our customers to reduce the amount of water they use, it is important that we demonstrate that we are undertaking actions ourselves.

Members of the team also provide verifications of our abstraction and DI meters, as well as optimisation and pressure management of the water network.

1.6.8. Asset risk assessment

Responsibilities

Department	Team	Responsibility
Water Asset Strategy & Planning	Water Risk & Resilience	Assess risks and drive investment

Asset risk assessment plays an important role in ensuring that assets and sources are adequately prepared should a drought develop.

Critical sources have been identified in each WRZ which, if lost, would have a significant impact on our ability to supply water to meet customer demand.

By identifying these risks and targeting investment to remove or reduce them, sources and WRZs should become more resilient and resistant to droughts.

These risk assessments are undertaken as part of work by the Water Risk & Resilience Team to define ageing assets and resilience strategies for water assets in the short, medium and long term.

1.6.9. Meet water efficiency targets

Responsibilities

Department	Team	Responsibility
Environment & Corporate Affairs	Communications	Promote water efficiency with customers
Water Asset Strategy & Planning	Water Strategy	Develop water efficiency strategy
Water Asset Strategy & Planning	Supply Demand Sponsor	Develop the water efficiency delivery plan
Wholesale Water Services	Demand Management	Deliver the water efficiency plan

Promoting water efficiency is a key part of our strategy to secure resources for the future as it encourages our customers to think about the way in which they use water. We have one of the most ambitious water efficiency plans in the UK water industry whereby we are planning to reduce per capita consumption (PCC) of our domestic customer to 100 litres/person/day by 2040 (Target100). Our reported PCC in 2020 was 126 litres/person/day.

By reducing the amount of water that customers use, we will need to abstract less from the environment. This will result in more water being available during droughts in areas where water is abstracted from storage sources, such as reservoirs, and from some groundwater sites.

1.6.10. Communication and engagement

Responsibilities

Department	Team	Responsibility
Environment & Corporate Affairs	Communications	Integrate information on water resources when engaging customers
		Communicate with customers and stakeholders

Communication and engagement with customers, stakeholders and our communities about water use, water supply, rainfall and water levels are critical to developing a better understanding before a drought develops. The Communication Team is responsible for developing and providing information to support delivery of the Water Efficiency Plan and general information on our water supply. This information includes:

- Regular updates on rainfall, levels of water sources and leakage
- Information on the current drought status, the Drought Plan and restrictions
- Water efficiency advice and access to discounted products
- Information on the water cycle and the supply process
- Key stage education programmes for primary and secondary schools
- Information on leakage and development of new water resources
- Promotion of campaigns with Waterwise, Water UK and Water Resources South East (WRSE).

A range of tools are used to communicate this information, including:

- Website
- Social media (Facebook and Twitter)
- Video
- News releases
- Stakeholder newsletters
- Campaigns in the community
- Partnerships with councils and community organisations
- Waterwise talks for schools and community groups
- SWS News and the intranet for staff

1.6.11. Drought exercises

During normal periods we will undertake drought exercises to test our drought response this could take the form of internal drought workshops or wider workshops with neighbouring water companies and stakeholders such as the Environment Agency.

Since publication of our draft Drought Plan we have undertaken a drought exercise for the River Itchen in May 2021. This included representatives from Southern Water, Portsmouth Water, The Environment Agency and Natural England and led to us undertaking some further refinement of our River Itchen Drought Response and Triggers, which has been reflected in this plan.

1.7. Our Levels of Service

The nature and frequency of measures that we will introduce to reduce demand and increase supply in the event of a drought is governed by our target Levels of Service (LoS). Two target LoS are relevant in this regard (Table 1.3).

- Customer target LoS relate to the frequency and nature of restrictions on water use, such as Temporary Use Ban (TUB) or Non-Essential Use Ban (NEUB), that customers may experience.
- Environmental target LoS relate to the frequency of drought permits/orders allowing modified abstraction regimes at some of our sources.

Table 1-3: Our target LoS

Measure type	Probability of occurrence within any year	Return period	Probability of at least one occurrence within the next five years[a]
Customer target LoS			
Advertising to influence water use	20.0%	1-in-5 years	67%
TUB on different categories of water use (section 76)[b]	10.0%	1-in-10 years	41%
Drought order (NEUB on different categories of water use (section 74(2)(b))[c]	5.0%	1-in-20 years	23%
Emergency Drought Order to restrict water use (rota cuts and stand-pipes) (section 75)[b,d]	0.2%	Only in a civil emergency (1-in-500 years)	1%
Environmental target LoS			

Measure type	Probability of occurrence within any year	Return period	Probability of at least one occurrence within the next five years[a]
Application for drought permit/order to increase supplies through relaxation of licence conditions, increase in licenced quantities or other measures[e]	5.0%	1-in-20 year	23%
Implementation of drought permit/order to increase supplies through relaxation of licence conditions, increase in licenced quantities or other measures[e]	0.5%	1-in-200 years	2%

[a] Frequency of first implementation but would be introduced via a phased approach.
[b] The Water Industry Act, 1991, HMSO as amended by section 36 of the Flood and Water Management Act 2010 (FWMA 2010).
[c] The Water Resources Act, 1991, HMSO and The Water Use (Temporary Bans) Order 2010, which is a statutory instrument (No. 2231) providing definitions of words and phrases and certain exceptions to the categories of water use specified in section 76 of the Water Industry Act 1991.
[d] As part of 'More before four' (Section 3.6.1), we will take all possible measures before we implement these stage 4 actions
[e] In short term in our Western area there is a risk we will fail to meet our environmental target levels of service following the Section 20 Agreement reached at the Hampshire abstraction licences Public Inquiry in March 2018. For more information on Western area exclusivities see Section 3.3.

1.8. Relationship with other plans

1.8.1. Relationship with the WRMP

Our 2019 WRMP (WRMP19) sets out the actions we will take to ensure a constant supply of high-quality drinking water to our customers.

It describes our long-term plan to be resilient to droughts and the Drought Plan sets out the operational steps that we will take over the short term, if droughts occur, to maintain supplies to customers and protect the environment. In some situations, we might be able to bring forward new schemes that are being delivered to meet our long-term WRMP strategies in order to overcome short-term drought events.

We published our WRMP19 in December 2019. The options to manage drought described in this Drought Plan are included in the WRMP19. Figure 1.2 shows the interlinkages between our WRMP and Drought Plan. Our WRMP24 has not been finalised but, when it is finalised, that WRMP will align to our next Drought Plan that we expect to cover the period 2027 to 2032.

A key influence on our WRMP19 was our agreement with the EA under Section 20 of the Water Resources Act 1991 ('The Section 20 Agreement')[10] and licence changes that set new limits on the amount of water that we can abstract under our three existing licences in the River Itchen catchment (Lower Itchen surface water, Lower Itchen groundwater and Twyford groundwater) as well as River Test surface water abstraction and abstraction from the EA's Candover Augmentation Scheme boreholes. As a result of these licence changes, the amount of water we can take from these sources during a severe drought is significantly reduced. This has a significant impact on our ability to maintain supplies to customers as discussed later in this report and set out in Section 3.3.

The Section 20 Agreement also includes a substantial package of environmental monitoring, mitigation and potential Imperative Reason of Overriding Public Interest (IROPI) compensation measures. Our case for IROPI is presented in Annex 3.

1.8.2. Relationship with the WRSE regional plan

A regional multi-sector resilience plan is being delivered by the WRSE group consisting of six water companies in the South East (AFW, PRT, SES, SEW, SWS and TWUL) and includes the EA in the programme management board. The aim to is to develop a resilient multi-sector water resources plan that considers the whole of South East England as a single region, unconstrained by water company boundaries. Options to best meet the water requirements of the domestic and non-domestic consumers in the whole region are being appraised. The regional plan is to be finalised in 2024 The WRMPs to be published by individual water companies in 2024 are expected to align with the regional plan.

All of the options considered in this Drought Plan for implementation during a drought have been included in the list of constrained options that has been provided to the WRSE for consideration in the development of a 'best value' plan for the region.

[10] See Section 3.3.1 for details on the Section 20 Agreement.

The water companies in the WRSE group and Water Resources East (WRE), are also collaborating on the development of Drought Plans and issued a joint statement in December 2020 whereby they have pledged to work closely and to regularly share information about their available water resources, weather forecasts and any communication needed with customers about any emerging drought situation.

Due to local differences, the drought actions that water companies take and their timing may differ but there is recognition of the need by the water companies in the South East to discuss the development of their plans and to align the drought levels as closely as possible, especially the restrictions and exceptions that might need to be imposed in the event of a drought.

1.9. Wider impacts of drought

One of the ways that we work with our neighbouring companies is that we chair and participate in the regular WRSE 'dry weather' meetings which focus on the risk of any potential future water shortages. In these meetings all water companies share information about their available water resources, weather forecasts, and any communication needed with customers about any emerging drought risk. These meetings are held all year round and stepped up in frequency when a risk of water shortages across the South East starts to emerge. The meetings facilitate collaboration between water companies and actions to ensure an effective regional response to a developing drought. By working together and following a joined-up approach to communication, we aim to reduce confusion so our customers clearly understand the pressure on water supplies and the environment during water shortages, what we are doing, how they can use water wisely, and what water restrictions may need to be, or are being, imposed.

This process is implemented through the Dry Weather Monitoring Group (DWMG) for which terms of reference have been agreed. The purpose of the DWMG is the provision of a regular update and information sharing forum when companies are operating in Business As Usual (BAU) mode but when near term risks can be observed, and a heightened level of preparedness is desirable. It will draw information from national, regional and local perspective and in turn provide updates which will help inform regional and national awareness and early preparedness.

As part of regional drought planning, in 2018, we participated in a sprint event along with the other water companies in the South East and Anglian Water. The sprint event, convened by WRSE CEOs in conjunction with Water UK, stakeholders, regulators and independent experts, started the development of a regional management approach for extreme droughts in the South East of England. This extreme drought framework sought to integrate measures with existing contingency plans, emergency plans (SEMD), Drought Plans, Drinking Water Safety Plans and WRMPs. The effects of an extreme drought on the South East as a whole was explored along with the potential irreparable economic and social damage.

As we enter a drought, we would expect to participate in the National Drought Group, Platinum Incident Management and the National Incident Management groups as we did during the dry weather event of 2018. These groups will provide a joined up approach to tackling drought and enable strong communication between water companies and regulators. Further to this we would seek to build upon our knowledge sharing forums and set up regional centres of excellence to pool resources and expertise between companies and to support collaboration, which is vitally important during a drought. We have recently held knowledge sharing sessions with Portsmouth Water and Thames Water to promote best practice and innovative solutions for technical areas around water resource management such as leakage management.

As part of regional collaboration with WRSE, we now have several joint datasets (for example coherent climate data) and tools (for example a regional simulation model and a dynamic demand forecasting model) which will allow us to undertake forecasting in drought events on a regional scale. Furthermore, the close

collaboration afforded by being part of WRSE has delivered a coordinated policy on implementing restrictions, a senior executive group that worked together in the 2005/06 drought and recent research on impacts of COVID-19 on demand. We would expect national collaboration to increase as we go through the different triggers and drought levels, encapsulating other sectors, regulators and the local resilience forums.

Other Sectors

Through the WRSE regional planning process we've worked with the main water-using sectors in the region to understand their future water needs and how resilient their existing water supplies are to droughts. The Environment Agency's National Framework set the requirement for regional groups to consider the needs of other sectors in their regional plans and it provided an initial assessment of other sectors' demand for water.

Where we have specific bulk supply agreements with commercial customers drought obligations are set out through the mechanisms within those bulk supply agreements. These actions are discussed further in Section 3 for each supply area.

For our supply region agriculture represents the largest drought vulnerable external sector particularly activities such as trickle irrigation which is used by many horticultural businesses and is prominent in the region.

WRSE have identified that nearly 100 million litres of additional water could be needed by other sectors every day by 2060, primarily by the power and paper industries, and some horticultural users for trickle irrigation. Through WRSE engagement so far with these sectors they have indicated that they can meet most of this increased need using their existing licences, by becoming more efficient and by increasing on-site storage. However, the paper and energy sectors have requested that 30 million litres is included in the regional plan and delivered through options that could benefit other sectors.

We will continue to work with the other sectors through the regional planning process to incorporate their future needs into the regional plan and our WRMP.

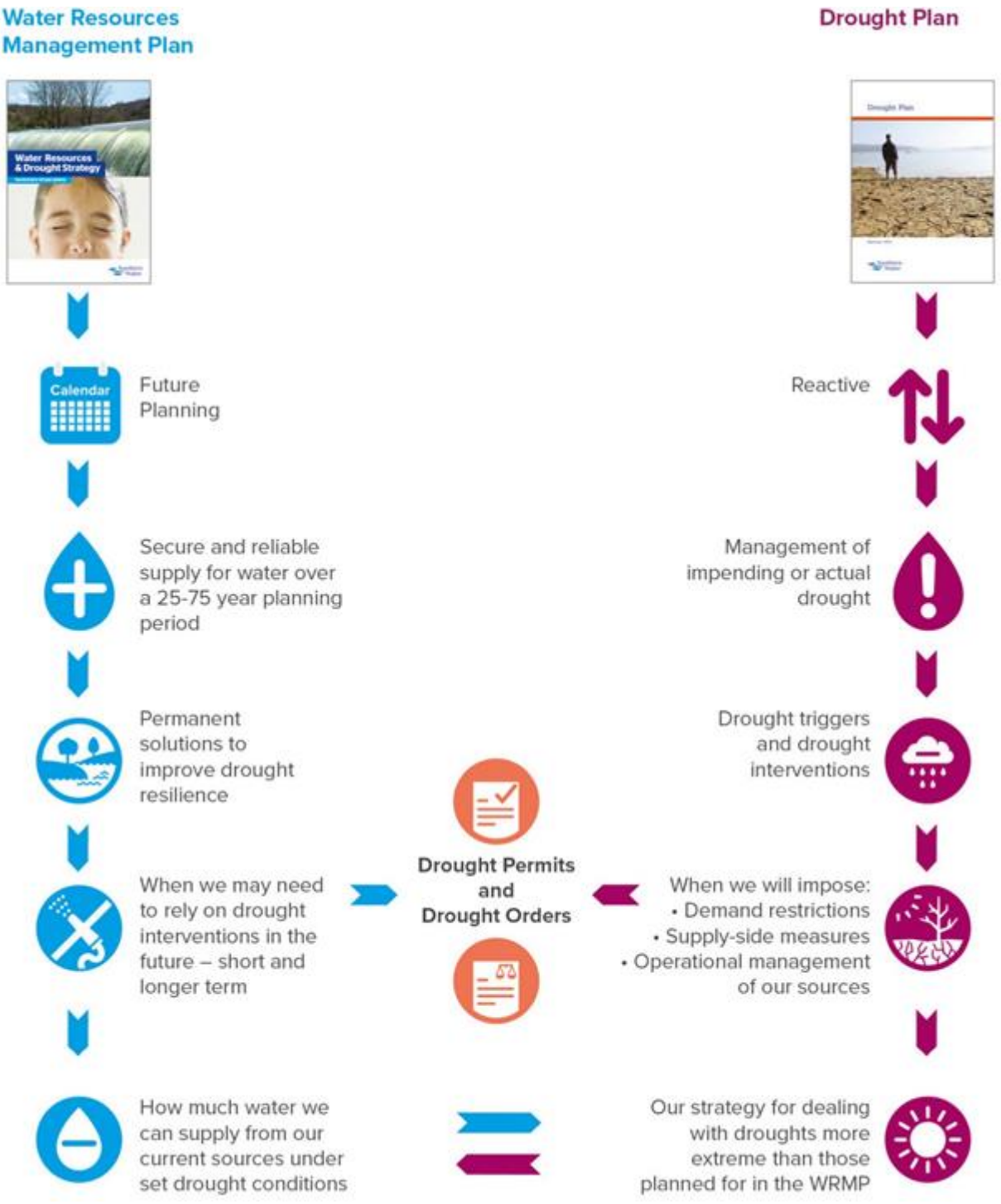


Figure 1-2: Interaction between our WRMP and Drought Plan.

2. Monitoring and forecasting a drought

2.1. Supply area vulnerability

As required by the Drought Plan guideline, we have conducted a drought vulnerability assessment following the methods set out in the UKWIR Drought Vulnerability Framework[11]. The full assessment is presented in Annex 4 and a summary is provided here.

We initially carried out a high-level screening against a defined set of criteria to identify the WRZs that required detailed assessment. The results show there are five WRZs that could be screened out from detailed assessment; four of these are in the Western area (HAZ, HKZ, HWZ, HRZ) and one in the Eastern area (KME).

For the WRZs that were identified as 'drought vulnerable' from the high-level screening, we have derived 'drought response surfaces' which relate duration and severity of rainfall deficit to the likelihood of supply failures. An example drought response surface is shown in Figure 2.1.

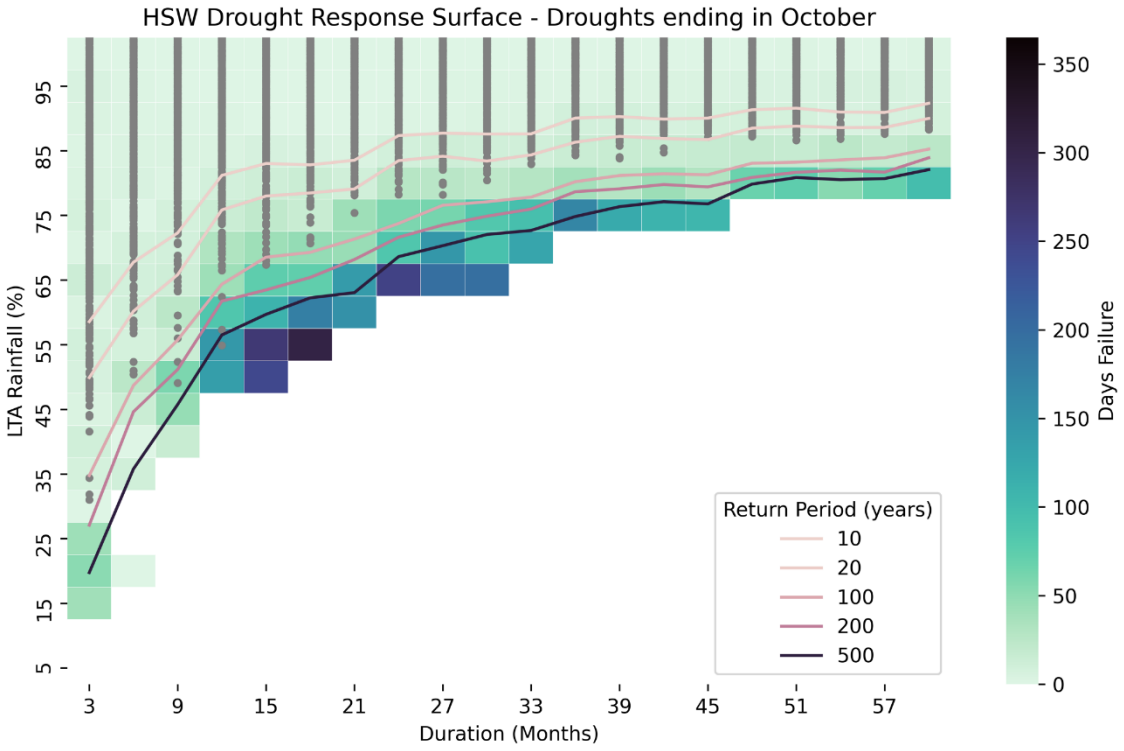


Figure 2-1: Example drought response surface.

[11] Counsell, C., Hunt, D., and Ledbetter, R., 2017. Drought Vulnerability Framework, UK Water Industry Research Limited, London.

A drought response surface plots the duration of a rainfall deficit along the x-axis and the magnitude of the rainfall deficit, as a percentage of long-term average rainfall on the y-axis. The colour shading indicates the average duration of supply system failure for a given rainfall deficit and duration. The grey dots in Figure 2.1 indicate the distribution of historical rainfall and the coloured lines indicate the probability of a given event. Each drought response surface is unique to each WRZ. We can use these plots to identify the critical drought type that poses the greatest risk to each WRZ.

The WRZs that predominantly rely on abstraction from rivers (HSE, HSW and SNZ) are the most drought vulnerable. This vulnerability arises from a combination of existing or marginal supply-demand deficits and DO which is dominated by river flows above minimum or hands-off flow (HoF)[12] licence conditions.

Our assessment found that Central and Western areas show very similar critical droughts. This largely reflects the characteristics of the Chalk aquifer which dominates SBZ and SWZ WRZs and provides groundwater baseflow support to the rivers Test and Itchen in Hampshire. Southern Hampshire and the Sussex Chalk are most sensitive to 12-21 months events ending in October with the most critical event around 15 months in duration. These represent single dry winter events but with multiple dry summers and autumns. Dry autumns are particularly critical reflecting that delayed onset of recharge and groundwater recovery following a dry summer extends groundwater and flow recessions below normal levels. SNZ WRZ shows a similar critical drought response to the adjacent chalk dominated WRZs but the supply mix differs, mostly comprising Lower Greensand groundwater and baseflow to the Western Rother.

Our Eastern area WRZs tend to be more sensitive to longer duration droughts than in the Central and Western areas and to an extent this reflects the storage buffering of the large reservoir systems which provide a degree of resilience to short duration drought events.

2.2. Drought monitoring

Our drought monitoring reflects the diversity and vulnerability of water resources across our supply area. Our decision making is based on a range of factors that take account of rainfall deficits, time of year and the status of our water resources (reservoir levels, flows and groundwater levels). We have developed triggers based on our analysis of a wide range of drought events considering a variety of different monitoring data. The triggers are progressive in nature and therefore intended to reflect the increasing severity of a drought event so that the measures associated with each set of triggers are only introduced when they are required.

We use a range of data in our decision making that describe the different hydrological characteristics and responses of our water supplies. This includes:

- Rainfall
- Potential evapotranspiration (PET)
- Groundwater levels
- River flows

[12] HoF is the flow below which abstractions have to stop.

- Reservoir storage

Each of these data, and the derivation and testing of our drought triggers is discussed in detail in Annex 4.

Drought is characterised by an absence or reduction in rainfall that poses a threat to supply and therefore monitoring of rainfall is critical to establish the emergence of drought. Our drought vulnerability assessment has indicated that rainfall deficits in the order of 12-18 months' duration are indicative of critical drought durations that have then greatest impact on supplies in many of our WRZs. Only a few WRZs (HSW and IOW) show significant sensitivity to short duration droughts. We have chosen to monitor rainfall deficits through Standard Precipitation Indices (SPI)[13] which allow easy site to site comparison across our supply area.

Rainfall data alone provide limited use in understanding the hydrological impact of drought (e.g. on groundwater levels and flows). The timing and seasonality of rainfall deficits are important for their impact on water resources. To better understand and monitor the hydrological impacts of rainfall deficits we incorporate PET data to allow us to monitor the amounts and deficits of effective rainfall. These data are captured through a Standard Precipitation and Evapotranspiration Index (SPEI)[14], an extension of the SPI calculation.

Over 70% of our resources are groundwater abstractions from the Chalk and Lower Greensand aquifers and these comprise many drought sensitive sources where yields reduce when groundwater levels are low. Through our operational practices and numerous modelling studies we have developed a good understanding of the characteristics of each aquifer block and have selected indicator boreholes which provide a reasonable representative indication of the groundwater status. Generally, these 'indicator' boreholes have long observation records, are regularly monitored, and are often included in the EA water situation reports.

Similarly, for surface water supplies we have set triggers on river flow levels to inform the need to take drought actions to maintain supplies, protect the environment and to meet our HoF or MRF licence conditions. In many cases, our river flow triggers are directly linked to our drought actions, for example under the Section 20 Agreement with the EA for the River Test and River Itchen catchment drought permits/orders.

We have also set triggers and actions linked to the storage volumes in our reservoirs, which are critical to the supplies in some of our WRZs, particularly in our Eastern area and are based on behavioural modelling of reservoir performance during severe and extreme droughts.

Overlying these individual suites of drought trigger levels are a series of multifactorial trigger levels that identify the key trigger sequences that reflect the underlying resources of our supply areas and WRZs.

2.2.1. Rainfall and evaporation

As mentioned above, our rainfall triggers are based on SPI. The SPI is an internationally recognised approach to categorising rainfall deficit, which is essentially a comparison of rainfall deviation from average

[13] McKee, T.B., Doesken, N.J., Kleist, J., 1993. The Relationship of Drought Frequency and Duration to Time Scales, Eight Conference on Applied Climatology, 17-22 January 1993, Anaheim, California.
[14] Vicente-Serrano, S.M., Santiago Beguería, J., López-Moreno, I. 2010. A Multi-scalar drought index sensitive to global warming: The Standardized Precipitation Evapotranspiration Index – SPEI, Journal of Climate 23: 1696-1718.

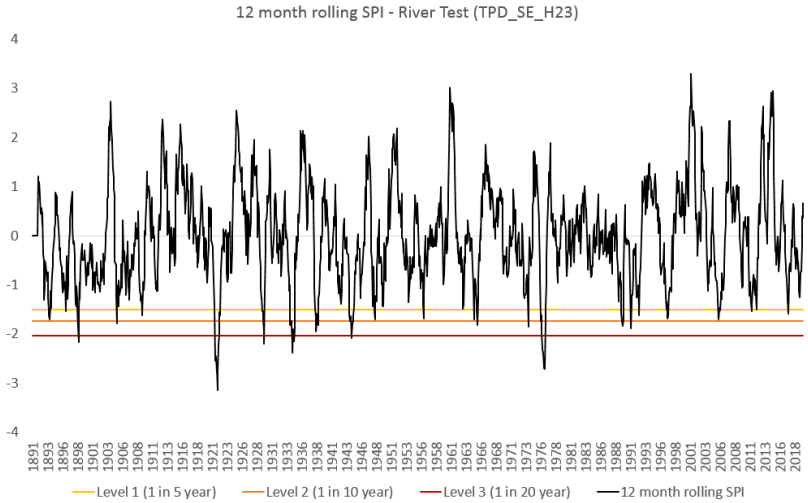
values, normalised according to the natural variability (expressed as a standard deviation) of rainfall at a given site. It gives a good indication of the status of rainfall variation from the norm over a given period (e.g. 6, 12, 24 months) and can be assessed probabilistically.

We use the Met Office 'Had UK' monthly rainfall data which is provided to us under licence by the EA and which are copyright of the EA and the Met Office[15].

We have developed the following rainfall triggers.

- Level 1 trigger based on a 20% annual probability (1-in-5 years). This trigger is useful for establishing the start of a drought and is more critically applied in our HSE and HSW WRZs where river flows and recession towards HoF conditions, which restrict DO, is sensitive to very mild rainfall deficits.
- Level 2 trigger based on a 10% annual probability (1-in-10 years) consistent with our target LoS for TUBs.
- Level 3 trigger based on a 5% annual probability (1-in-20 years) consistent with our target LoS for NEUBs and drought permit application (outside of Western area).

SPI based trigger thresholds have been calculated for accumulation periods covering 3, 6, 12, 18, 24, 30, 36, 42 and 48-month durations for fourteen EA Hydrological Catchments which are relevant to our WRZs. An example SPI time series plot showing historical trigger crossings is shown in Figure 2.2.



	Number of annual crossings	Annual crossings frequency
Level 1	26	0.20
Level 2	13	0.10
Level 3	7	0.05

Figure 2-2: Example application of our SPI rainfall triggers to historical rainfall time series.

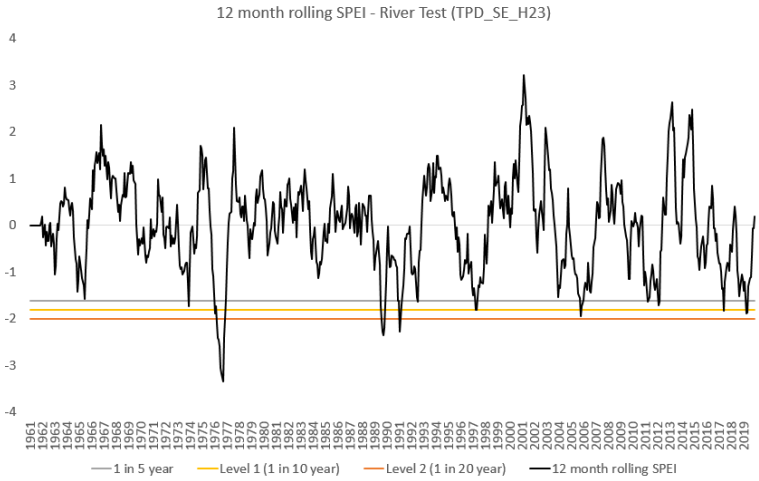
The SPI is a good measure for meteorological drought, i.e. a metric of the absence of rain; however, it provides only limited information about how that rainfall deficit may manifest as a hydrological drought characterised by low flows or low groundwater levels. The timing of rainfall deficits is exceptionally important to how water resources respond, and our groundwater dominated supplies are much more sensitive to rainfall deficits that accumulate over the annual winter-spring recharge period. We are less sensitive to

[15] Dataset name, Monthly Rainfall data for Hydrological Areas used within Water Situation Reports from the Environment Agency Daily Rainfall Tool (DRT) – 3rd Party IP: NRW, SEPA and Met Office.

summer rainfall droughts as we would not normally expect groundwater recharge or river baseflow recovery to be significant at this time of year due to increased evapotranspiration.

The SPEI is based on the same principles as the SPI but attempts to capture the seasonality of hydrological response by accounting for PET and hence provides a better metric of hydrological drought.

To derive our SPEI triggers we obtained monthly PET data from the EA based on their new dataset[16]. These PET data relate to the same hydrological catchments as the rainfall series used to calculate SPI and so they are directly comparable. We have then determined SPEI triggers following a similar calculation method to SPI and the same probability thresholds (1-in-5 years, 1-in-10 years and 1-in-20 years) (Figure 2.3).



	Number of annual crossings	Annual crossings frequency
Level 1	11	0.19
Level 2	6	0.100
Level 3	3	0.05

Figure 2-3: Example application of our SPEI triggers.

Overall, we consider the SPEI to be a better metric when considering the water resource impact of droughts because it is more closely related to the hydrological response of our water resources. However, recognising that SPI and SPEI respond differently and that other water users (e.g. agriculture) may be more significantly affected by rainfall deficits alone, it is useful to consider both as complementary drought metrics.

2.2.2. Groundwater levels

Drought trigger curves for groundwater levels have been developed from EA groundwater level data across a suite of key indicator observation boreholes (OBHs). These boreholes have been selected based on location, aquifer type, monitoring record and frequency of monitoring.

Our groundwater triggers are based on Standardised Groundwater Indices (SGI). The SGI method was developed by the British Geological Survey[17] and follows similar principles to that applied for SPI and SPEI

[16] Environment Agency, 2020. Potential evapotranspiration datasets, v.1.0 available under the Open Government Licence
[17] Bloomfield, J. P. and Marchant, B. P., 2013. Analysis of groundwater drought building on the standardised precipitation index approach, Hydrol. Earth Syst. Sci., 17, 4769–4787, https://doi.org/10.5194/hess-17-4769-2013.

to estimate normalised indices for each calendar month by transforming the data via non-parametric normal-scores.

Our calculation of SGI values and derivation of triggers followed these steps.

- Interpolate observed groundwater level series (z_i) to obtain the value on the first day of the month.
- Create ranked series of groundwater levels for each month.
- Calculate p_i for each groundwater level value (p_i is the probability that a value drawn at random from the fitted distribution is less than or equal to z_i).
- Apply an inverse normal cumulative distribution to the p_i values to produce a monthly SGI series
- Calculate the annual minimum SGI values and derive the 20th, 10th and 5th percentiles to provide Level 1, Level 2 and Level 3 'trigger SGI' values respectively.

Our Level 1, Level 2 and Level 3 trigger curves provide exceedance at intervals of 1-in-5 years, 1-in-10 years and 1-in-20 years respectively. We can apply the SGI method in reverse to calculate the groundwater levels associated with the trigger SGI and these can be directly compared to observed groundwater levels. An example set of drought trigger curves based on SGIs is given in Figure 2.4.

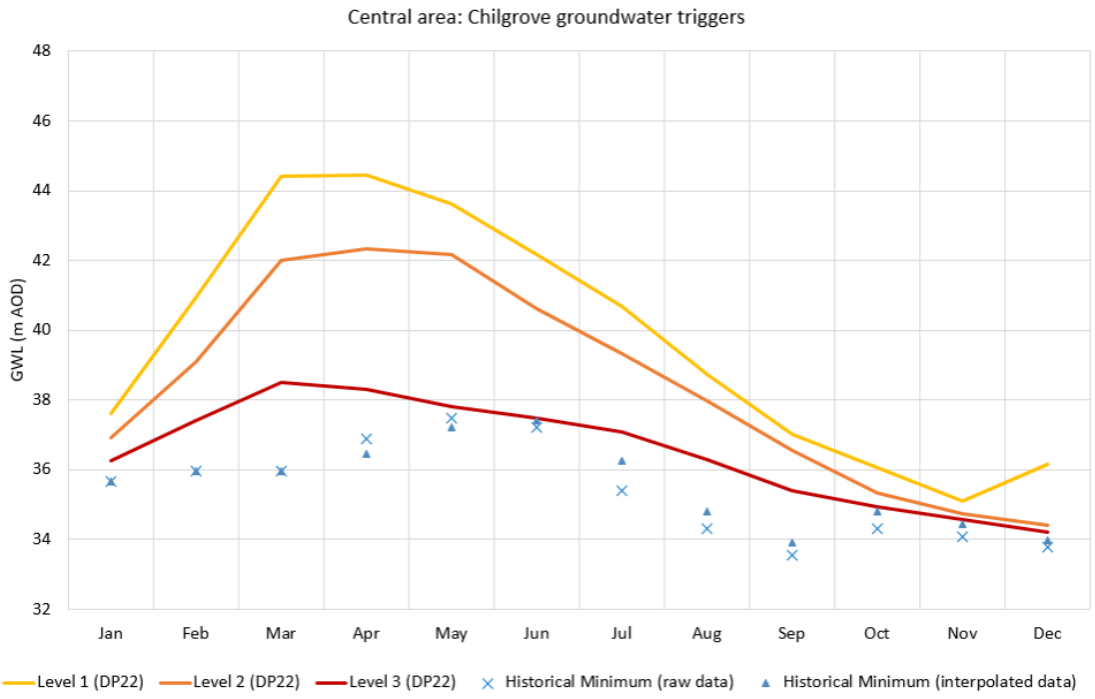


Figure 2-4: Example borehole drought trigger curve.

2.2.3. River flows

We have three major surface water abstractions which are not linked to reservoir systems. These operate on the River Test and the River Itchen in Hampshire (Western area), and the River Rother in West Sussex (Central area). These river abstractions are large and drought sensitive, such that at low flows, HoF or MRF licence conditions restrict the amount of water we can abstract.

In Hampshire, flow triggers are linked to our obligations and drought actions under the Section 20 Agreement with the EA. We have updated these drought triggers to resolve the issues relating to the relationship

between rapid runoff following rainfall and the baseflow which dominates the recession towards the HoF licence condition (or other set threshold) by deriving the triggers based directly on baseflow separated data. This is particularly important for the rivers Test and the Itchen which are baseflow dominated.

Time based triggers, as used for the River Test in the 2019 Drought Plan (DP19), have been adopted for the River Test with 90-day, 60-day and 35-day lead times. Each trigger level is defined as the minimum time that would ensure a certain probability of reaching the HoF (or other set threshold) in the adopted lead time for each month of the year. These thresholds have been based on the analysis of stochastic and historic flow recessions.

- The 90-day trigger is an early warning trigger that is linked to internal actions regarding Drought Plan preparation.
- The 60-day trigger is linked to increasing public awareness (Level 1 action) and any actions that need to be taken to consider optimisation of source operation, managing strategic transfers and drought permit/order pre-consultation.
- The 35-day trigger should provide enough time for review of the application with the flow threshold for implementation of any drought permit/order (Level 2 or 3 action) being reached by the end of that period.

The requirement for a 60-day and 35-day trigger for the River Test is set out in the Section 20 Agreement with the EA and is designed to accommodate the agreed drought permit application process for our Test surface water and Lower Itchen licences. Seasonality has been considered for each of the lead time triggers, presented in the form of profiled trigger levels, showcasing how there is a higher risk of reaching the different flow thresholds in particular months. During active drought management, we would supplement these trigger levels by forecasts of flow recessions based on our existing water resource modelling tools to ensure our actions under the Section 20 Agreement are carried out in sufficient time.

Our baseflow separation needs to be done automatically so that it can be programmed and implemented in our real-time monitoring. We have used the Eckhardt (2008)[18] digital filter, which has demonstrated good performance worldwide producing hydrologically plausible results like those obtained with manual separation and can be applied to flow records of any length.

An example set of time-based flow triggers for our Test surface water abstraction with associated levels linked to drought permit options is shown in Figure 2.5. We illustrate the adjustments that have been made to the triggers that relate to the River Itchen and Candover later in this document, for example in figures 2.9 and 3.3. We provide further detail in Annex 4.

For the Western Rother at Pulborough drought conditions are monitored based on the semi-naturalised flow over the weir (i.e. flow net of the surface abstraction near Pulborough).

Since Pulborough is a conjunctive use source, the risk to the resource comes from a combination of the magnitude and duration of surface water availability, as longer periods of low river levels mean there is a greater reliance on the groundwater storage. The trigger curves are therefore based on cumulative deviation from the long-term mean, rather than absolute river flows.

[18] Eckhardt, K., 2008. A comparison of baseflow indices, which were calculated with seven different baseflow separation methods, Journal of Hydrology (352), 168-173.

The River Rother trigger curve has been calculated based on departure from average flows for the period 1961-1990. The difference between these and actual in-month totals are calculated and added on a cumulative basis and trigger curves are calculated based on percentages from these deficit profiles.

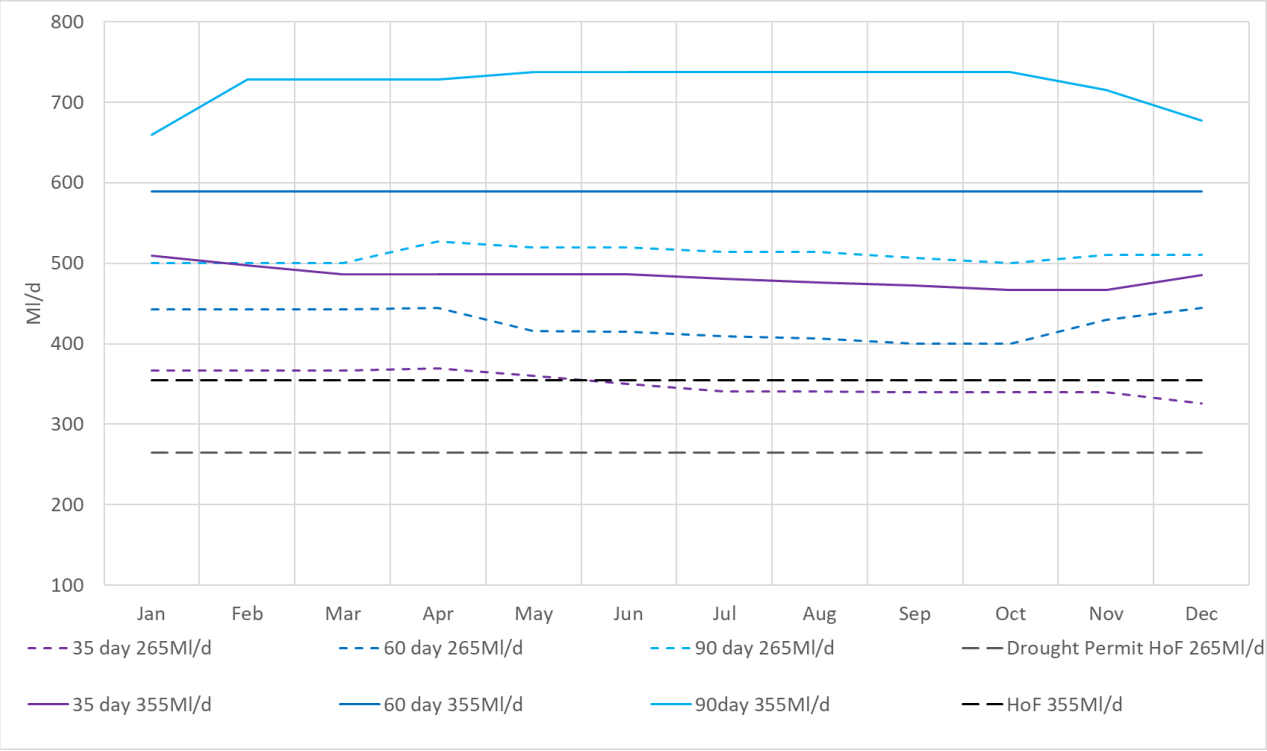


Figure 2-5: Time based triggers for the River Test.

Like our groundwater triggers, relevant percentiles have been selected to represent a 1-in-5 years, 1-in-10 years (Category 1) and 1-in-20 years (Category 2) frequency of exceedance. The Western Rother flow triggers are shown in Figure 2.6.

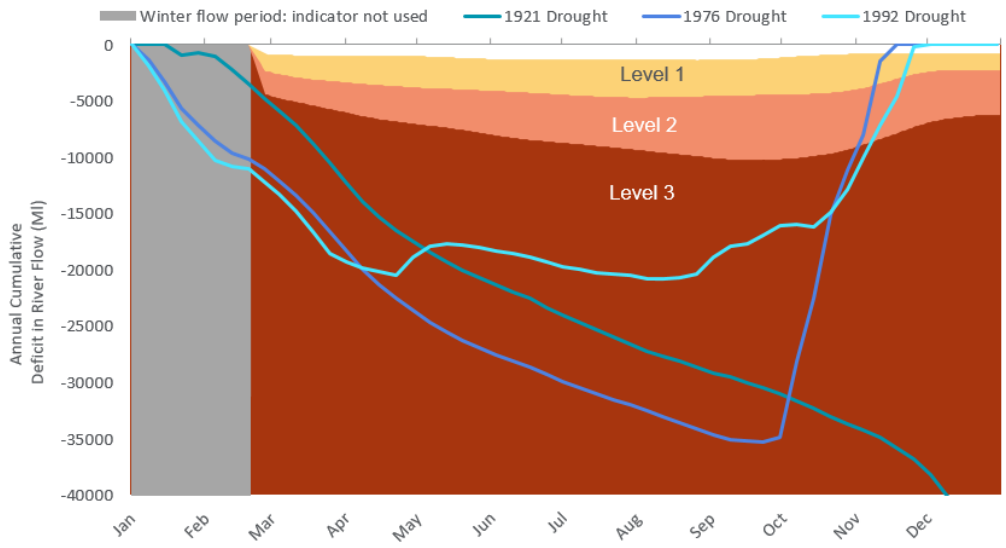


Figure 2-6: Cumulative deficit flow trigger curve for the Western Rother.

This approach should provide an indicator of how severe the recession is during the early part of the year allowing us sufficient time to act ahead of the summer peak demand or autumn minimum flow critical periods. It should indicate how long river flows have been below the threshold at which abstraction starts to become limited during the summer. This is important as it provides an indicator of the stress that the key groundwater storage site in SNZ WRZ has experienced because of abstraction during the drought. It should indicate the timing of the recharge period, and when this is late enough to cause concerns over the next year's recession so if necessary, drought measures can be extended.

2.2.4. Reservoir levels

We have four main reservoirs in our supply area:

- Bewl Water reservoir (Eastern area)
- Darwell reservoir (Eastern area)
- Powdermill reservoir (Eastern area)
- Weir Wood reservoir[19] (Central area)

We have updated our reservoir triggers for Bewl, Darwell and Powdermill from DP19. Since the greatest threat to supplies in our SNZ WRZ is low flows on the River Rother, our drought actions for this WRZ are primarily driven by our flow triggers. The previous reservoir trigger curves for Weir Wood reservoir remain valid but were not updated as they are unlikely to trigger in advance of the primary river flow triggers.

[19] We are currently upgrading the water treatment works at Weir Wood reservoir.

Due to the interconnected nature of the River Medway Scheme and the Bewl-Darwell internal raw water transfer, we have developed a combined resource metric for our Eastern area surface water reservoirs based on the combined storage.

Based on analysis of WRMP19 stochastic reservoir storage data, triggers have been developed for Level 2 (1-in-10 years) and Level 3 (1-in-20 years) thresholds which have been defined by the day of the year. Manual adjustments have been made to ensure a representative number of years with crossings over the 2,000-year stochastic dataset. Some smoothing has been applied using a 61-day average profile due to the variability evident within the profiles. The trigger levels were checked against the historical observed reservoir levels and available Aquator time series. An example is shown in Figure 2.7.

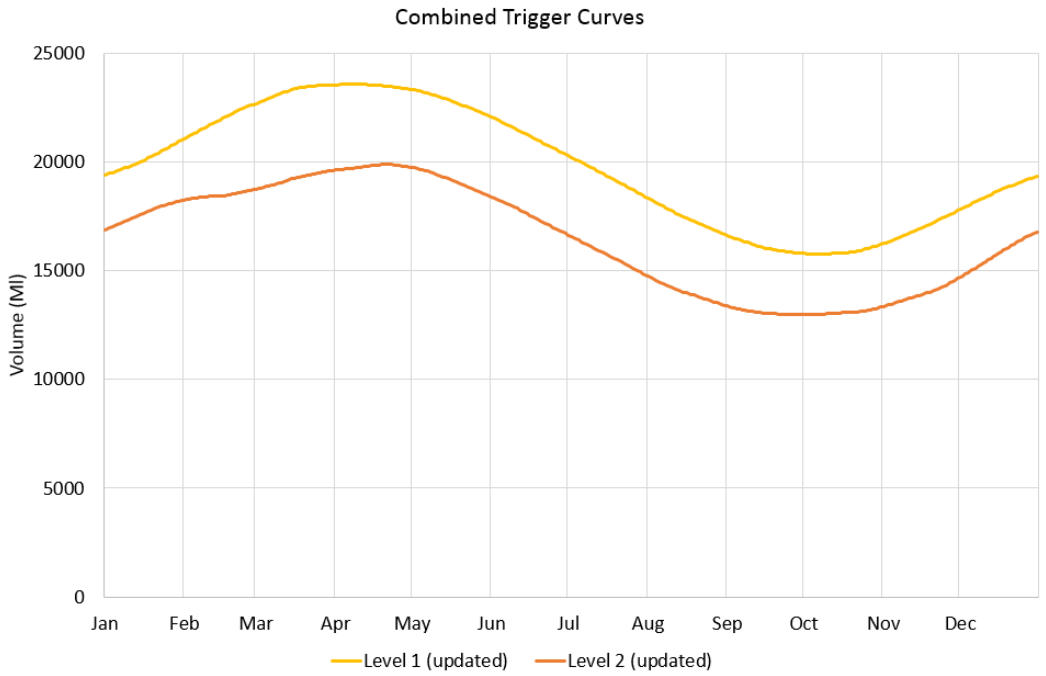


Figure 2-7: Example of a reservoir trigger curve.

2.2.5. Environmental triggers

The Drought Plan guideline allows for the development of environmental triggers that would indicate when the environment might become stressed during drought due to a reduction of flows or groundwater levels, but which may not necessarily impact water supplies.

Many of our large abstractions have been subject to sustainability investigations under the Water Industry National Environment Programme (WINEP), the goal of which has been to improve the status of abstraction-impacted waterbodies in line with the objectives of the Water Framework Directive (WFD). Many of these sites have since been subject to abstraction licence changes as part of mitigations to improve water body status and prevent deterioration. These have taken the form of annual, monthly or daily quantity reductions and the imposition of HoF or MRF conditions.

In some cases, it is the loss of resource from environmentally driven licence changes that have required us to develop new drought permit/order options to be able to maintain public water supply in a drought. We acknowledge that such actions may lead to environmental damage, but the drought permit/order process

seeks to limit such damage by only enacting these measures when necessary to maintain water supplies and through monitoring and mitigation of the impacts. Environmental stresses will also, to a greater or lesser extent, be mitigated within the abstraction licence conditions and our preparations for drought permits/orders.

Development of environmental stress triggers may be more practical, and provide more benefits, for sites where the environmental impacts of our abstractions are less well understood. This is most likely to be the case for our groundwater sources which have not yet been subject to Restoring Sustainable Abstraction (RSA) studies or which are due to be studied under our 'No Deterioration' WINEP objectives. Limited hydroecological data currently exist for such sites and is unlikely to be comprehensive for low flow periods given that recent years have been relatively wet.

In the absence of regular or live hydroecological monitoring, flow and/or water quality data are likely to provide the best indication of potential for environmental stress. We propose that the flow standards for the Environmental Flow Indicator (EFI) thresholds or use of the Common Standards Monitoring Guidance (CSMG) thresholds could be applied as an indicator for establishing environmental stress.

In Table 2.1 we have set out environmental stress triggers for several key surface water bodies in our supply area. The triggers are based on the low flow Q_{95} (95^{th} percentile) EFI which provides a good indication or water body stress during drought conditions.

We have used our understanding of the specific abstraction reductions likely to be required at the relevant individual sources to meet EFI targets to set target abstraction rates based on the work we have conducted for Sustainability Reductions in WRMP19 and for our draft WRMP24 Environmental Destination.

However, our long term WRMP planning has shown that to achieve these abstraction reduction targets before 2027 would create supply - demand deficits until some of our long term strategic water supply options are available. As these abstractions are currently operating within their abstraction licences any reductions to alleviate environmental stress would have to be made on a best endeavours basis, reflecting the drought severity and supply risk at that time.

Table 2-1: Environmental stress triggers and associated actions based on Q_{95} EFI.

River name	Q_{95} EFI (Ml/d)	Associated gauging station	Associated source(s)	Best Endeavors Abstraction Target rate	WRZ	Action
Anton	76.42	Fullerton	Andover	5Ml/d	HAZ	Increase water efficiency communications, reduce abstraction at Andover as much as possible to target rate, increase abstraction at near Whitchurch to compensate
Test, conf Dever to conf Anton	223.27	Chilbolton	Whitchurch, Overton	1.55Ml/d 1.6Ml/d	HAZ	Increase water efficiency communications, no other action presently possible, no relocation option
Test, conf Dun to Tadburn Lake	339.26	Timsbury	Romsey	5.4Ml/d	HRZ	Increase water efficiency communications No other action presently possible, no relocation option
Test total flow	450.74	Testwood, Conager Bridge, Ower, M27TV1	Test Surface Water	55Ml/d	HSE	Flow already below River Itchen flow triggers, drought actions including monitoring and mitigation set out under our Section 20 Agreement
Candover Brook	17.69	Borough Bridge, Candover Stream	Alresford	0Ml/d	HWZ	Increase water efficiency communications, reduce abstraction at Alresford (relocate to Winchester) but only shifts impacts downstream
Itchen at Easton	195.28	Easton	Winchester	13.3Ml/d	HWZ	Increase water efficiency communications, reduce abstraction at Winchester (relocate to Itchen Surface Water or the Section 20 Agreement measures), shifts impacts downstream
Itchen at Allbrook and Highbridge	283.02	Allbrook and Highbridge	Itchen Surface Water, Itchen Groundwater, Twyford	30Ml/d	HSE	Flow already below River Itchen flow triggers, drought actions including monitoring and mitigation set out under our Section 20 Agreement
Lukely Brook	24.67	Carisbrooke	Newport, Lukely Brook	3.42Ml/d 0.79Ml/d	IOW	Increase water efficiency communications, reduce abstraction at Lukely Brook and, if possible, Newport
Chillerton	12.93	River Medina at Chillerton	Rookley	0.7Ml/d	IOW	Increase water efficiency communications, relocate abstraction to Newport or Sandown (if possible)
Caul Bourne	2.82	Caul Bourne	Caul Bourne	0.8Ml/d	IOW	Increase water efficiency communications, abstraction already limited to protect HoF, no other actions possible
Eastern Yar	13.34	Burnt House	Sandown	8Ml/d	IOW	Increase water efficiency communications, Use Flow Augmentation Scheme, relocate abstraction to Newport if possible, use Cross-Solent main
Upper Rother at Durford	19.86	River Rother at Iping Mill	Rogate	0Ml/d	SNZ	Increase water efficiency communications, associated source is out of service until 2024, no other actions possible
River Lod	4.29	River Lod at Halfway Bridge	Petworth South	1.33Ml/d	SNZ	Increase water efficiency communications, relocate abstraction downstream (to Pulborough)
Western Rother	121.85	Pulborough	Pulborough Surface	40Ml/d	SNZ	Increase water efficiency communications, no other action presently possible, no relocation option
Nailbourne and Little Stour	40.19	Little Stour at Littlebourne	Near Canterbury	5Ml/d	KTZ	Increase water efficiency communications, relocate abstraction from Canterbury to other sources where possible (but may not be due to wider goundwater abstraction impacts)

Most of these water bodies are either currently subject to or have been previously subject to environmental investigations. These locations have been selected as telemetered flow data is available at nearby gauging stations that allows near real time monitoring of flow conditions compared to the EFI and so could act as a reasonable live indicator of environmental stress. Potential mitigations actions are indicated in Table 2.1, however, there are also several limitations to this approach that must be recognised.

Currently, we can only take limited actions if the EFI based environmental triggers are crossed. The most obvious is to increase water efficiency messaging and to reduce abstraction from affecting sources (e.g. those closest to surface water bodies or groundwater dependent terrestrial ecosystems) and relocate it elsewhere (e.g. from headwater catchments to downstream sources). However, this may not always be practical, particularly in a developing drought and will depend on the nature of the sources (capacity, licence, network arrangement, and drought sensitivity) and levels and distribution of demand. Relocation of abstraction also risks relocating the environmental stress elsewhere.

For sites not yet subject to environmental licence changes, or which are subject to ongoing WINEP studies, flow conditions and abstraction impacts may be such that EFI targets are not met, even under normal conditions; hence the environment may be in a degree of constant stress. This may only be fully understood and appropriate mitigation possible once these studies conclude.

There may be some physical enhancement or management actions we could take (e.g. sluice control) if such environmental stress triggers are crossed but this would rely on having a good understanding of the hydro ecological function of an affected water body to ensure that such actions are appropriate and would not cause damage themselves.

Our current WINEP studies cover many of our groundwater abstractions. The investigations will require a significant amount of monitoring, modelling and will result in an improvement in our understanding of abstraction impacts on surface water bodies and groundwater dependent terrestrial ecosystems. This is likely to lead to future licence changes and mitigations which will provide enhanced protection against deterioration of water body status but will also provide us with the data and understanding that we could use to develop more refined environmental stress triggers, and where needed, additional drought actions to provide increased environmental protection.

2.3. Multi-factor triggers and drought phasing

In general, for all WRZs, the start of a drought (Level 1), which involves voluntary actions, has been defined as any trigger crossing the 1-in-5 years SPI, SPEI or groundwater trigger thresholds. The exceptions to this are the rivers Test and Itchen where drought actions are defined under the Section 20 Agreement. In this case, the start of drought (Level 1) is defined with a 60-day threshold to start preparation of drought permit and water efficiency measures. An additional 90-day trigger is also defined to provide an internal early warning. This will nearly always be a 90-day threshold triggered for the River Test and it will typically occur in advance of even moderate rainfall deficits developing.

Level 2 and Level 3 actions will tend to be defined with triggers crossing the 1-in-10 years and 1-in-20 years thresholds respectively, except for the rivers Test and Itchen where drought actions are defined under the Section 20 Agreement. For each WRZ, primary and supporting triggers have been defined.

Our multi-factorial approach considers the adoption of primary and secondary triggers to aid our decision making through Level 2 and Level 3 actions. Primary triggers include the river flow, reservoir storage or groundwater levels and supporting triggers include SPI and SPEI for associated durations as well as

groundwater levels and triggers based on other WRZs. We have defined the associated duration for SPI and SPEI based on a comparison of historic drought occurrence between the primary trigger and different SPI and SPEI durations.

Level 2 or Level 3 actions can be initiated based on the primary trigger or if the secondary SPI or SPEI triggers are breached, and the primary trigger is close to its respective trigger level. If this is the case, it is likely there will still be risks to supplies as indicated by the SPI and SPEI rainfall deficits. It is important to note that the trigger levels do not require both SPI and SPEI to initiate the next phase of drought actions. This multi factor approach also helps to mitigate some of the uncertainties associated with our triggers, for example where groundwater triggers have necessarily been based on limited datasets.

In the case where, due to data availability or recording issues, a trigger is not available, actions may be initiated based on primary or supporting triggers alone. In addition to this we may consider the use of alternative duration SPI and SPEI metrics as necessary to support an ESoR case for any drought permit/order applications. This follows the lessons learned from the Section 20 Agreement process for the River Test surface water Drought Permit in 2019 and 2020.

A drought ends when normal conditions resume and the risk to security of supply and the environment are no greater than they would be under normal conditions. Several indicators are used to determine that a drought has ended. This varies for each WRZ but in general consists of the primary trigger (river flow, reservoir storage or groundwater level) exiting the defined trigger thresholds and SPEI reaching a defined threshold. From comparisons with historic droughts, we found that SPEI for the associated durations for each WRZ corresponds well to the progression of the primary triggers as it considers not just the significance of the rainfall deficit but also seasonality by accounting for PET and hence providing a better metric of hydrological drought.

2.3.1. Western area

In the Western area, the primary triggers for HSE and HSW WRZs relate to the Test and Itchen river flows and are subject to a specific set of thresholds and actions as defined in the Section 20 Agreement and which were set out in DP19. In addition, the groundwater OBHs for Clanville Lodge (for HAZ and HKZ WRZs in Hampshire North) and West Meon (for HWZ, HRZ, HSE and HSW WRZs in Hampshire South) are also included though these are more drought resilient than the surface water sources.

Separate triggers have been defined for the IOW WRZ based on the indigenous groundwater resources. The primary trigger for this is the Carisbrooke Castle OBH. Given the need for supplies from the cross-Solent main, this WRZ is dependent on supplies from Hampshire. As such drought phasing is also linked to that for Hampshire South WRZs.

The response of resources to rainfall is markedly different for the high storage, persistent, chalk fed sources of the mainland and the low storage, constrained sources of the IOW. The rivers Test and Itchen resources are more likely to be affected by a combination of both long-term drought (up to 24 months duration), which reduces groundwater storage and baseflow, and shorter-term drought events (12 months). Given the relative importance of the river flow indicators, a single 12-months duration indicator has been adopted for the SPI and SPEI. For the IOW WRZ, the quicker responding groundwater is linked to a 6-months duration SPI and SPEI. These timescales are consistent with the critical drought durations identified by our drought vulnerability assessment. A schematic of primary and supporting triggers is shown in Figure 2.8.

The phasing of triggers is set out in Figure 2.9 incorporating the current trigger thresholds we use for the rivers Test and Itchen. Both the rivers Test and Itchen also have 90-days early warning triggers which

provide additional lead time to the Level 1 stage. It is expected that for Hampshire South WRZs the river flow triggers will drive Drought Plan actions in line with the Section 20 Agreement. However, groundwater levels for West Meon as well as the SPI and SPEI triggers will provide supporting information on the drought progression and can be used to initiate Drought Plan actions in addition to the river flow triggers. It is unlikely that these supporting triggers will provide any advance warning ahead of the time-based river flow triggers for the rivers Test and Itchen.

For Hampshire North WRZs the groundwater level triggers for Clanville Lodge are used. Due to the uncertainty in and closeness of some of the trigger levels there is greater flexibility to define Drought Plan actions based on a combination of groundwater level and associated SPI or SPEI duration triggers, particularly as SPI and SPEI can provide some advance warning of drought conditions.

A similar principle applies for the IOW WRZ triggers where SPI and SPEI can also provide some advance warning of drought conditions. For this WRZ since there is reliance on the cross-Solent Main a linking trigger has been included to allow for alignment in drought conditions with the Hampshire South WRZs.

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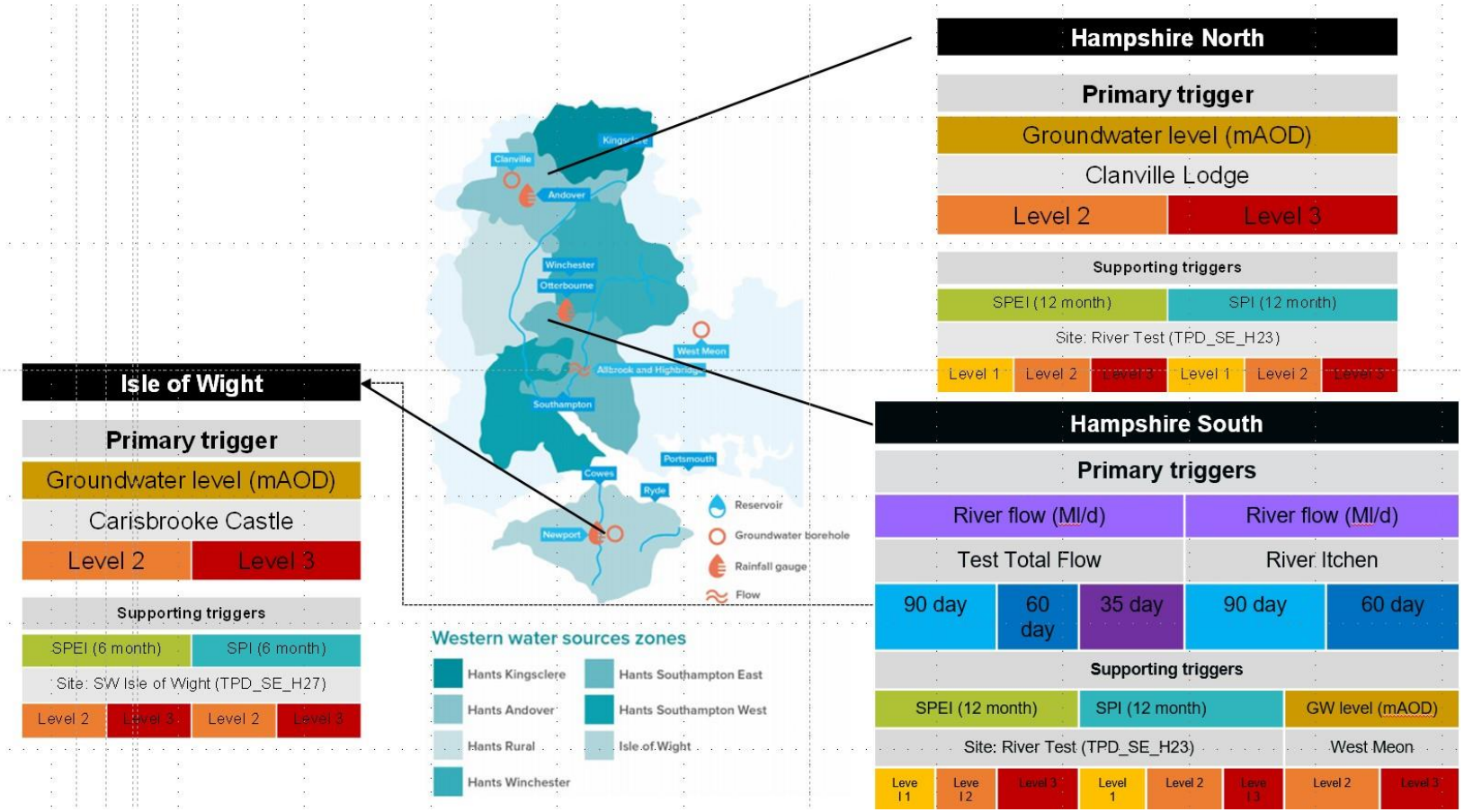


Figure 2-8: Western area primary and supporting triggers for Level 2 and Level 3

Note that this figure no longer refers to the River Itchen 35-day trigger. This aligns with figure 3.3. For more details on this refer to Annex 4.

	Trigger	Level 1	Level 2	Level 3	Drought end
Isle of Wight	Groundwater level: Carisbrooke Castle SPI (6 month rolling): Stour SPEI (6 month rolling): Sour Hampshire South zone conditions	• SPEI or SPI **below** 1 in 5 year threshold OR • Level 1 conditions triggered in Hampshire South zone OR • GW level **below** 1 in 5 year threshold	• GW level **below** 1 in 10 year trigger curve and SPEI/ SPI **below** 1 in 5 year threshold OR • SPEI / SPI **below** 1 in 10 year trigger curve and GW level **close to** 1 in 10 year trigger curve OR • Level 2 conditions triggered in Hampshire South zone	• GW level **below** 1 in 20 year trigger curve and SPEI/ SPI **below** 1 in 5 year threshold OR • SPEI / SPI **below** 1 in 20 year trigger curve and GW level **close to** 1 in 20 year trigger curve OR • Level 3 conditions triggered in Hampshire South zone	• SPEI **above -0.5** AND • GW level above 1 in 10 year trigger curve AND • Drought end conditions met in Hampshire South zone

Note: If due to data availability / recording issues drought plan action levels may be initiated based on primary or supporting triggers alone.

Hampshire North	Groundwater level: Clanville Lodge SPI (24 month rolling): River Test SPEI (24 month rolling): River Test	• SPEI or SPI **below** 1 in 5 year threshold OR • GW level **below** 1 in 5 year threshold	• GW level **below** 1 in 10 year trigger curve and SPEI/ SPI **below** 1 in 5 year threshold OR • SPEI / SPI **below** 1 in 10 year trigger curve and GW level **close to** 1 in 10 year trigger curve	• GW level **below** 1 in 20 year trigger curve and SPEI/ SPI **below** 1 in 5 year threshold OR • **SPEI / SPI below** 1 in 20 year trigger curve and GW level **close to** 1 in 20 year trigger curve	• **SPEI above -0.5** AND • GW level above 1 in 10 year trigger curve

Hampshire South	River flow: Test Total Flow (TTF)	TTF below 60-day to HoF 355Ml/d Subsequent triggers through Level 1: • TTF below 35-day to HoF 355Ml/d (DP application) • TTF below 90-day, 60 day, 35-day to DP HoF 265Ml/d	TTF below 356Ml/d Subsequent triggers through Level 2: • TTF below 35-day to DP HoF 265Ml/d	TTF below 310Ml/d	• **SPEI above 0.0** AND • TTF **above** 60-day HoF 355Ml/d threshold AND • Itchen above 60-day to 205Ml/d threshold AND • GW level above 1 in 10 year trigger curve
	River flow: Itchen – Highbridge & Allbrook	Itchen below 60-day to HoF 205Ml/d*	Application threshold determined by flow forecasting and in agreement with EA*	River Itchen Flows < 205 Ml/d* River Itchen Flows < 200 Ml/d* River Itchen Flows < 198 Ml/d*	
	Groundwater level: Carisbrooke Castle SPI (6 month rolling): Stour SPEI (6 month rolling): Sour	• SPEI or SPI **below** 1 in 5 year threshold OR • GW level **below** 1 in 5 year threshold	• GW level **below** 1 in 10 year trigger curve and SPEI/ SPI **below** 1 in 5 year threshold OR • SPEI / SPI **below** 1 in 10 year trigger curve and GW level **close to** 1 in 10 year trigger curve	• GW level **below** 1 in 20 year trigger curve and SPEI/ SPI **below** 1 in 5 year threshold OR • SPEI / SPI **below** 1 in 20 year trigger curve and GW level **close to** 1 in 20 year trigger curve	

Note: If due to data availability / recording issues drought plan action levels may be initiated based on primary or supporting triggers alone.
Note: 90-day trigger thresholds also exist for the Test and Itchen to provide additional internal lead time prior to the Level 1.

Figure 2-9: Western area trigger phasing

*Levels 1, 2 and 3 for the Itchen have been updated. For Level 1, ‘subsequent triggers’ have been removed. For Level 2, the statement of ‘Itchen below 206ML/d’ has been removed and replaced with ‘application threshold determined by flow forecasting and in agreement with EA’. For Level 3, the statement ‘Itchen below 205Ml/d’ has been removed and divided into 3 categories for River Itchen Flows (205, 200 and 198 Ml/d). This aligns with figure 3.3.

2.3.2. Central area

In the Central area, our primary and supporting triggers are defined for each WRZ as follows:

- SWZ: Chilgrove OBH groundwater level
- SBZ: Houndean Bottom and Whitelot Bottom OBH groundwater levels
- SNZ: Cumulative flow deficit triggers for the Western Rother at Pulborough

Groundwater provides an important source in the Central area drawing on abstractions from the SBZ and SWZ groundwater sources. Although Chilgrove is located outside the SWZ WRZ, it serves as an indicator of the groundwater levels in the Chalk block. The Western Rother is an important surface water source for the Pulborough supply works.

Comparison of the primary triggers and supporting SPI and SPEI triggers indicates the Central area sources tend to be vulnerable to relatively short droughts of between 6 and 18 months. SPI and SPEI indicators have therefore been chosen as 12 months for SNZ and SBZ WRZs and 6 months for SWZ WRZ to match the historic drought occurrence and provide lead time against the primary triggers. A schematic of primary and supporting triggers is shown in Figure 2.10.

The phasing of triggers is set out in Figure 2.11. For groundwater level triggers, due to the uncertainty in and closeness of some of the trigger levels there is greater flexibility to define Drought Plan actions based on a combination of groundwater level and associated SPI or SPEI duration triggers.

The cumulative flow deficit trigger for the Rother tends to trigger in advance of the associated SPI and SPEI triggers due to the quicker responding nature of the surface water system. As such, the cumulative flow deficit is most likely to initiate the Level 2 and Level 3 phases. However, SPI and SPEI are included in case there is a situation where these provide some advance warning.

Drought end thresholds for SPEI have been checked against historic droughts and set at -0.5 for all WRZs.

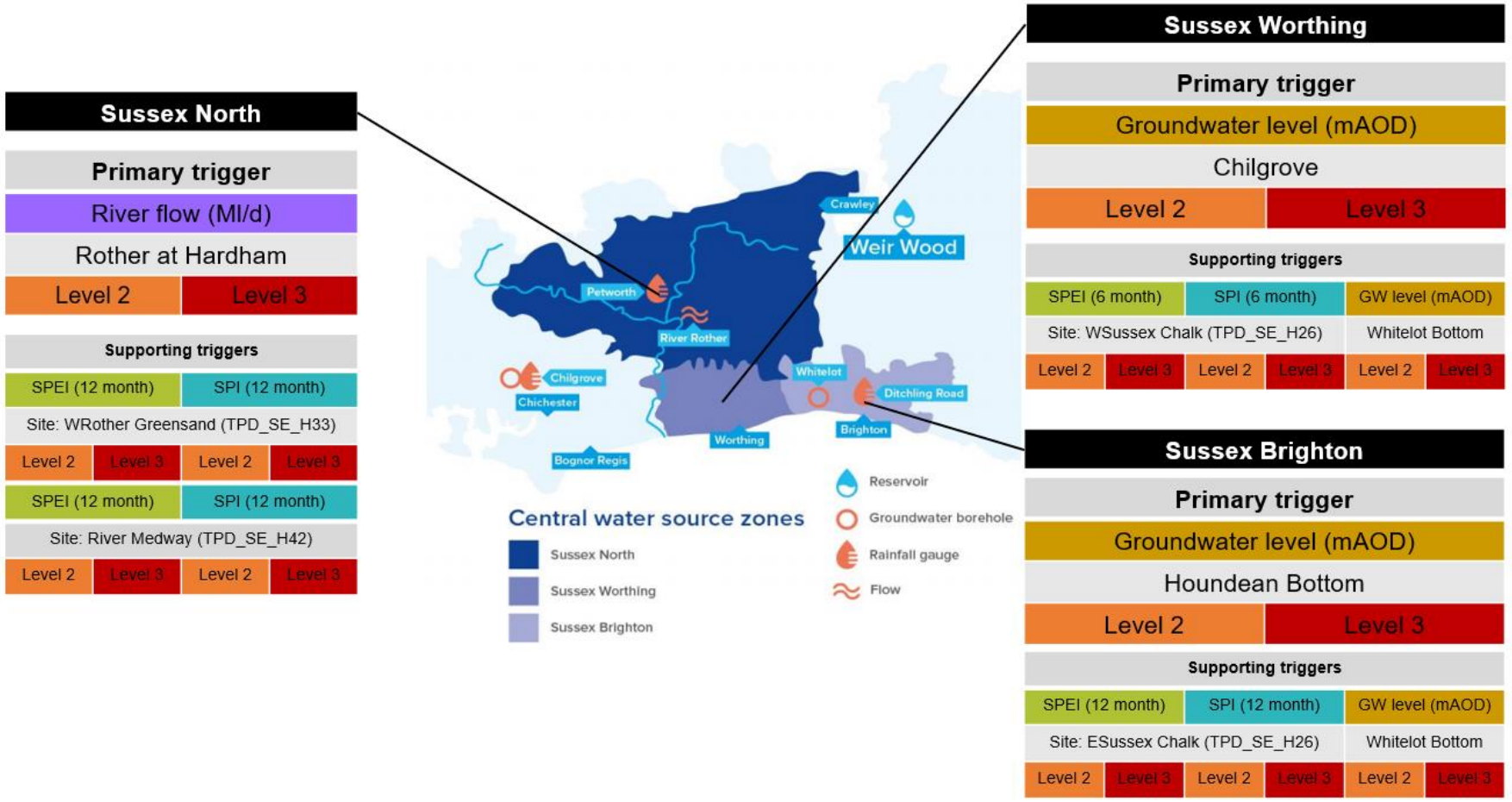


Figure 2-10: Central area primary and supporting triggers for Level 2 and Level 3.

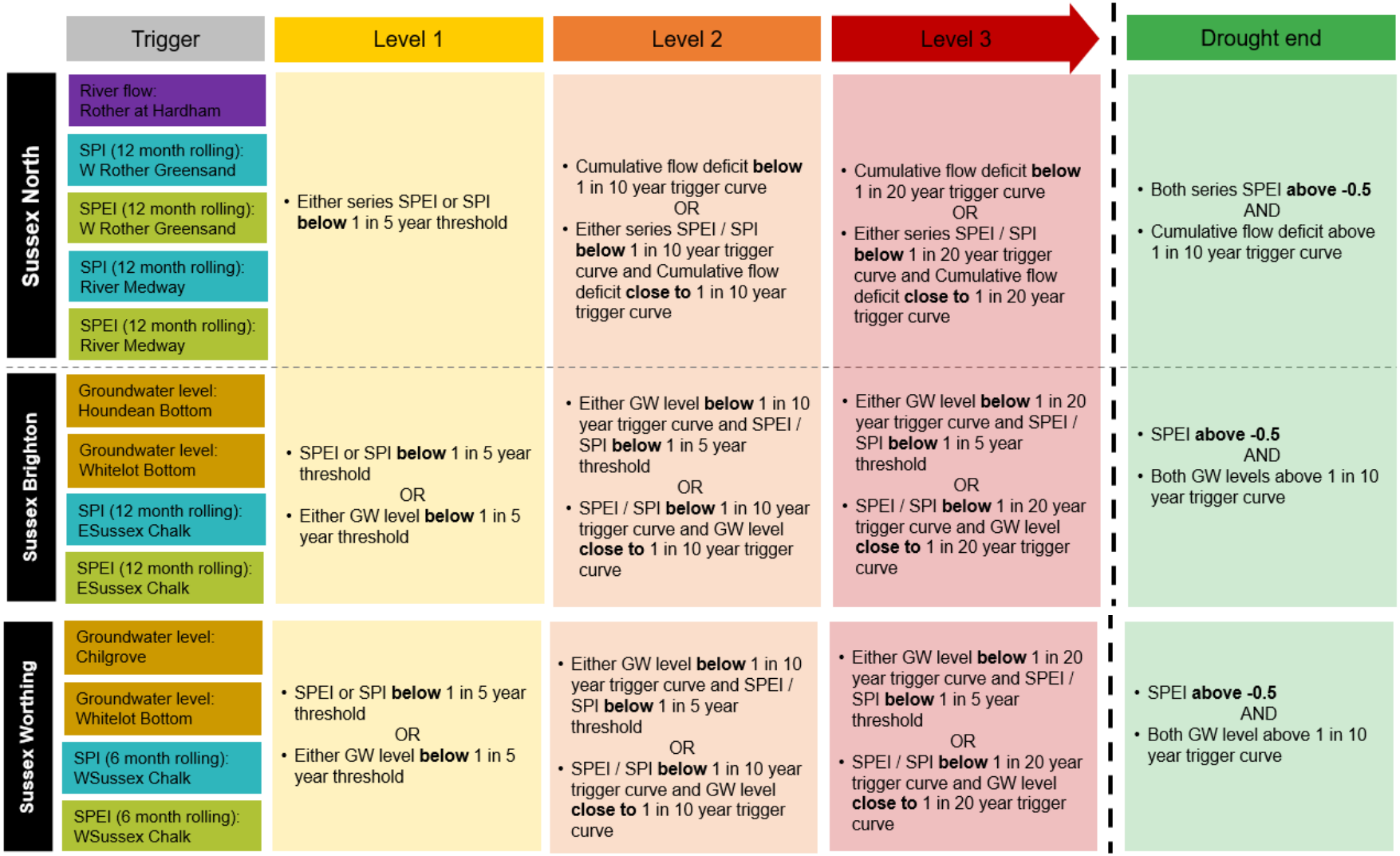


Figure 2-11: Central area trigger phasing.

2.3.3. Eastern area

In the Eastern area our primary and supporting triggers are defined for each WRZ as follows:

- KTZ: Little Bucket OBH groundwater level
- KME and KMW: The combined storage volume for the Bewl, Darwell and Powdermill reservoir system with Riddles Lane and Little Bucket OBH groundwater levels as supporting triggers
- SHZ: The combined storage volume for the Bewl, Darwell and Powdermill reservoir system

The relatively long storage times provided by the Bewl-Darwell reservoir system and the KME, KMW and KTZ borehole sources mean that the SPI and SPEI indicators that have been chosen are a combination of moderately long and very long-term rainfall and hydrological deficits (12 months and 30 months). A schematic of primary and supporting triggers is shown in Figure 2.12. The phasing of triggers is set out in Figure 2.13.

For groundwater level triggers, due to the uncertainty in and closeness of some of the trigger levels, there is greater flexibility to define drought plan actions based on a combination of groundwater level and associated SPI or SPEI duration triggers.

The combined reservoir storage tends to trigger in advance of the associated Level 2 and Level 3 SPI and SPEI triggers due to the quicker responding nature of the surface water system. As such, the reservoir storage trigger is most likely to initiate the Level 2 and Level 3 phases. However, SPI and SPEI are included in cases where these provide some advance warning. For simplicity, although it is only Bewl that is located in the KMW WRZ, we use the same combined reservoir storage metric as for the SHZ WRZ.

Drought end thresholds for SPEI have been checked against historic droughts and set at -0.5 for all WRZs.

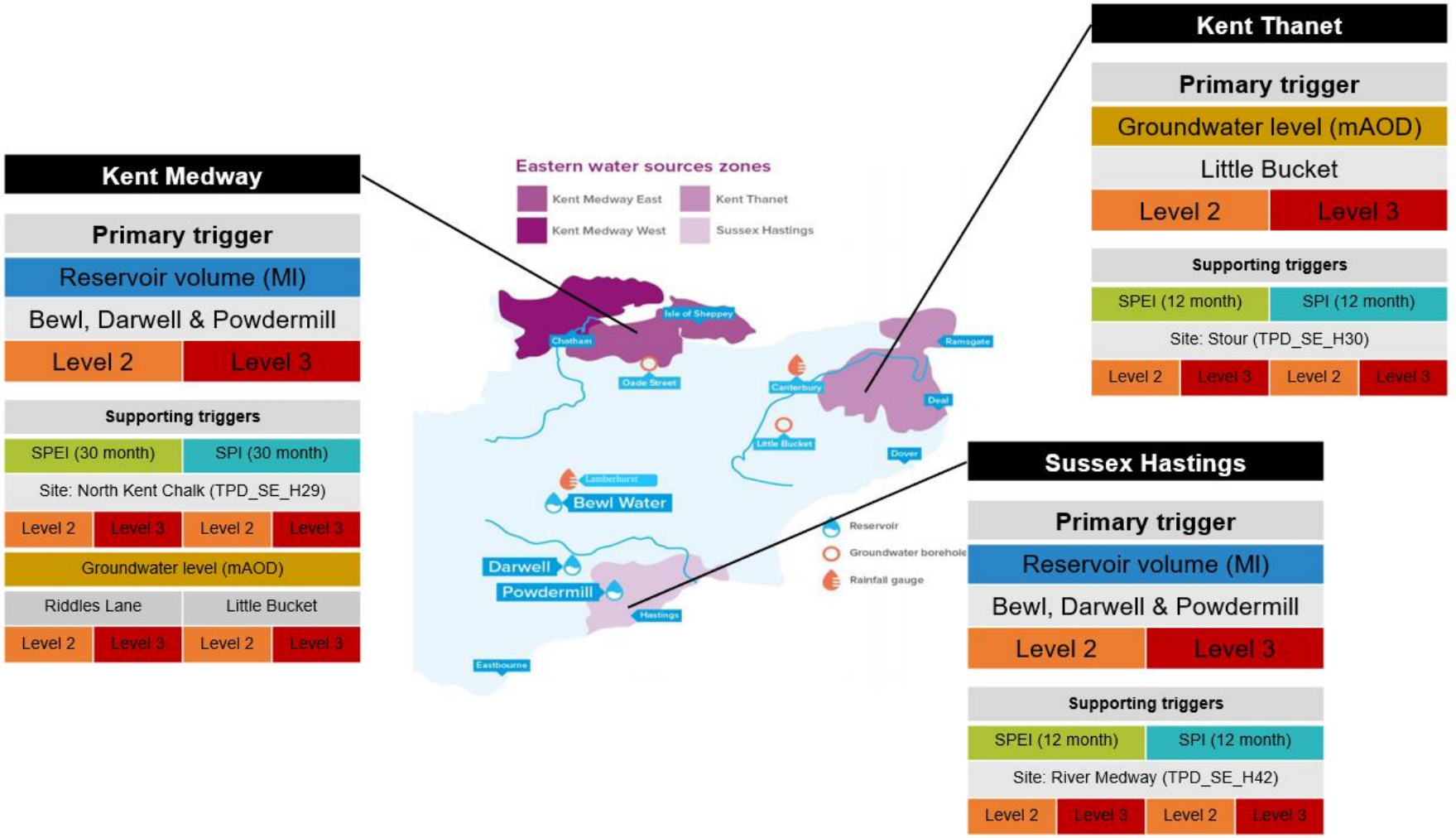


Figure 2-12: Eastern area primary and supporting triggers for Level 2 and Level 3 phases.

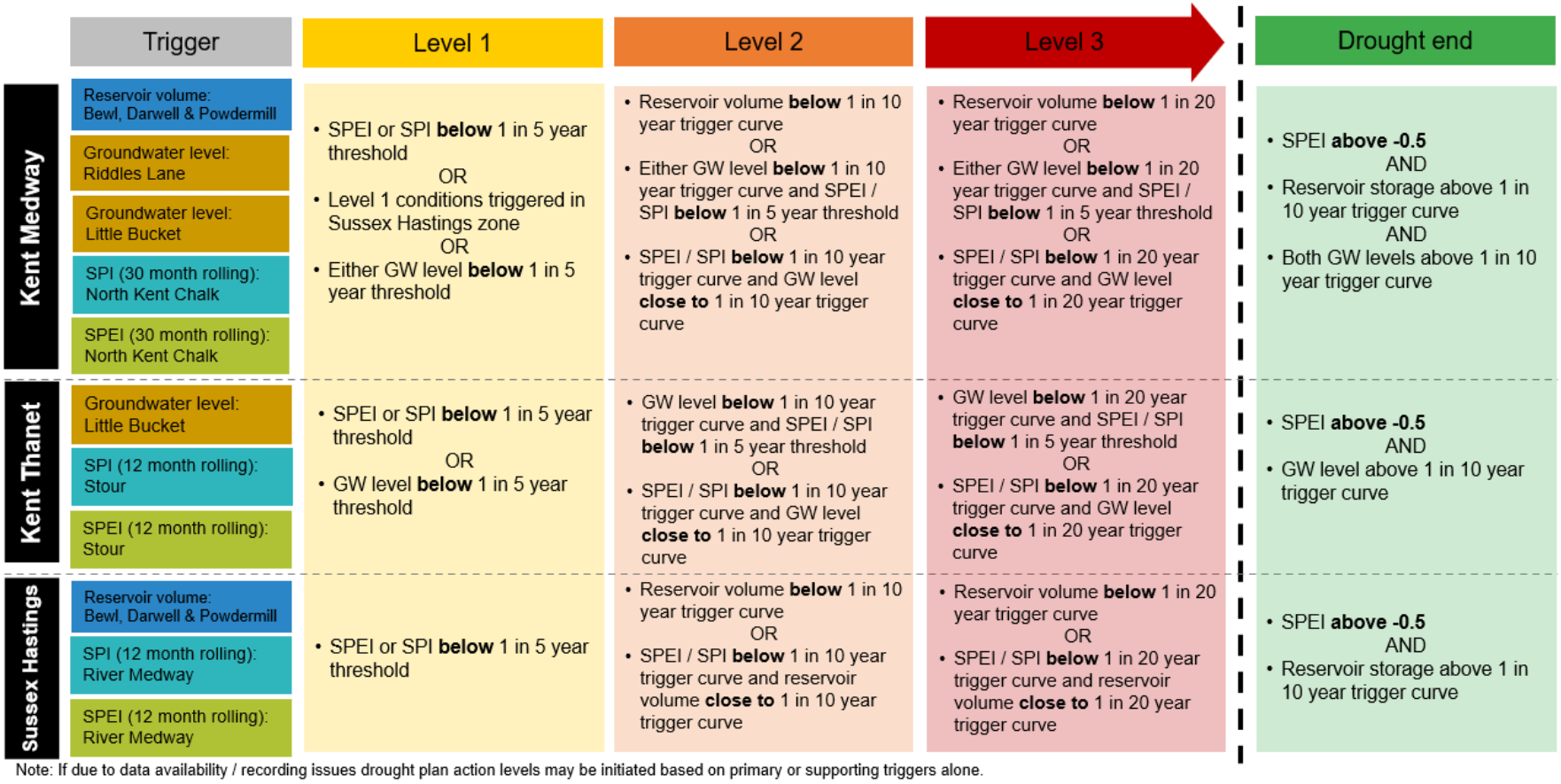


Figure 2-13: Eastern area trigger phasing.

2.4. Forecasting a drought

Once it is recognised that drought conditions exist and there is a risk that severe drought conditions could develop, forecasting of potential drought conditions are undertaken using the groundwater models (e.g. MODFLOW), hydrological models (Catchmod), water resource models (Aquator, Pywr) and spreadsheet tools for the supply-demand balance assessment.

For the modelling assessments, recent historic rainfall and evaporation are used in the Catchmod river flow models and, where available, groundwater tools, to establish baseline conditions. Potential rainfall and evaporation scenarios are developed based on historic sequences, and these are input into the models to predict possible resource availability from the current drought situation. The outputs are used in the Aquator models to decide the conjunctive use capability of the supply system if the drought progresses.

Forecasting of potential demand is based on current DI values adjusted for current leakage levels. These are fed into historic dry year demand 'envelope' curves to produce an unmodified demand forecast. The impact of demand management measures, including TUBs, drought orders to restrict water use and leakage reduction initiatives are then applied to the forecast as appropriate. If relevant, we will consider additional demand scenarios such as the effect of heatwaves or abnormal high household demand, for example as we have seen in response to the COVID-19 pandemic.

2.4.1. Supply-demand balance

As a drought progresses, we will use a variety of models to examine the current balance between available resources and forecast demand. The results from this work will allow us to examine the risk that the drought might cause to the balance between supply and demand in the coming months. The models to be used for this purpose include:

- Supply model for the strategic network (Aquator, Pywr).
- Rainfall runoff models used to predict river flows (Catchmod).
- Groundwater recharge models (4R).
- Groundwater simulation models (MODFLOW, Lumped Parameter Models).
- Bespoke spreadsheet models.

Key outputs from this work include:

- potential resource availability over the forecast period for different rainfall scenarios.
- Potential demand 'envelopes' based on latest measured Distribution Input and calculated leakage.
- Current and anticipated operational issues and source outages which could affect the availability of water supplies.
- Security of Supply Index (SoSI) calculations.

There are two levels of approach that are used when carrying out the supply-demand balance analysis (Figure 2.14). The 'simple' approach uses simple forecasting methods for surface water, such as the river recession curve shown in Figure 2.15, and standard mass balance models for reservoirs to estimate resource availability. The 'modelling' approach uses a range of modelling tools that are available for forecasting future resource positions. These include Catchmod rainfall-runoff models and groundwater models, which feed into Aquator conjunctive use water resource models. These models can use recent and forecast rainfall and DI records to estimate future, area wide, conjunctive use resource availability. These are then used to produce risk-based forecasts of supply and demand.

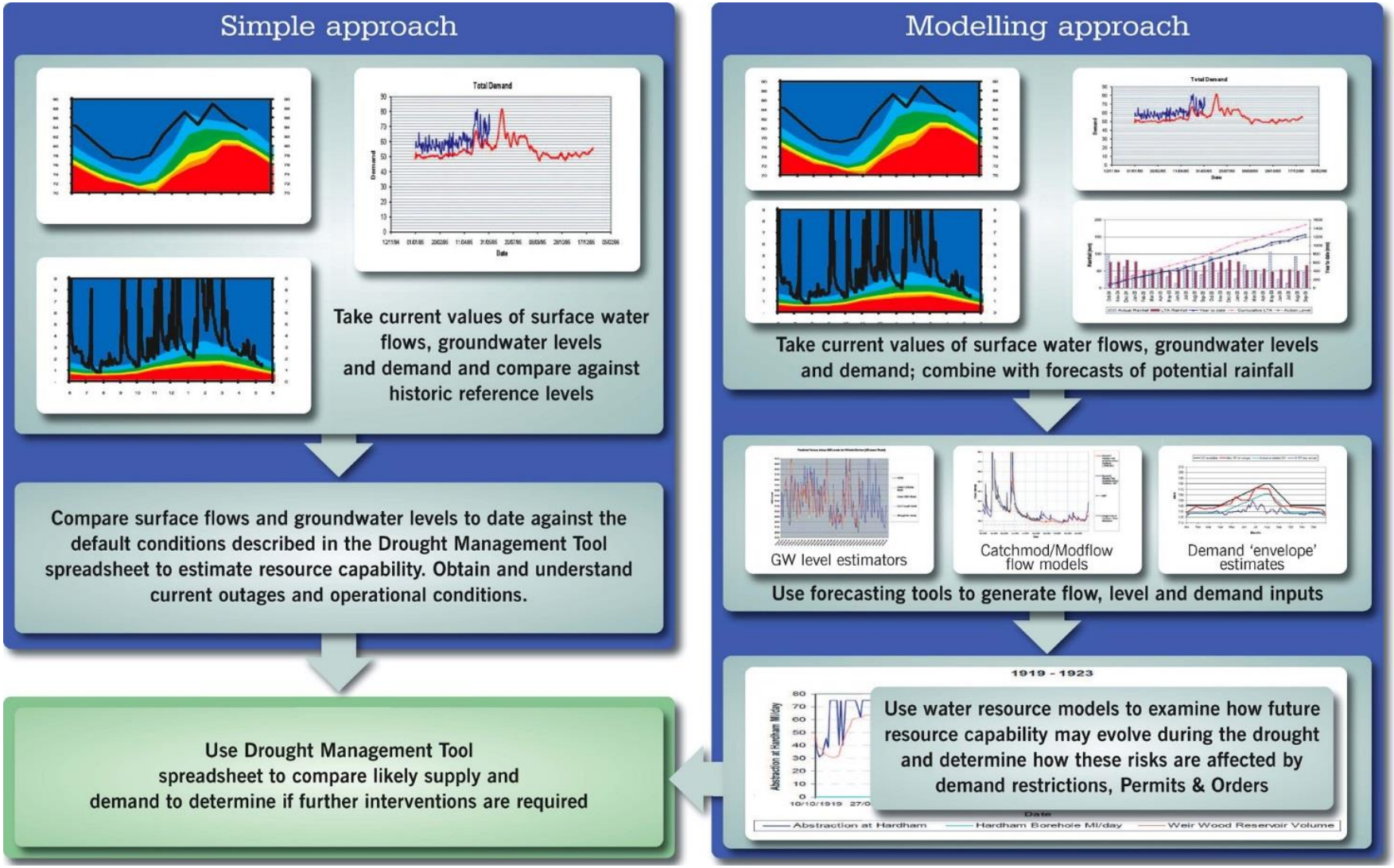


Figure 2-14: Approach to supply-demand balance analysis during drought conditions.

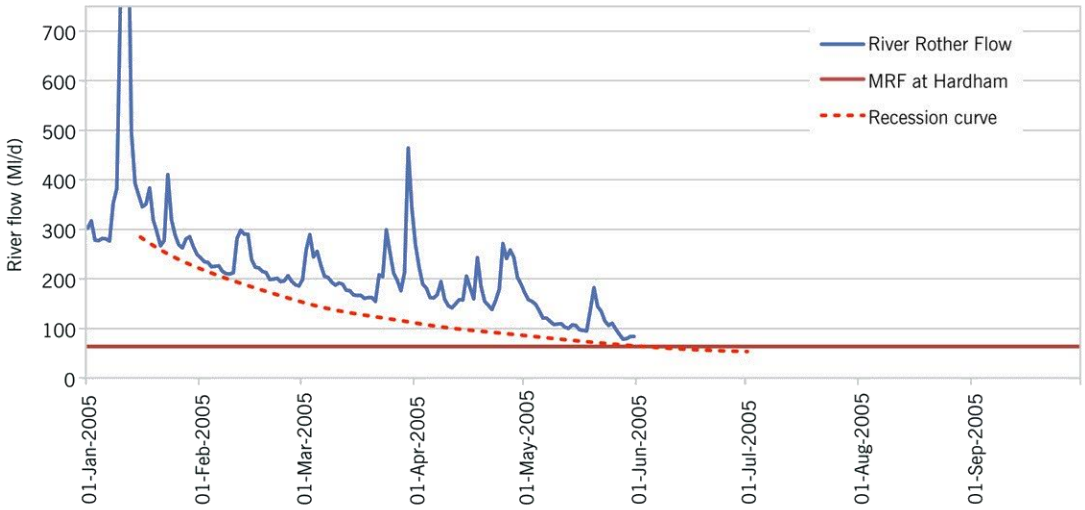


Figure 2-15: Example of monitoring river flow recession in the Western Rother near Pulborough.

Two forms of demand data are used for the purpose of drought management, as illustrated in Figure 2.16:

- Average daily demand
- Average day peak week (ADPW) demand

The ADPW is used to represent critical peak summer demands and is the average daily demand in the seven continuous days when the highest demand occurs.

Summer demands are influenced by discretionary water use, especially garden watering, although agricultural use and tourism also influence the seasonal variations in demand. Typical daily profiles in household demand for water are shown in Figure 2.17. Summer demand therefore tends to be higher during hot dry weather than during periods of cool wet weather. High weather-related demand can occur at any time from May to August, although typically the highest demands occur in late July or early August.

The average daily demand is the average demand over an entire year and so considers high demands in summer and lower demands in winter. Annual average demand therefore also tends to be higher in years characterised by hot, dry summers.

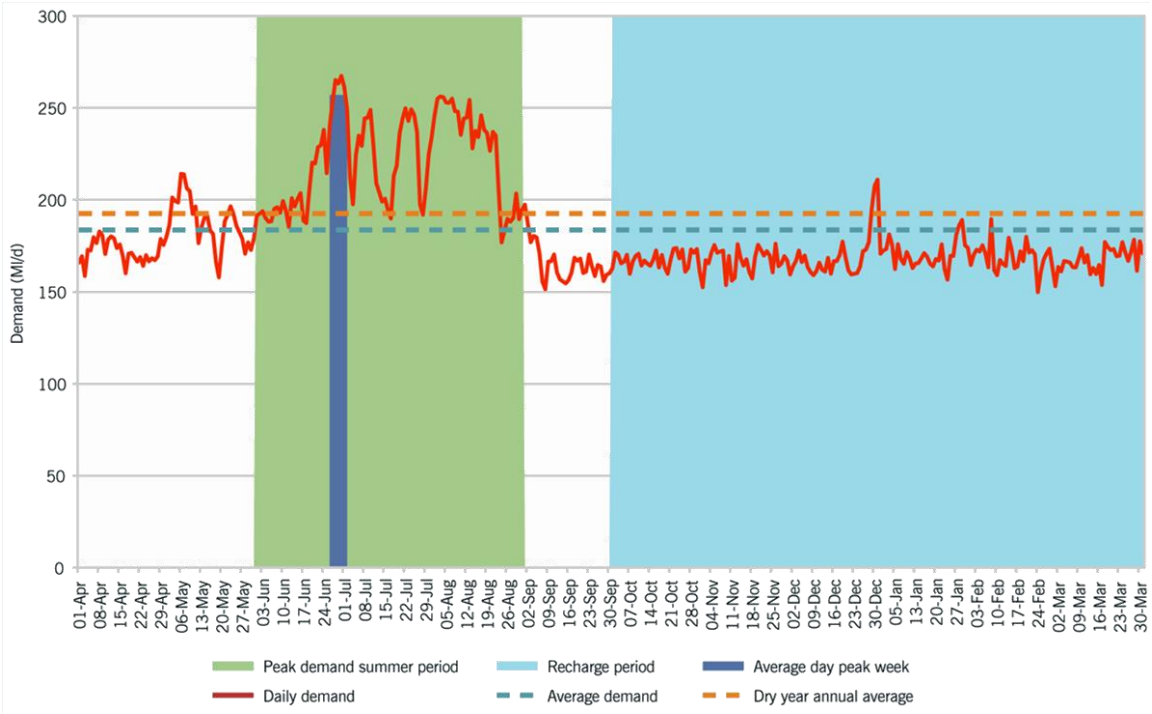


Figure 2-16: Example of demand profile over a year illustrating demand concepts.

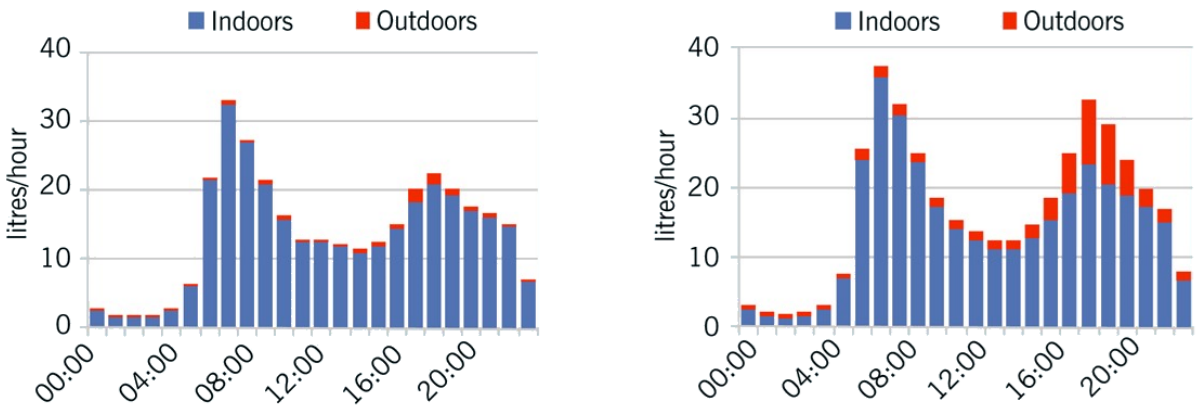


Figure 2-17: Typical daily consumption profiles in winter (left) and summer (right) (after WRc 2005[20]).

Having validated and gained confidence in the skill of our predictive models we have made a refinement to our approach. We recognise that the triggers themselves are conservative and would lead to more drought

[20] WRc (2005: Increasing the value of domestic water use data for demand management, final report, CP187.

permit / drought order applications than are required. We have learned from dry conditions since 2019 in particular from the River Test drought permit applications in 2019 and 2022. So, we would now only apply for a drought permit or drought order if both our flow forecasting shows that crossing of the hands off flow is likely and we have discussed with our regulators that an application should take place. We discuss how our drought triggers operate in more detail in Annex 4 (drought triggers and indicators).

3. Drought management actions

This section sets out the drought management actions we will use before and after a drought in our areas and then provides further details of how we would implement these actions dependent on the local circumstances. Further information on each of our actions is in Annex 2.

As mentioned in Section 1.1, the drought actions are split into demand-side and supply-side actions. The demand-side actions aim to reduce the demand for water and the supply-side drought actions aim to increase the volume of water available. We aim to prioritise those supply-side actions that have no environmentally damaging effects and our demand-side actions before moving onto the more damaging actions. This is reflected in the drought levels.

- Level 1 (impending drought): We would aim to increase our water efficiency campaigns and increase leakage activities.
- Level 2 (drought): We would increase media campaigns, introduce demand restrictions and start requiring drought permits/orders.
- Level 3 (severe drought): We would implement NEUBs as well as seeking to implement drought permits/orders that have an environmental impact.
- Level 4 (extreme drought): This would lead to the most extreme drought actions. We would carry out all possible measures before we implement these.

In normal conditions before we reach Level 1, we would be utilising water efficiency campaigns and home visits as part of our T100 campaign and continuing to tackle our leakage and outage volumes. The T100 programme is part of our WRMP and aims to reduce PCC to 100 litres/person/day by 2040.

3.1. Demand actions

We have identified a number of actions that we can take to reduce demand in the event of a drought in order to balance supply and demand. The generic actions within the Drought Plan that we will take in drought stages up to Level 3 are summarised in Table 3.1. Actions we will take in a Level 4 drought (worse than 1-in-500 years) are discussed in Section 3.6.

Table 3-1: Demand-side interventions for each type of drought.

Normal conditions	Impending Drought (Level 1)	Drought (Level 2)	Severe Drought (Level 3)	
Water efficiency household audits and retrofits.	Media campaigns to encourage water efficiency and to raise awareness of impending drought	Introduce demand restrictions (phase 1 TUBs) in addition to Level 1 activities	Introduce phase 1 of demand restrictions through a drought order	Introduce phase 2 of demand restrictions through a drought order plus phase 2 TUBs
Waterwise advice and talks to schools and community groups	Increase leakage monitoring and repair activity	Mains pressure reduction in addition to Level 1 activities		
	Engage with partner organisations to ensure co-ordinated approach to interventions	Enhanced media campaign to publicise restrictions and encourage water savings in addition to Level 1 activities		
	Initiate discussions with local authorities regarding watering regimes for public parks and gardens			
	Business retail customer initiative			

Table 3.2 provides further details of the key interventions including estimates of the likely reduction in demand that would be achieved by each intervention, and the time between when a measure is triggered and implemented. Ideally the times between the measures will be as long as possible in order to allow the previous measure to be effective before the next, more significant measure, is taken. However, the measures must also be introduced in a timely manner keeping in view the nature of the drought, its development and best management in order to maintain balance between restricting water use and minimising environmental impacts of abstractions. The indicative process timelines are shown in Table 3.2.

For Temporary Use Bans (TUBs) we would plan to announce the restrictions at least 1 week before imposition. For Non-Essential Use Drought Orders (NEUBs) to restrict water we expect these would follow the normal Drought Order Application Process and may include a hearing to address concerns and our estimate is a timescale of 30 days from application to imposition.

The trigger levels for the demand restrictions are slightly different for each WRZ, given the characteristics of the resources, the forecast supply demand position and the prevailing demands (see Annex 5).

As can be seen from Table 3.2, effective communication with our customers and other stakeholders is going to be of key importance in implementing demand-side measures. Annex 6 provides details of our communications plan.

3.1.1. Effectiveness of demand restrictions

We carried out an assessment of the impacts of the demand restrictions that we applied during the 2005-06 drought. The analysis is based on an empirical model of household demand that accounts for both weather influences and the effect of metering on demand. In broad terms, the methodology followed the recommended methods contained within the EA Drought Demand Modelling Guidance report, with a minor change around the inclusion of time of year/sunshine hours as an explanatory factor. However, the models that were used contained a significant enhancement to allow a quantified analysis of the impact of metering on summer peak demand. This incorporation of a demonstrably stable and accurate, but non-linear and multiplicative form of regression model meant that the impacts of metering on both underlying demand and demand response to weather could be modelled, allowing the response of the current, mostly metered, customer base to restrictions to be quantified.

The modelling demonstrated that the ratio of summer demand to underlying (winter) demand has decreased as a result of increased meter penetration, with the relative size of the summer peak (as calculated relative to winter Minimum Deployable Output (MDO) demand) now approximately 35% smaller for the Western and Central areas and 60% smaller for the Eastern area than it was in the early to mid-2000s. This will affect the effectiveness of demand restrictions because discretionary use is clearly now smaller as a percentage of total demand. It is worth noting that there was no observable response to the 2005 hosepipe ban on the fully metered IOW.

The model was able to accurately estimate the impact of restrictions on demand during the 2005-06 drought event and provide an estimate of the likely change therein as a result of increased metering. The estimated profiles for the Western (excluding the IOW) and Central areas are now in the order of 1% rising to 5% for TUBs (winter to summer profiles) and 3% rising to 8% for TUBs plus NEUBs. The Eastern area is expected to have a much lower response, at 0% rising to 3% for TUBs and 1% rising to 4% for NEUBs.

Table 3-2: Demand interventions.

Trigger for action to be used	Type of action	Area	Summary of action	Likely benefit/saving[a]	Risks, constraints and requirements	Environmental impacts	Timescales for implementation[b]	Priority
Level 0: Normal conditions	Water efficiency	Company wide	Water efficiency household audits and retrofits	Expected to reduce demand in a normal year	Uncertainty in the effectiveness of this measure (whether customers will collaborate and conserve water or not).	Limited benefit as demand is reduced	BAU	1
Level 0: Normal conditions	Water efficiency	Company wide	Waterwise advice and talks to schools and community groups	Expected to reduce demand in a normal year	Uncertainty in the effectiveness of this measure (whether customers will collaborate and conserve water or not).	Limited benefit as demand is reduced	BAU	1
Level 1: Impending Drought	Water efficiency	Affected water supply area	Engage with partner organisations to ensure co-ordinated approach to interventions	Expected to reduce demand via coordinated actions	Inform the EA, NE, DWI, Defra, fire authorities and local authorities of impending drought status.	Limited benefit as demand is reduced	1 week	1
Level 1: Impending Drought	Water efficiency	Affected water supply area	Initiate discussions with local authorities regarding watering regimes for public parks and gardens	Expected to reduce demand via coordinated actions	Inform the EA, NE, DWI, Defra, fire authorities and local authorities of impending drought status.	Limited benefit as demand is reduced	1 week	1
Level 1: Impending Drought	Water efficiency	Affected water supply area	Media campaigns to encourage water efficiency	Expected to reduce demand during peak demand periods	Inform the EA, NE, DWI, Defra, fire authority and local authorities of impending drought status. Uncertainty in the effectiveness of this measure (whether customers will collaborate and conserving water or not).	Limited benefit as demand is reduced	1 week	1
Level 1: Impending Drought	Network management	Affected water supply area	Increased leakage control and repair	Up to 1.5% on peak weekly demand	Time needed for training and resourcing staff may delay the implementation.	Limited benefit as demand is reduced	1-3 months	1
Level 2: Drought	Network management	Affected water supply area	Mains pressure reduction	Limited as mains pressure is already optimised across WRZs	Work closely with the fire authorities to ensure no adverse risk.	Limited benefit as demand is reduced	1-3 months, allowing gradual reductions in the network with continuous impact assessments	2
Level 2: Drought	Water Efficiency	Affected water supply area	Enhanced media campaign to encourage water savings and publicise restrictions when implemented	Expected to reduce demand during peak demand periods	Inform the EA, NE, DWI, Defra, fire authorities and local authorities of impending drought status. Uncertainty in the effectiveness of this measure (whether customers will collaborate and conserve water or not).	Limited benefit as demand is reduced	Minimum 2 weeks for initial enhanced messaging; 4-6 weeks for a full campaign	2
Level 2: Drought	TUBs	Western area[c]	TUBs (Phase 1)	9.6Ml/d 5% on peak weekly demand	Inform the EA, NE, DWI, Defra, fire authorities and local authorities of drought status.	Limited benefit as demand is reduced	Minimum 4-8 weeks after appeal for restraint	2

Trigger for action to be used	Type of action	Area	Summary of action	Likely benefit/saving[a]	Risks, constraints and requirements	Environmental impacts	Timescales for implementation[b]	Priority
		Central area		10.6Ml/d 5% on peak weekly demand	Advertise the TUB (Phase 1). Time for representations (objections) may delay the implementation. Large number of responses possible. Customer satisfaction requires careful considerations for the right balance of water saving and minimum of inconvenience for customers.		Minimum 4-8 weeks after appeal for restraint	2
		Eastern area		6.1Ml/d 3% on peak weekly demand			Minimum 4-8 weeks after appeal for restraint	2
Level 3: Severe Drought	NEUBs	Western area[c]	NEUBs drought order (Phase 1)	15.4Ml/d, 8% on peak weekly demand	Inform the EA, NE, DWI, fire authority and local authorities of severe drought status. Consult with Defra and apply for a drought order. Objections from commercial water users. Financial costs to provide compensation against any impacted licence holders.	Limited benefit as demand is reduced	Minimum 8-12 weeks from TUB implementation.	3
		Central area		17.0Ml/d, 8% on peak weekly demand			Minimum 8-12 weeks from TUB implementation	3
		Eastern area		8.2Ml/d, 4% on peak weekly demand			Minimum 8-12 weeks from TUB implementation	3
Level 3: Severe Drought	NEUBs	Affected water supply area	NEUBs drought order (Phase 2) and TUBs (Phase 2)	Unknown	Consult with Defra and apply for a drought order. Advertise the TUB (Phase 2). Objections from commercial water users. Financial costs to provide compensation against any impacted licence holders.	Limited benefit as demand is reduced.	Minimum 4-8 weeks from Phase 1 NEUB drought order	4

[a] See Annex 5 for details.
[b] Although these timings apply for the majority of drought permit/order options in the Drought Plan there are different procedural and timing intentions for the drought permit/order options on the River Test and River Itchen. These are set out in a Water Resources Act 1991 Section 20 Agreement (March 2018) between SWS and the EA. In particular the drought permit on the River Test will be needed as an early measure (applied for during Normal conditions and potentially implemented during Drought conditions). The Section 20 Agreement sets out the sequencing of applying for and implementing drought permits/orders and the triggers for demand interventions which are linked to flows in the River Test and Itchen.
[c] Excluding the IOW.

3.2. Supply actions

In addition to introducing measures that will help us reduce demand, we will be taking a number of steps to maintain supplies during a drought. The generic actions that we will take in drought stages up to Level 3 are summarised in Table 3.3. Actions we will take in a Level 4 drought (worse than 1-in-500 years) are discussed in Section 3.6.

Table 3-3: Supply-side interventions for each type of drought.

Normal conditions	Impending Drought (Level 1)	Drought (Level 2)	Severe Drought (Level 3)
Outage recovery	Operation of sources	Operation of sources	Operation of sources
Operation of sources	Intercompany bulk transfers	Intercompany bulk transfers	Intercompany bulk transfers
Intercompany bulk transfers		Recommission mothballed sources	Discuss bulk supply agreements with major commercial customers
		Enhance drought yield from existing sources by adjusting infrastructure and process	Use of tankers to move water between WRZs or from other companies with surplus
		Modification of distribution network to maximise drought yield and utilisation of available supplies.	Use of drought permits/orders in order to increase abstraction and/or conserve water storage.
		Use of tankers to move water between WRZs or from other companies with surplus	
		Use of drought permits/orders in order to increase abstraction and/or conserve water storage.	

Table 3.4 provides further details of the key interventions including estimates of the likely increase in supply that would be achieved by each intervention, and the time between when a measure is triggered and then implemented. Ideally the times between the measures will be as long as possible in order to allow the previous measure to be effective before the next, more significant measure, is taken. However, the measures must also be introduced in a timely manner keeping in view the nature of the drought, its development and best management in order to maintain balance between restricting water use and minimising environmental impacts of abstractions.

In extreme circumstances (more severe than 1-in-500 years return period), we may need to implement standpipes and rota cuts via an Emergency Drought Order. We expect the need for these to only arise in conditions of civil emergency and as such our Emergency Plan covers this in more detail. Before we reach this stage, we will take every possible measure to avoid this scenario as part of our ‘more before four’ planning discussed in Section 3.6.

Table 3-4: Supply interventions.

Trigger for action to be used	Type of action	Area	Summary of action	Likely benefit/saving[a]	Risks, constraints and requirements	Environmental impacts	Timescales for implementation[b]	Priority
Level 0: Normal conditions	Outage recovery	Affected area	Outage already being reduced as part of outage recovery plan. As a drought becomes reality, we would undertake the action to recover outage in advance of our outage recovery plan.	Maximum benefit: Western area: 22.24Ml/d Central area: 15.85Ml/d Eastern area: 5.02Ml/d	Financial implications of bringing back outage ahead of schedule. Risks around the time to implement outage recovery. Constraints around whether the outage to be recovered is in the right area for a drought.	Limited	Varying according to affected area and complexity of the outage,	1
Level 0: Normal conditions	Inter-company bulk transfers[c]	HSE, SNZ, KTZ	Optimise management of bulk transfers between water companies.	HSE: 15Ml/d SNZ: 15Ml/d KTZ: 0.1Ml/d	Constraints surrounding whether the donor company has spare water, as drought intensifies the likelihood of receiving transfers will reduce. Majority of bulk transfers agreed up to a 1:200 drought severity	Limited	Ongoing activity throughout duration of drought.	1
Level 1: Impending Drought	Operation of sources	Affected area	Adjustment of source operations to maximise storage and reduce environmental stress.	1-3% increase in DO. Impacts greatest when initiated in the spring and summer.	Inform the EA around plans for any changes in source operation.	Limited as any changes in abstraction regime will be monitored.	Immediate implementation but benefits may not be realised for several months,	1
Level 2: Drought	Recommission mothballed sources	Affected area	We have a limited number of sources that, for a variety of reasons, were never commissioned, have been decommissioned or are subject to long term outages. We maintain a list of these sources and site plans. During the course of a drought, we would consider recommissioning these sites, which could include the installation of temporary pumps, headworks and pipework and treatment.	<5Ml/d	Inform the EA for any plans to recommission a mothballed source. Constraints around whether sources to be recommissioned are in the right area for a drought.	Potential adverse environmental effect from bringing back a mothballed source. Would require monitoring in place to help identify mitigation. Risk of deterioration under the WFD if a source is brought back in the longer term.	3-6 months.	2
Level 2: Drought	Enhance abstraction at existing sources	Affected area	Enhance yield from existing sources by adjusting infrastructure and process	<5Ml/d	Inform the EA for any plans to increase abstraction or to change abstraction patterns.	Potential adverse environmental effect from increasing abstraction. Would require monitoring in place to help identify mitigation.	3-6 months, for groundwater sources. Work would need to take place during a dry winter and spring to	2

Trigger for action to be used	Type of action	Area	Summary of action	Likely benefit/saving[a]	Risks, constraints and requirements	Environmental impacts	Timescales for implementation[b]	Priority
							maximise benefit in the summer and autumn.	
Level 2: Drought	Distribution network modification	Affected area	Modification of distribution network to maximise yield and utilisation of available supplies.	Limited benefit but may be useful to reduce abstraction impacts on environmental receptors	The actual impact on resource availability over the course of a drought may be limited.	Limited, potential environmental gains.	3-6 months if infrastructure modifications required.	2
Level 2: Drought	Road tankering from alternate supplies[d]	Affected area	Use of tankers to move water between WRZs or from other companies with surplus	8-12 tankers, approx 2 Ml/d	Water quality risks, network constraint risks (traffic, discharge points, tanker availability). Availability of water. Would enter discussions with neighbouring companies and water suppliers regarding water availability. As drought intensifies, the availability of water from other regions will reduce.	Increased carbon emissions from transporting supplies, increased abstraction at source of tankering.	1-2 weeks	2
Level 2: Drought	Drought permits/orders	IOW, HSE, HSW, SNZ, SWZ, KMW	Use of drought permits/orders in order to increase abstraction and/or conserve water storage	Maximum benefit: IOW: 3Ml/d HSE/HSW: 80Ml/d SNZ: 20 Ml/d SWZ: 0.6Ml/d in winter only KMW: 9Ml/d	For drought permits work closely with the EA when applying for, during the course of, and after the end of a drought permit. EA determine the outcome of whether the drought permit is granted. Defra determine the outcome of whether the drought order is granted. Advertise drought permit and discuss with any impacted organisations.	Environmental impacts vary from minor to major. Details of specific drought permits/orders in Section 4.4.	Varies according to individual drought permit/orders. Details of specific drought permits/orders in Section 4.4.	2
Level 3: Severe Drought	Inter-company bulk transfers	HSE, SNZ, KTZ	Optimise management of bulk transfers between water companies.	HSE: 7.5Ml/d SNZ: 7.5Ml/d KTZ 0.1Ml/d	Would look to increase potential imports from neighbouring companies but, this will likely decrease as drought intensifies. Constraints surrounding whether the donor company has spare water	Limited	Ongoing activity throughout duration of drought.	3

Trigger for action to be used	Type of action	Area	Summary of action	Likely benefit/saving[a]	Risks, constraints and requirements	Environmental impacts	Timescales for implementation[b]	Priority
Level 3: Severe Drought	Discuss bulk supply agreements with major commercial customers	HSE, SHZ	Discuss bulk supply agreements with major commercial customers.	Uncertain, subject to negotiations.	Would liaise with our major commercial customers in the event of a severe drought to discuss pain share agreements	Limited environmental impact Some economic and social impact.	Minimum of 8-12 weeks from TUB implementation.	3
Level 3: Severe Drought	Use of drought permits/orders to increase abstraction and/or conserve water storage.	IOW, HSE, HSW, SNZ, SWZ, KTZ,, KME, KMW, SHZ	Use of drought permits/orders to increase abstraction and/or conserve water storage.	As Level 2 plus maximum benefit: IOW: 2.5 Ml/d HSE: 52 Ml/d SNZ: 3 Ml/d SNZ: 1.14 Ml/d (winter) SNZ: .14 Ml/d (summer) SWZ: 2.5 Ml/d KTZ: 1.27 Ml/d KME: 15 Ml/d KMW: 8 Ml/d SHZ: 3.1 Ml/d	For drought permits work closely with the EA when applying for, during the course of, and after the end of a drought permit. EA determine the outcome of whether the drought permit is granted. Defra determine the outcome of whether the drought order is granted. Advertise drought permit and discuss with any impacted organisations	Environmental impacts vary from minor to major. Details of specific drought permits/orders in Section 4.4.	Varies according to individual drought permit/order. Details of specific drought permits/orders in Section 4.4.	3

[a] Outage benefits estimated using the difference between current average outage levels as of February 2021 and the outage recovery plan 2025-26 position. The action here expatiates that plan in the event of a drought forming.
[b] Although these timings apply for the majority of drought permit/order options in the Drought Plan, there are different procedural and timing intentions for the drought permit/order options on the River Test and River Itchen. These are set out in the Section 20 Agreement between SWS and the EA. In particular, the River Test drought permit will be needed as an early measure (applied for during Normal conditions and potentially implemented during Drought conditions). The Section 20 Agreement sets out the sequencing of applying for and implementing drought permits/orders and the triggers for demand interventions which are linked to flows in the River Test and Itchen.
[c] Details of our bulk transfers to and from other water companies can be seen in Section 3.3.7, Section 3.4.10 and Section 3.5.4.
[d] Road tankering would not be the priority at Level 2 drought but we would start to explore this option at this stage. As drought intensifies we would to explore further tankering options if required.

3.3. Western area

This section sets out the bespoke drought management measures and interventions we will use in our Western area at each level of drought severity.

The main drought risks, particularly in Hampshire, relates to flows on the River Test and the River Itchen and the need to provide greater protection to these designated rivers. Changes to abstraction licences in our Western area mean that stricter conditions have been placed on the amount of water we can abstract from these rivers and the EA's Candover Augmentation Scheme boreholes.

This means that we currently have a greater reliance on drought permits/orders in order to meet our statutory obligations to our customers until we have fully implemented our long-term supply solutions. The Section 20 Agreement continues to govern this interim abstraction scheme.

3.3.1. The Section 20 Agreement and the Drought Plan

The Section 20 Agreement implements an interim abstraction scheme and an agreed procedure allowing the increased use of drought permits/orders while long-term solutions are implemented. The agreed procedure does not vary the statutory requirements for applications but agrees the sequencing and timing of drought permit applications to the EA and a set of principles to ensure that this process can be used and relied on more effectively.

The Section 20 Agreement was approved by the Secretary of State on 25 February 2019 and was incorporated into our Drought Plan 2019. No variations to the sequencing and timing set out in the Section 20 Agreement are made in this Drought Plan 2022.

Key features of the Section 20 Agreement are as follows.

- Arrangements for the River Test Surface Water Drought Permit are subject to a six-monthly review to ensure for application readiness. It operates on a timetable for acceptance and determination of 35 days (or less in the case of extreme urgency). Low flows on the River Test between 355Ml/d and 265Ml/d are also deemed capable of constituting exceptional circumstances for the purposes of Article 4(6) of the WFD.
- At the time of application of a River Test Surface Water Drought Permit, the case for an exceptional shortage of rain (ESOR) can include a forecast component and water use restrictions do not have to be in place pre-application (only at the time of implementing the permit). Refusal of access by landowners for monitoring and/or mitigation is not a detriment to being ‘application ready’.
- It is accepted that SWS has a good case that it has no alternative solutions to its Candover and Itchen Drought Order schemes in order to maintain public water supply and that the schemes satisfy the test in Article 6(4) Habitats Directive, for an IROPI. Our outline IROPI case is set out in Annex 3.
- The Section 20 Agreement allows us to submit a Test surface water Drought Permit application before water use restrictions (e.g. TUBs) are imposed provided that they are imposed before the Test Drought Permit is implemented. It also assumes an application for a drought order to impose a NEUB after a Test Drought Permit is implemented but, before any other drought orders of the Section 20 Agreement are required.

The Section 20 Agreement sets out the sequencing for the implementation of the Test Surface Water Drought Permit/Order, Candover Augmentation Scheme Drought Order and Lower Itchen sources Drought Order. Aquatic environmental monitoring of prevailing drought conditions in the rivers Test and Itchen will be used to help inform the final sequencing of drought order implementation in any future drought event, as well as taking account of our supply duties.

Because of the enhanced dependency on drought permits/orders for maintenance of supply as drought develops, we may need to utilise demand restrictions and drought permits/orders in our Western area more often than our target LoS until such time as we expect long-term supply solutions to become available[21]., No changes to the sequencing, frequency of drought interventions or the timing for reliance on IROPI in the Western area are set out in this Drought Plan.

3.3.2. Update on the Section 20 Agreement from DP19

The enhanced bi-annual engagement and review of the River Test Surface Water Drought Permit continues to be carried out. Feedback is discussed and routinely incorporated where practicable to keep the River Test Surface Water Drought Permit application ready.

Annex 1 of our WRMP19 sets out our target and expected of LoS for each of our supply areas.

So far, since the licence changes were made in 2019, we have triggered the Drought Permit application process under the Section 20 Agreement each year and we continue to expect to need to prepare a River Test Surface Water Drought Permit to some degree in each year of this Drought Plan. However, we would only need to implement the permit if a drought of 1-in-10 years to 1-in-20 years' severity develops. There is a 40-65% chance of needing to implement the permit at least once in the next 10 years.

We undertook a mock application exercise in August to November 2018 prior to the licence changes being implemented which highlighted several areas of improvement. A real application was then submitted in July 2019 and was subject to a public hearing before being granted in September 2019. Substantial rain in late September sustained river levels above 600Ml/d and the permit therefore did not need to be implemented. It was surrendered in November 2019.

We prepared and submitted a further application after reaching the '60-day trigger' in June 2020 which was withdrawn in September 2020 again due to river levels being restored. In 2021, we began internal preparation of the drought permit application but owing to a wet summer and Autumn the ’60-day’ trigger was not reached, and no formal drought permit application steps were taken. Nevertheless, this preparatory exercise is critical to maintaining ‘application ready’ status.

After each application, we still undertake (and take any actions from) a ‘lessons learned’ exercise. As a result of this recurring application and improvement process, our operational management is also ‘application ready’ having demonstrated its ability to respond to the Section 20 Agreement application timeframe.

We also applied for planning permission in 2020 in respect of the infrastructure to facilitate the Candover Drought Order but withdrew this to reassess and take account of representations. We anticipate submitting a revised application in spring 2022[22]. We may need to apply for a drought order for the Candover Augmentation Scheme as frequently as one to two times every 10 years on average, implementing it if a drought of 1-in-60 years to 1-in-80 years develops (15% chance in the next 10 years). We will use the

[21] We will describe the way we will balance supply and demand in our Western area in our 2024 water resources management plan (WRMP24)
[22] We also applied for a drought permit for the River Test in 2022 but, again, did not need to implement the drought permit. We learned lessons from the process.

Candover Drought Order only in extreme droughts between 2027 and 2029-30 and the Candover Drought Order will not be used after 2029-30[23]. We provide an update in relation to the Candover Drought Order in section 3.3.8.

For the Test surface water Drought Order and Lower Itchen sources Drought Order we should meet our environmental target LoS (i.e. we should not need to apply for these more frequently than 1-in-20 years on average). There is a 40% chance that we would need to apply for these in the next 10 years. We would expect to implement the Test Drought Order if a drought of between 1-in-150 years and 1-in-180 years develops and there is around a 6% chance of this in the next 10 years. We would expect to implement the Lower Itchen sources Drought Order if a drought of between 1-in-200 years and 1-in-300 years develops and there is around a 5% chance of this in the next 10 years. We will not use the Itchen Drought Order after 2027.

Provided our drought permits/orders are granted and implemented, we will only need to resort to extreme water saving, such as rota cuts or standpipes in the street, once every 500 years on average.

In the event that any changes to our LoS stated in our WRMP19 materialise this will be an issue for consideration as part of the WRMP and WRMP Annual Review.

3.3.3. Linking our drought triggers and actions

Figure 2.9 sets out the phasing of how each of our four drought levels is recognised in our Western Area based on our drought trigger levels. More detail on derivation of these triggers is provided in Annex 4.

Links between the key drought triggers used to define the actions we will take at each level of drought in our Western area are presented in Figure 3.1 to Figure 3.3.

Figure 3.2 and Figure 3.3 summarise the links between the drought triggers and the initiations of drought intervention actions we will take at each stage of a drought.

Figure 3.1 is a general set of actions that is applicable to any groundwater dominated zone which for our Western area could include HAZ, HKZ, HWZ and IOW.

Figure 3.2 and Figure 3.3 set out the bespoke actions, consistent with the Section 20 Agreement, for our HSW and HSE WRZs respectively.

The following sub-sections set out our specific drought actions for the Western area at each drought level.

[23] Addendum - the Candover planning application has been withdrawn at the request of the Local Planning Authority and will be resubmitted in 2025. It is expected that permission will be in place by Autumn 2026, followed by delivery of the works. This will mean that the option will be available in 2027, towards the end of this plan. This will be reflected fully in the Drought Plan 2027.

Drought Level	Trigger Status	Drought Actions
Normal Conditions	▪ SPI, SPEI > Level 1 Trigger ▪ Groundwater, Reservoirs > Level 2 Triggers	▪ Routine drought monitoring ▪ Normal Patterns of abstraction under Sustainable Abstraction Policy ▪ Normal Water Efficiency Actions ▪ On recovery conduct lessons learned review
Level 1 Minor or developing drought	▪ SPI, SPEI < Level 1 Trigger ▪ Groundwater, Reservoirs > Level 2 Trigger	▪ Maximise use of Run-of-River and "Leakage" groundwater Sources. ▪ Minimise use of "Storage" groundwater sources ▪ Issue early warning on Inter-company bulk supplies ▪ Reduce transfers out of affected WRZs, increase transfers from unaffected zones ▪ Increased Water Efficiency Messaging ▪ Engagement with Local Authorities
Level 2 Drought	▪ SPI, SPEI < Level 2 Trigger ▪ Groundwater, Reservoirs < Level 2 Trigger	▪ Temporary Use Bans ▪ Increased leakage reduction activity ▪ Mains pressure reduction management ▪ Recommission unused sources ▪ Distribution Network Modifications ▪ Enhancement of abstraction at existing sources ▪ Level 2 and 3 Drought Permit and Order Preparation and submission ▪ Level 2 Drought Permit and Drought Order Implementation
Level 3 Severe Drought	▪ SPI, SPEI < Level 3 Trigger ▪ Groundwater, Reservoirs < Level 3 Trigger	▪ Implement Drought Orders to restrict Water Use ▪ Implement Level 3 Drought Permits and Orders (supply side)
Level 4 Extreme Drought	▪ River Flows approach or below MRF/HoF conditions even after modifications by Drought Permits and Orders ▪ Groundwater yields reduce such that demand exceeds available supply ▪ Reservoirs at emergency storage	▪ Emergency Drought Orders

Figure 3-1: Linking drought triggers and actions – groundwater dominated WRZs

Drought Level	Trigger Status	Drought Actions
Normal Conditions	▪ River Test Flows > 90 day Triggers	▪ Routine drought monitoring ▪ Normal Patterns of abstraction under Sustainable Abstraction Policy ▪ Normal Water Efficiency Actions ▪ On recovery conduct lessons learned review
	▪ River Test Flows < 90 day Triggers	▪ Begin River Test DP Internal Preparation
Level 1 Minor or developing drought	▪ River Test Flows < 60 day Triggers	▪ Increased Water Efficiency Messaging ▪ River Test Drought Permit Pre-Consultation with Environment Agency ▪ Reduce transfers out of HSW (to HSE, IoW) ▪ Increased leakage reduction activity in WRZ ▪ Activate Portsmouth Water Bulk Supply * ▪ Engagement with Local Authorities
	▪ River Test Flows < 35 day Triggers	▪ Submit River Test Drought Permit ▪ Section 20 Annex 2 Timeline Activities ▪ Pre-consultation on River Test Drought Order (stage 1 – HoF to 265Ml/d) ▪ Begin River Test DO Internal Preparation
Level 2 Drought	▪ River Test Flow <=355 Ml/d	▪ Temporary Use Bans ▪ Mains pressure reduction management and Distribution Network Modifications ▪ Submit application for River Test Drought Order (Stage 1 – HoF to 265Ml/d) ▪ Pre-consultation and submission for Level 3 Phase 1 Restrictions Drought Order
Level 3 Severe Drought	▪ River Test Flows < 310Ml/d	▪ Implement Level 3 Phase 1 Restrictions Drought Order Restrictions ▪ Pre-consultation for River Test Drought Order (HoF to 200Ml/d) ▪ Submit River Test Drought Order (Stage 2 – HoF to 200Ml/d) ▪ Pre-consultation and submission for Level 3 Phase Restrictions Drought Order
	▪ River Test Flows < 265Ml/d	▪ Implement Level 3 Phase 2 restrictions Drought Order ▪ Implement t River Test Drought Order (Stage 2 – HoF to 200Ml/d)
Level 4 Extreme Drought	▪ River Test Flows < 200Ml/d	▪ Emergency Drought Orders

Figure 3-2: Linking drought triggers and actions – HSW WRZ

* Begin discussions about drought management with Portsmouth Water

Drought Level	Trigger Status	Drought Actions
Normal conditions	• River Itchen flows > 90-day triggers	• Routine drought monitoring • Normal Patterns of abstraction under Sustainable Abstraction Policy • Normal Water Efficiency Actions • On recovery conduct lessons learned review
	• River Itchen flows < 90-day triggers	• Begin Candover Augmentation Scheme Drought Order internal preparation • Begin Lower River Itchen Drought Order internal preparation
Level 1 Minor or developing drought	• River Itchen flows < 60-day triggers	• Increased Water Efficiency Messaging • Reduce transfers out of HSE (to HW) • Increased leakage reduction activity in WRZ • Mains pressure reduction management and Distribution Network Modifications • Activate Portsmouth Water Bulk Supply** • Engagement with Local Authorities • Candover Augmentation Scheme Drought Order pre-consultation with Environment Agency • Consider need for Lower River Itchen Drought Order application to reduce flow condition for Portsmouth Water's Abstraction*** • Lower River Itchen Drought Order(s) pre-consultation with Environment Agency
Level 2 Drought	• Application threshold determined by flow forecasting following discussion with EA*	• Temporary Use Bans • Submit application for Candover Augmentation Scheme Drought Order • Submit application for Itchen Drought Order(s) • Submit application for Level 3 Phase 1 and Phase 2 Drought Order Restrictions****
Level 3 Severe Drought	• River Itchen Flows < 205 Ml/d	• Implement Candover Augmentation Scheme Drought Order • Apply Level 3 Phase 1 Drought Order Restrictions (NEUBs).
	• River Itchen Flows < 200 Ml/d	• Apply Level 3 Phase 2 Drought Order restrictions (NEUBs)
	• River Itchen Flows < 198 Ml/d	• Implement River Itchen Drought Order(s)
Level 4 Extreme Drought	• River Itchen Flows < 165 Ml/d	• Emergency Drought Orders

Figure 3-3: Linking drought triggers and actions – HSE WRZ

* We have replaced the level 2 trigger status which previously read 'River Itchen Flows < 35 day trigger' with 'Application threshold determined by flow forecasting and in discussion with EA.'
** This option would be used prior to level 1 water use restrictions
*** If discussions about drought have not already started with Portsmouth Water (see figure 3.2) they will begin at this stage.
**** These Level 3 Drought Order restrictions on use are also referred to as Non- Essential Use Bans or (NEUBs)

The August 2024 letter from Defra included comments relating to the drought triggers for the River Itchen. For example, the letter asked that all documents referring to these triggers be consistent and that we include further explanation for why we will use a flow forecasting instead of a 35 day trigger for the Itchen. None of this affects the Section 20 Agreement. In the February 2024 submission to regulators, some figures in the drought plan main report referred to triggers in HSE and HSW. In addition, Annex 4 provided more detailed information regarding drought triggers. We have reviewed these reports to ensure consistency. For clarity, we now show the triggers in the following figures and provide more detail about these drought triggers in annex 4.

The following figures show the drought triggers that would be used in HSE and HSW. None of the triggers in these figures are new. However, these figures are now easier to interpretate because they no longer include the triggers from the 2019 drought plan. We provide more detail about drought triggers in Annex 4.

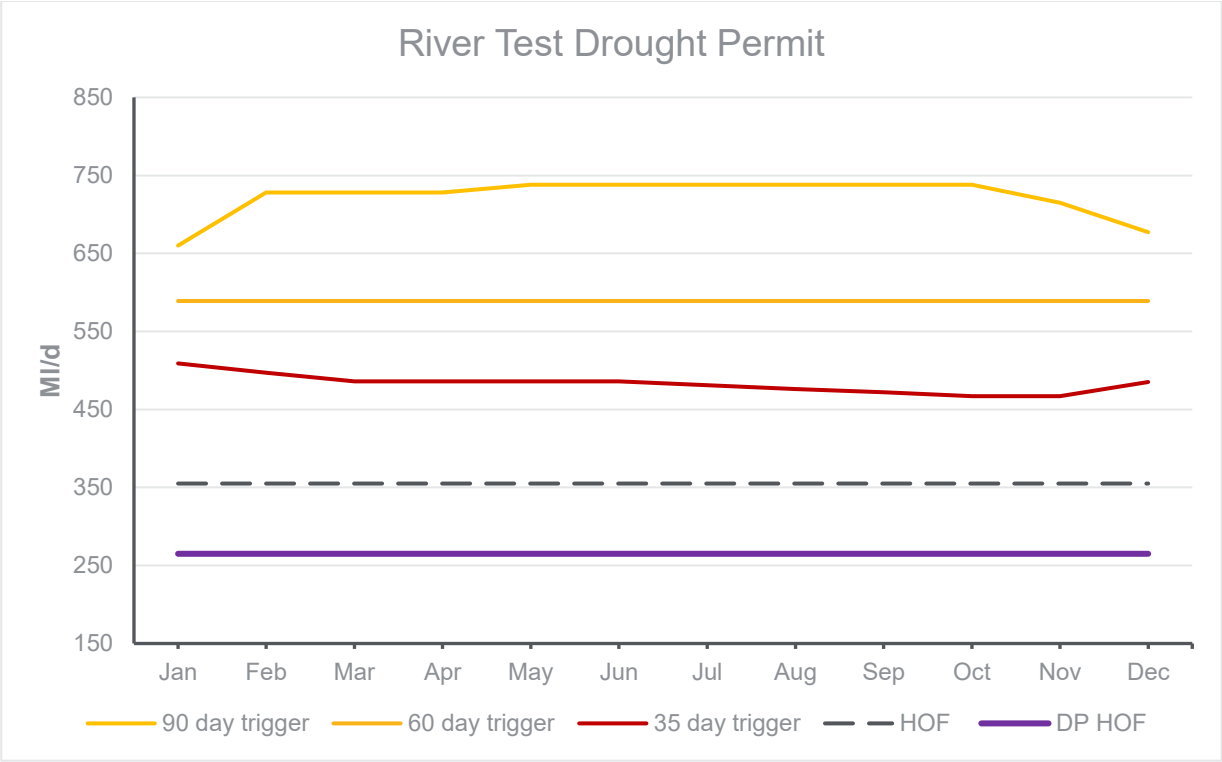


Figure 3-4: Drought triggers for River Test Drought Permit

The dashed line labelled HOF in the figure above indicates when the flow has reached the Hands Off Flow (HOF). If the EA were to grant a Drought Permit (DP) for the River Test then this is the point when it would be implemented. If this Drought Permit were implemented, the revised HOF would be the flow shown by the purple line i.e. the Drought Permit Hands Off Flow (DP HOF). The DP HOF is 265 Ml/d. The HOF would only

be 265Ml/d for the period that the Drought Permit applies. After the Drought Permit expires, the HOF would revert to the previous value of 355 Ml/d.

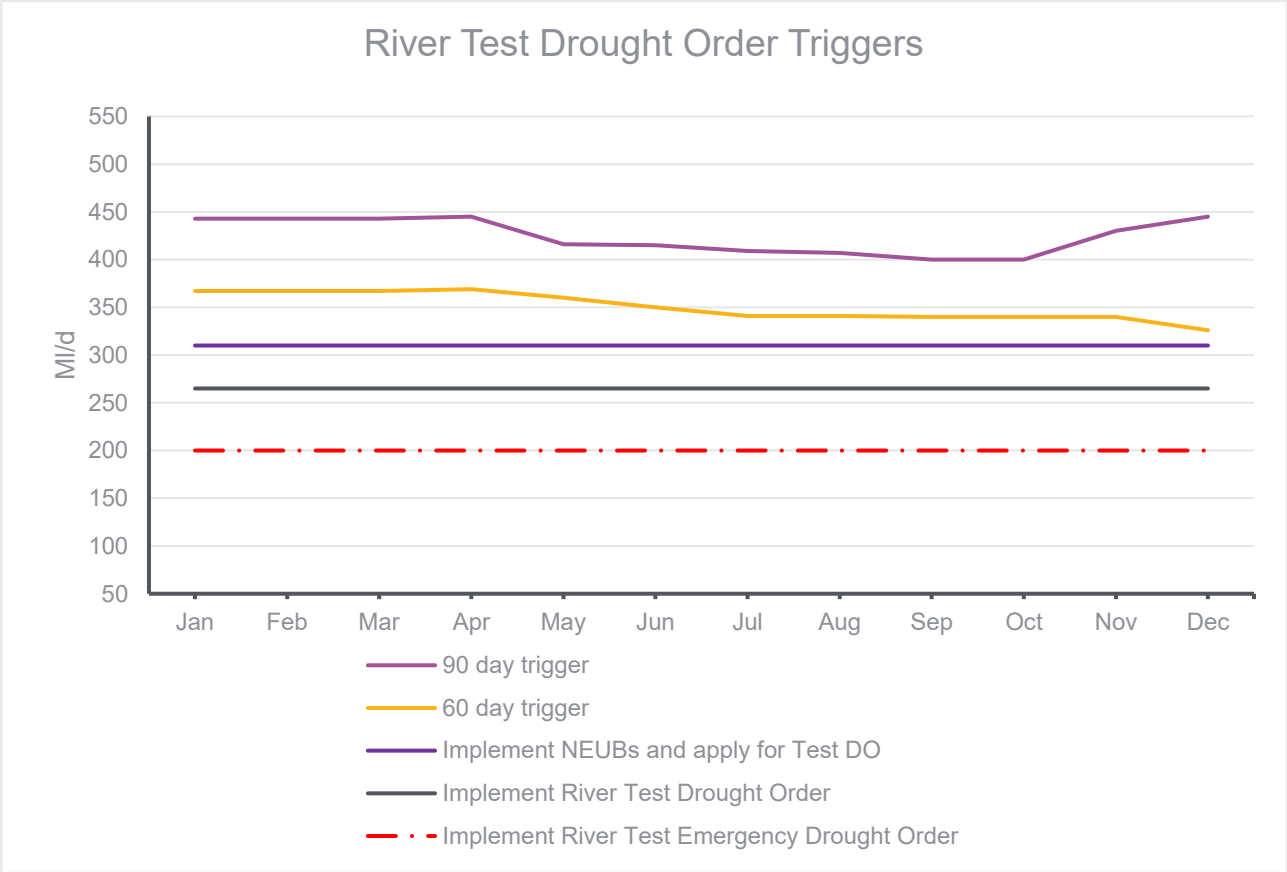


Figure 3-5: Drought triggers for River Test Drought Order

The figure above shows that a Drought Order is required when flows drop to 265 Ml/d, that being the Hands Off Flow (HOF) condition that would apply under a River Test Drought Permit. The HOF proposed under Drought Order would be 200 Ml/d, after which an Emergency Drought Order is required. As noted beneath figure 3.3, Non-Essential Use Bans (NEUBs) are also referred to as Level 3 Drought Order restrictions.

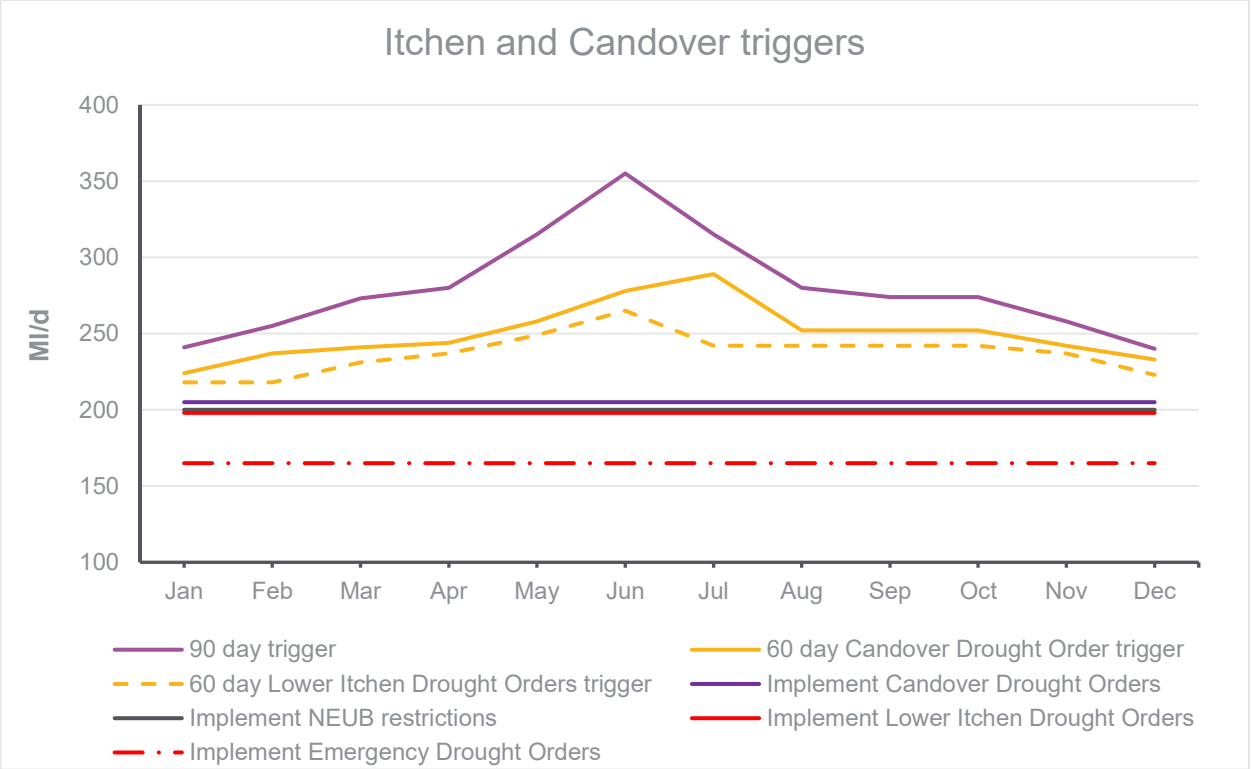


Figure 3-6: Drought triggers for Itchen and Candover Drought Orders

As noted earlier, Non-Essential Use Bans (NEUBs) are also referred to as Level 3 Drought Order restrictions.

3.3.4. Level 1 bespoke actions for the Western area

The key drought trigger for entering Drought Level 1 in our Western area is for either:

- Flows on the River Test or River Itchen to fall below their respective 60-day flow triggers
- SPI or SPEI to fall below their Level 1 (1-in-5 years drought trigger)
- Groundwater levels fall below their Level 1 (1-in-5 years drought trigger)

Of these, we expect that the crossing of the River Test 60-day flow trigger is likely to occur most frequently and there are defined actions within the Section 20 Agreement that we must take 60 days before the River Test HoF condition is reached. These include:

- Notifying the EA that we are 60 days away from crossing the River Test HoF threshold and begin formal pre-consultation engagement with the EA and other stakeholders for the River Test Drought Permit including provision of a draft Test Surface Water Drought Permit. Including the threat to supplies, forecast ESoR.
- Although not defined in the Section 20 Agreement, at our defined 60-day trigger for the Candover Augmentation Scheme and Lower Itchen Drought permit we would also begin formal pre-consultation for these Drought Order at the Level 1 trigger. However, we would expect that in most situations that the River Test Drought Permit 60-day trigger would be reached first.

Supply actions

We would expect the crossing of the 35-day flow trigger for the River Test Drought Permit to also occur under Level 1 conditions. When this trigger is crossed, we will submit the application for the River Test Drought Permit. If necessary other actions under this application might include:

- A hearing, if required, into non ESoR matters (day 11 after application)
- Provide an updated ESoR position and forecast (day 15-17 after application)
- A hearing, if required, on the ESoR position

We would not seek to impose TUBs until shortly before the Test Drought Permit was required at a Test total flow of 360Ml/d.

If we consider risks to be high, there are some circumstances where the 90-day and/or 60-day triggers conditions for preparation and pre-consultation of the River Test Drought Order may also be crossed whilst under Level 1 conditions and this work would proceed concurrently with the River Test Drought Permit actions. However, the trigger for application for the Lower Test Drought Order would occur under Level 2 conditions.

Following Drought Permit and Drought Order Guidance and actions required under recent River Test Drought Permit pre-consultation and application periods, under Level 1 conditions we would also minimise internal transfers out of affected WRZs, for example from HSW to HSE or from HSE to HWZ. In accordance with the Section 20 Agreement ‘during the month of September’ utilisation of the PRT bulk supply will be made in preference to increased transfer of water from HSW to HSE.

In addition to the Lower Test Drought Permit we also have a drought permit for the IOW WRZ which would be utilised under Level 2 conditions and would remove a MRF condition on the Lukely Brook to allow our groundwater sources to continue abstracting. We will begin preparation for this drought permit if our Level 1 SPI/SPEI or groundwater level triggers for the IOW are met such that the application could be made to have the permit in place should the drought develop to Level 2.

Demand actions

We will also escalate water efficiency measures, including media campaigns to reduce water usage in line with the stated obligation in the Section 20 Agreement and our general Level 1 actions (Section 3.1).
All other Level 1 interventions would be consistent with our general drought measures as set out in Section 3.1 and Section 3.2. We would also consider if there are any further appropriate opportunities to reduce demand at this time.

3.3.5. Level 2 bespoke actions for the Western area

The move to level 2 conditions for our Western area would be triggered by any of the following conditions:

- SPI and/or SPEI triggers and/or groundwater level triggers falling below 1 in 10-years levels.
- River Test Flows falling below 360/355Ml/d and the imposition of TUBs.
- River Itchen Flows falling below the application threshold for the Candover Drought Order. This threshold is based on our flow forecasting tool and will be discussed with the EA to provide sufficient time for the drought order application.

Supply actions

The most likely next action until a Level 2 drought would be implementation of the River Test Drought Permit as this is likely to be the earliest drought constraint on water supply allowing our Lower Test abstraction to reduce Test Total Flows below 355Ml/d.

If flow in the River Test crosses our 35-day trigger for application of the Lower Test Drought Order at flows between 360Ml/d and 340Ml/d we would apply for the Lower Test Drought Order. Note that the application threshold of 369-360Ml/d between January and May would occur at the lower end of Level 1 conditions. However, the drought order would not be implemented until Level 3 conditions are reached.

Almost concurrently[24] we would expect to submit the Drought Order application for the Candover Augmentation Scheme and/or the Lower Itchen Drought Order as the application threshold based on our flow forecasting tool for the River Itchen is reached. If a drought order is required due to a threat to supplies, we will prioritise the Candover Augmentation Scheme Drought Order ahead of the Lower Itchen Drought Order and its use may delay the need to implement the Lower Itchen Drought Order.

The IOW (Lukely Brook) Drought Permit would be applied for on crossing the Level 2 SPI, SPEI or groundwater level trigger. The most likely requirement for the permit utilisation would typically occur in the late summer and early autumn of a drought year and therefore the application preparation and pre-consultation may need to begin in the spring to be available in time. If groundwater levels on the IOW continue to decline, we would begin preparation of our Level 3 drought permits/orders in parallel with the Lukely Brook Drought Permit.

Further details for our Level 2 drought permits are summarised in Table 3.5

[24] As we describe in section 3.3.8, the Candover scheme is not currently operational. Until it is available, the Lower Itchen Drought Order would be used alone and not concurrently with the Candover scheme.

Table 3-5: Summary of drought permit/order options available at Level 2 for our Western area.

Trigger for action to be used	Type of action	WRZ	Summary of action	Likely benefit / saving	Risks, constraints and requirements	Environmental impacts category**	Confidence level	Time to implement	Sequencing of implementation within WRZ
Level 2: Drought conditions	Drought permit River Test (surface water source Drought Permit)[b]	HSE and HSW	Relax the Test total flow condition in the abstraction licence from 355Ml/d to 265Ml/d.	80M/d max yield	Work closely with the EA when applying for, during the course of, and after the end of a drought permit. EA determine the outcome of whether the drought permit is granted. Advertise drought permit and discuss with any impacted organisations. Equates to daily licence volume available if HoF is reduced.	Up to Moderate	Low	3 months	1
Level 2: Drought conditions	Drought permit Lukely Brook (groundwater source)	IOW	Remove requirement for flow condition at the Sheep Dip Weir on the Lukely Brook. Provision of a temporary compensation flow release of 0.4Ml/d to the Lukely Brook via a temporary pipeline.	3.0M/d max yield	Work closely with the EA when applying for, during the course of, and after the end of a drought permit. EA determine the outcome of whether the drought permit is granted. Advertise drought permit and discuss with any impacted organisations.	Up to Major	Medium	6 months	1

[a] Detailed environmental impacts found in the respective environmental assessments on request

[b] Required as part of the Section 20 Agreement

Demand actions

It is likely that TUBs would be applied if the Level 2 triggers are reached. This is consistent with EA guidance for drought permits/orders[25] in that steps to reduce demand should be taken before the implementation of drought permits/orders.

If flows on the River Test continue to recede towards the Level 3 triggers, then we will begin preparation for the drought order to bring in Phase 1 water use restrictions (NEUBs)

3.3.6. Level 3 bespoke actions for the Western area

The move to Level 3 conditions for our Western area would be triggered by any of the following conditions:

- SPI and/or SPEI triggers and/or groundwater level triggers falling below 1 in 20-years Level 3 trigger levels
- River Test Flows falling below 310Ml/d and the imposition of the first phase Drought Order to restrict water use
- River Itchen Flows fall below 205Ml/d and implementation of the Candover Augmentation Scheme Drought Order or implementation of the Lower Itchen Drought Order if flows fall below 198Ml/d

Supply actions

Level 3 conditions would lead to a significant escalation in drought interventions in our Western area. We would already expect the River Test Drought Permit to have been implemented, and, if groundwater levels were below the Level 2, 1-in-10-years trigger on the IOW, the Lukely Brook Drought Permit.

If groundwater levels decline below the 1-in-20 years trigger on the IOW we would submit and then, if granted, subsequently implement, Drought Orders on the IOW for the Caul Bourne and Eastern Yar if flow in either river falls towards their MRF conditions.

If the Lower Test Drought Order is granted this should be implemented if flows in the River Test fall below 265Ml/d and would remain in place to lower the HoF down to 200Ml/d.

If flows fall below 205Ml/d on the River Itchen, we would first implement the Candover Augmentation Scheme Drought order, which would lead to a partial temporary flow recovery allowing the Lower Itchen abstractions to operate for longer.

If the river flow continues to fall, even with augmentation, and the threat to supplies remains we would implement the Lower Itchen Drought Order to allow us to abstract below 198Ml/d on the River Itchen. We recognise that, due to the sensitivity of the Lower Itchen habitat and designated sites, implementation of the Lower Itchen Order would be an action of last resort before reaching Level 4 conditions and would only be implemented after all other drought permits/orders and demand management measures have been exhausted and a threat to supplies remains.

[25] Environment Agency and Defra, 2019. Drought permits and drought orders, Supplementary guidance from the Environment Agency and Department of Environment, Food and Rural Affairs.

Further details on each individual Western area Level 3 Drought Permit and Order are provided in Table 3.6.

Demand actions

If the River Test total flow falls below 310Ml/d or flows in the River Itchen reach 205Ml/d, we would implement our Level 3 Phase 1 Drought Order restrictions on water use. It is a requirement of the Section 20 Agreement that these restrictions would be in place before any further supply interventions.

If flows in the River Itchen fall below 200Ml/d or River Test total flow falls below 265Ml/d we would implement our Level 3 Phase 2 Drought Order restrictions on water use.

3.3.7. Agreements with other licenced water suppliers

We have a number of bulk transfer agreements with our neighbouring water companies. These are listed in Table 3.7.

Table 3-6: Summary of drought permit/order options available at Level 3 for our Western area.

Trigger for action to be used	Type of action	WRZ	Summary of action	Likely benefit / saving	Risks, constraints and requirements[3]	Environmental impacts category[a]	Confidence level	Time to implement	Sequencing of implementation within WRZ
Level 3: Severe drought conditions	Drought permit Caul Bourne (groundwater source)	IOW	Reduce the MRF in the Caul Bourne from 4l/s (0.3Ml/d) to 2l/s (0.15Ml/d)' Remove the constraint that limits abstraction to 40Ml (1.3Ml/d) within a 30-day period when the flow drops below 20l/s (1.7Ml/d).	1.5M/d max yield	Work closely with the EA when applying for, during the course of, and after the end of a drought permit. EA determine the outcome of whether the drought permit is granted. Advertise drought permit and discuss with any impacted organisations.	Up to Major	Medium	6 months	2
Level 3: Severe drought conditions	Drought permit Eastern Yar Augmentation Scheme (surface water source)	IOW	Reduction to the Minimum Residual Flow conditions: River Medina 1) reduce from 2.7Ml/d to 1.7Ml/d River Medina 2) reduce from 5Ml/d to 4Ml/d. This will allow increased abstraction for transfer and augmentation of flows in the Eastern Yar.	1.0M/d max yield	Work closely with the EA when applying for, during the course of, and after the end of a drought permit. EA determine the outcome of whether the drought permit is granted. Advertise drought permit and discuss with any impacted organisations. Maximum additional flow constraint.	Up to Major	Medium	6 months	3
Level 3: Severe drought conditions	Drought order River Test (surface water source) (Drought Order)[b]	HSE and HSW	Reduce the Test total flow condition in the abstraction licence from 355Ml/d to 200Ml/d.	Up to 80.0M/d	Work closely with Defra when applying for, during the course of and after the end of a drought order. Defra determine the outcome of whether the drought order is granted. Advertise drought order and discuss with any impacted organisations. Equates to daily licence volume available if HoF is reduced. *Up to 80M/d is not additional to the drought permit – the drought order replaces the drought permit once flows fall below 265Ml/d.*	Up to Moderate	Low	3 months	2[2]
Level 3: Severe drought conditions	Drought order Candover Augmentation Scheme (groundwater source)[b]	HSE	Drought order to operate the Candover river augmentation scheme boreholes. To allow up to 27Ml/d and 3750Ml/year (20.8Ml/d over 6 months). This would enable additional DO at our River Itchen WSW.	14.4M/d in 1-in-200 years drought at MDO	Work closely with Defra when applying for, during the course of, and after the end of a drought order. Defra determine the outcome of whether the drought order is granted. Advertise drought order and discuss with any impacted organisations. 1-in-200 years MDO benefit shown based on WRMP19 assessment, varies with drought severity.	Up to Minor	Medium	3 months	2[2]

Trigger for action to be used	Type of action	WRZ	Summary of action	Likely benefit / saving	Risks, constraints and requirements[3]	Environmental impacts category[a]	Confidence level	Time to implement	Sequencing of implementation within WRZ
Level 3: Severe drought conditions	Drought order Lower Itchen (SWS and PRT) (groundwater and surface water sources)[b]	HSE	SWS may need to apply for a drought order to reduce the flow condition controlling PRT's abstraction licence from 194Ml/d to 150Ml/d and reduce the flow condition in the River Itchen at Allbrook and Highbridge from 198Ml/d to 160Ml/d controlling SWS's Lower Itchen surface and groundwater sources.	38.0M/d from SWS's Lower Itchen sources	Work closely with Defra when applying for, during the course of, and after the end of a drought order. Defra determine the outcome of whether the drought order is granted. Advertise drought order and discuss with any impacted organisations. Equivalent to reduction in HoF from 198 to 160Ml/d	Up to Moderate	Medium	3 months	3[2]

[a] Detailed environmental impacts found in the respective environmental assessments on request.

[b] Required as part of the Section 20 Agreement.

Table 3-7: Agreements with other licenced water suppliers in the Western area.

WRZ	Name and Capacity (Ml/d) of Bulk Supply	Time constraints	Details	Pain share arrangements
Portsmouth Water (PRT)				
HSE	Import from PRT: PDO[26] +15Ml/d MDO +15Ml/d ADO[27] +15Ml/d	Planned bulk transfer from 2019 onwards. Further bulk transfer (9Ml/d) from PRT to Hampshire (River Itchen) to be contracted for 2024-25.	New import from PRT into HSE WRZ. Availability of this bulk supply was confirmed by PRT during discussions in AMP5 and reconfirmed during discussions in early 2019 and will be available up to and including the scenarios represented in PRT's WRMP19. PRT has confirmed that its forecast surplus is sufficient to provide [the initial 15Ml/d into Hampshire] bulk supply without the need for additional resource developments and for this to be reliable up to and including droughts of 1-in-200 years severity. It is assumed that the bulk supply could be at risk in an extreme (above a 1-in-200 years) drought event, unless supported by a drought order covering SWS and PRT's Lower Itchen sources. As part of our planning assumptions, we have assumed a 50% reduction in supply availability in an extreme drought event based on a best estimate of resource availability; however, this is not a commitment to the transfer.	The Section 20 Agreement recognises the possible need for a Lower Itchen Drought Order to maintain the bulk supply for severe and extreme drought. PRT has confirmed the supply should be available in drought events of up to and including 1-in-200 years severity. As drought develops SWS and PRT will undertake drought management by implementing their current Drought Plans. Accordingly, PRT and SWS should progressively increase monitoring and review of their water resource and supply-demand balance situations and should share situation reports regularly, monthly to weekly, depending on the drought stage. The two companies should also agree joint statements to the Press (Media) and customers. Should it become apparent that the full supply may not be available, the two companies should meet to ensure complete joint understanding of the reason(s) and the overall options for maintaining supplies. The two companies should establish and work to a management plan that makes the best overall use of resources, including their conservation, with due consideration of environmental impacts of operations and respective costs. Where this joint management approach involves one or other company incurring costs over and above that which it would incur if progressing individually, the additional cost should be reasonably shared. Such cost estimates and subsequent actual costs must be made available to the company in auditable detail in this circumstance. The options for managing demand should be considered. It will normally be expected that should PRT need to seek restraint by its customers or to restrict water use of its customers, in order to maintain the supply to SWS, then SWS should also seek restraint by its customers or restrict water use by its customers. It does not necessarily follow that should SWS already be seeking restraint by its customers or be restricting water use by its customers, PRT has to do this. However, under this circumstance, PRT should at least have a clear plan as to when it would implement those measures on its customers and should share this plan with SWS.
Wessex Water (WSX)				

[26] Peak deployable output.
[27] Average deployable output.

WRZ	Name and Capacity (Ml/d) of Bulk Supply	Time constraints	Details	Pain share arrangements
HA	Export to WSX PDO -0.41Ml/d MDO -0.31Ml/d ADO -0.33Ml/d	Through the planning period	The volume of the transfer reflects the take over recent years. In the event of a drought, we would discuss with WSX the relative resource position in the HAZ WRZ and agree what action is required to mitigate the impact of the drought.	In the event of a drought, we would discuss with WSX the relative resource position in the Chute area and agree the action(s) required to mitigate the impact of the drought as well as discussing relevant pain share agreements. We send two exports to WSX on the eastern side of our boundary near Andover. Liaison with WSX has verified that in the event of a drought we would expect these supplies to be secure during a drought, but we would be in regular communication with each other to discuss relative resource positions and the need for flexibility with transfers should the need arise. It may be that pressures to accommodate more constraints on our abstractions in Hampshire may increasingly restrict these transfers during droughts in the future.

3.3.8. Updated position relating to the Candover Drought Order

Following our considerations of the proposed extended period for the reliance on the Candover Drought Order (until 2034), we have withdrawn the two planning applications that were submitted in February 2023. We intend to resubmit these planning applications. We spoke to the Environment Agency about the Candover Drought Order on 28 November 2024, 11 December and also on 19 December 2024. We will continue to work with regulators and the planning authorities on this option to resolve this situation for the benefit of the environment and our customers.

Since the most recent application withdrawal, we have been progressing work towards a revised planning application for the Candover pipeline. We are exploring alternative options that would allow the Candover Drought Order to be implemented and at the time of writing, agreement is being sought over an alternative pipeline route and the outcome of this will give a clearer timeframe for submission of the application. We commit to submit as early as feasibly possible however, and are currently aiming for no later than the end of 2026.

Until this option is available, and if flows in the River Itchen fall below the triggers set out in Figure 3.6 then we would implement the options set out in figure 3.3 with the exception of the Candover Drought Order. Until the Candover Drought Order option is available this would have the effect of triggering the use of the Itchen Drought Orders more frequently than would otherwise be the case. But it is important to note that the return period of flows reaching the 198 Ml/d HoF and triggering implementation of the Itchen Drought Order (without the use of the Candover Drought Order) is 1 in 59 as shown in Table 3-8 below. Table 3-8 shows that the Candover option, once it is available, will reduce this to a 1 in 141-year return period.

In order to fully assess the potential environmental effects of the Candover Augmentation Scheme being unavailable before 2027, we have committed to progress a project level HRA and accompanying EAR for the River Itchen Sources Drought Order (without Candover), and work towards this is now underway. At this stage it is only possible to provide a very high-level summary of assumed environmental implications based on information that is currently available:

1. As stated above, without the availability of the Candover Drought Order, there is an increased likelihood of a need for the Lower Itchen Sources Drought Order: as shown in Table 3-8 below, where the Candover Augmentation Scheme is unavailable, the return period of flows reaching the 198 Ml/d HoF and triggering implementation of the Lower Itchen Sources Drought Order increases from 1:141 to 1:59.

2. Due to the increased risk of more frequent use, and potentially longer duration of the Lower Itchen Sources Drought Order, post drought recovery on the Itchen may be extended. However, this will depend on individual drought scenarios and a more detailed assessment and investigation in the project level HRA is needed to clarify the degree of risk and effects.

3. Conclusions as to likely significant effects of the Lower Itchen Sources Drought Order (without Candover) alone, or in-combination with the River Test Drought Permit/Order on River Itchen SAC features could change.

Following the conclusions of the Lower Itchen Sources Drought Order (without Candover) HRA, we will work with the Environment Agency and Natural England to review the Section 20 compensation package as required.

Table 3-8: Modelling output showing frequency of trigger crossings for the River Itchen at Allbrook & Highbridge (A&H)

Trigger curve/ threshold	Itchen – A&H (with Candover)		Itchen – A&H (without Candover)	
	Number of years trigger crossed in 19,200 years	Return Period (years)	Number of years trigger crossed in 19,200 years	Return Period (years)
90-day trigger curve	15,961	1	15,961	1
60-day trigger curve	13,447	1	13,447	1
35-day trigger curve/ TUBs	9,262	2	9,262	2
206 Ml/d - NEUBs	502	38	503	38
205Ml/d Candover augmentation	478	40	NA	NA
198Ml/d - HoF	136	141	324	59
160 Ml/d - HoF	14	1371	18	1067

3.4. Central area

This section sets out the bespoke drought management measures and interventions we will use in our Central area at each level of drought severity. These actions are linked to the different drought trigger levels.

3.4.1. Frequency of drought measure implementation in SNZ WRZ

There is an elevated risk of drought management measures being needed in the Central area due in part to the actual LoS implied by our WRMP19 which requires the use of drought interventions to ensure a supply-demand balance in our 1-in-200 years frequency drought planning scenario. Achieving a supply-demand balance in this scenario means we can meet our target customer and environmental LoS. The current risk of needing drought management measures has increased slightly due to an outage affecting one of our strategic water sources (Weir Wood reservoir) in the SNZ WRZ and the need to investigate the impacts of our Pulborough groundwater abstraction licence on the environment. The latter issue relates to compliance with the Habitats Regulations and has emerged since we published our WRMP19. This has prevented us from implementing two supply schemes assumed within the WRMP19 which would have improved the supply-demand balance position in SNZ.

The current outage of Weir Wood treatment works is a temporary position that will be resolved as soon as practicable. The Drought Plan, as a 5-year operational plan, seeks to assess and manage both this temporary disruption and (once remedied) the reversion to a BAU situation.

In order to reduce the risk of needing to implement drought management measures in SNZ, to protect customers and the environment, we are implementing a number of supply and demand management measures to reduce the current supply-demand deficit. This includes re-zoning some of our customers to be supplied by a neighbouring water company, working with private abstractors to make best use of available resources and installing new supply connections with another water company to add resilience to the local supply network. We are working closely with the EA to ensure the current risk of needing drought measures is reduced as far as possible during the short term whilst we are experiencing an increased supply-demand risk.

The main influence on the timing and frequency of needing drought interventions in SNZ is the flow in the River Rother and how it is assumed to recess during dry periods. The DO of the Pulborough surface water source becomes constrained when flows fall towards the MRF in the abstraction licence. The frequency of needing to apply for and implement a drought permit for this source to continue abstraction is largely dependent on the flow in the river. The current situation with a supply-demand deficit in the WRZ means that a slightly higher output from the source could be needed to maintain a supply-demand balance and therefore the flow condition would be reached slightly earlier requiring the permit to be implemented.

Our assessment is that the difference in flow recession is likely to be measured in days rather than weeks and hence the expected frequency with which drought permits and orders will need to be implemented on the River Rother is not expected to change significantly from our stated Target Level of Service of 1 in 200 years. However, there are some further implications for our other levels of service. Because the Level 3 Weir Wood Drought Order is unavailable, and we are also unable to implement a Pulborough groundwater Drought Permit, we expect that we would need to implement the phase three Pulborough surface water Drought Order as our only option in order to offset the reduction in supplies in a severe drought. We expect that this drought order will need a longer pre-consultation period as well as a requirement to implement TUBs sooner so that their effectiveness can be assessed and included as part of the application. We will therefore need to relax our Level of Service for TUBs and drought permit and order applications in Sussex North WRZ until Weir Wood is available and the Pulborough Groundwater Sustainability study is complete.

We assessed and quantified the reduction in Level of Service using the latest system simulation models developed by Water Resources South East (WRSE) which account for the dynamic variations in demand and river flow and our distribution network and supply constraints. This work was initiated in Summer 2022 and we are currently reviewing the draft findings.

3.4.2. Utilisation of inter-zonal transfers between SWZ and SNZ WRZs

Our Central area includes a bi-directional inter-zonal transfer between SWZ and SNZ WRZs, as well as an inter-zonal transfer from SWZ to SBZ WRZs. In the WRMP19, the transfer from SWZ to SBZ is not shown to be fully utilised despite the fact that there is a supply-demand surplus in SWZ and that drought measures are required to solve the supply-demand balance. Since drought management measures are required, they are fully utilised in preference to utilising transfers, whereas in reality, in the event of a developing drought, we would fully utilise available sources at the time, including the inter-zonal transfer before implementing a drought permit or order. To be clear, in the 1-in-200 years drought event there is surplus water in SWZ WRZ which would be fully utilised before any drought permits/orders were implemented. The potential inter-zonal transfers available to us are shown in Table 3.9.

During a drought, we would utilise the available transfers in Table 3.9 before carrying out any more severe drought actions. For example, if the SNZ WRZ was at risk of deficit in any given drought, and SWZ had surplus, we would transfer that surplus into SNZ. The surplus in SWZ would be based on the water available for use given constraints at the time in the zone. We note that our ongoing WINEP investigations, for example in the SWZ, consider the environmental impacts of our abstraction regime and internal transfers, specifically in relation to compliance with the water framework directive (WFD.)

Table 3-9: Inter-zonal transfers in the Central area.

Trigger for action to be used		Type of action	Donor WRZ	Recipient WRZ	Capacity	Risks, constraints and requirements	Environmental impacts	Timescales for implementation[4]	Priority
Level 0: Normal conditions		Internal transfer	SNZ	SWZ	15Ml/d	Constrained by available water supply in neighbouring zone	Limited	Throughout the planning period	1
Level 0: Normal conditions		Internal transfer	SWZ	SNZ	15Ml/d	Constrained by available water supply in neighbouring zone	Limited	Throughout the planning period	1
Level 0: Normal conditions		Internal transfer	SWZ	SBZ	17Ml/d	Constrained by available water supply in neighbouring zone	Limited	Throughout the planning period	1
Level 0: Normal conditions		Internal transfer	SWZ	SBZ	13Ml/d	Constrained by available water supply in neighbouring zone	Limited	From 2026-27 onwards	1
Level 0: Normal conditions		Internal transfer	SBZ	SWZ	30Ml/d	Constrained by available water supply in neighbouring zone	Limited	From 2026-27 onwards	1

3.4.3. Relationship between Pulborough Drought Permit and the Pulborough groundwater abstraction licence

The output of the Pulborough surface water source which abstracts from the River Rother is particularly sensitive to drought conditions as the abstraction becomes constrained by a MRF licence condition when flows in the river become low. Our Drought Plan contains a three phased drought permit option for this

source to allow us to apply to reduce the MRF by increments of 10Ml/d. The Pulborough groundwater source is governed by an abstraction licence and a historic Water Order which contains a condition linking abstraction to flows in the River Rother. This means that if we were to implement the Pulborough surface water Drought Permit we would have to stop abstracting from the groundwater source. Whilst there are water resource benefits of this in terms of conserving groundwater storage, we would not be able to benefit from the DO assumed from the Pulborough groundwater source.

The consequence of the above relationship between the Pulborough surface water Drought Permit and the Pulborough groundwater abstraction licence is that we would need to apply for at least a Phase 2 (20Ml/d reduction in MRF) or Phase 3 (30Ml/d reduction in MRF) drought permit/order to maintain supplies in our 1-in-200 years severity drought scenario. Furthermore, whilst applying for either of these options would not equate to us stopping using the groundwater source, the point at which we start to implement the drought permit/order would mean that abstraction from the groundwater source would immediately stop.

There is no possibility that we can apply to vary the flow condition set out in the Water Order governing the groundwater abstraction licence because of the Habitats Regulations. The possibility of an impact of the Pulborough groundwater licence on nearby conservation sites is being investigated but until that is concluded the precautionary principle will apply and will prevent any temporary variation of the licence.

Given the increased risk of needing a Pulborough surface water Drought Permit/Order and the need to apply for a Phase 2 or Phase 3 reduction in the MRF our priority will be to ensure we are application ready. This includes ensuring the Environmental Assessment Reports (EARs) are as up to date as possible and incorporate the necessary monitoring and mitigation measures needed for all potential options.

3.4.4. Extreme drought option to vary the Pulborough groundwater licence

The constraint around using the Pulborough groundwater abstraction licence when implementing a Pulborough surface water Drought Permit/Order, would not have arisen if we had implemented our Pulborough groundwater licence variation scheme in 2020-21, as assumed in WRMP19. This scheme was selected as an extreme drought option to allow groundwater abstraction to continue when the flow in the River Rother drops below the MRF either naturally or due to the implementation of a Pulborough surface water Drought Permit/Order, on the basis that there is no hydraulic connectivity between the River Rother and groundwater source at Pulborough. The licence variation would have removed the flow condition which currently applies to the groundwater abstraction licence via a historic Water Order. This scheme has been put on hold pending the outcome of the Pulborough groundwater sustainability investigation which will consider any links between the groundwater and surface water source.

3.4.5. Linking our drought triggers and actions

Figure 2.11 sets out the phasing of how each of our four drought levels is recognised in our Central Area based on our drought trigger levels, more details on how these triggers were derived is provided in Annex 4.

Figure 3.7 summarises the links between the drought triggers and the initiations of drought intervention actions we will take at each stage of a drought. Figure 3.1 is a general set of actions that is applicable to any groundwater dominated zone which for our Central area could include SNZ, SWZ and SBZ. Figure 3.7 sets out the bespoke actions, for our Central area.

3.4.6. Level 1 bespoke actions for the Central area

The key drought trigger for entering Level 1 in our Central area is for either:

- Cumulative flow deficit falls below Level 1 trigger
- SPI or SPEI to fall below their Level 1 (1-in-5 years) drought trigger
- Groundwater levels fall below their Level 1 (1-in-5 years) drought trigger

Supply actions

If the cumulative flow deficit falls below the Level 1 trigger, we would start engagement with local authorities such as the EA and other water companies and stakeholders such as PRT, whereby we would look to activate the PRT bulk supply.

We would begin the Pulborough Level 1 surface water drought permit preparation and pre-consultation. The Level 1 drought permit looks to reduce the MRF from 63.65Ml/d to 53.65Ml/d which would allow us to abstract up to 10Ml/d extra from this source in times of drought.

We would begin the East Worthing groundwater drought permit preparation and pre-consultation. When applied for, and if granted, this would allow us to increase the abstraction daily licence limit from 4.5Ml/d to 7.0Ml/d between the months of October and December inclusive. Output of the site would have to be manually increased to achieve this benefit.

Demand actions

Further to the supply actions, we will increase our water efficiency messaging, explaining the onset of a drought and urging our customers to reduce their water use where possible. As part of this we will escalate water efficiency measures, including targeted media campaigns to reduce water usage in drought affected areas. At this time, we would also consider if there are any further appropriate opportunities to reduce demand.

Drought Level	Trigger Status	Drought Actions
Normal Conditions	▪ River Rother Flows > 90 day Triggers	▪ Routine drought monitoring ▪ Normal Patterns of abstraction under Sustainable Abstraction Policy ▪ Normal Water Efficiency Actions ▪ On recovery conduct lessons learned review
Level 1 Minor or developing drought	▪ Cumulative Flow Deficit falls below Level 1 Trigger	▪ Increased Water Efficiency Messaging ▪ Reduce transfers out of SN (to SW) ▪ Increased leakage reduction activity in WRZ ▪ Mains pressure reduction management ▪ Activate Portsmouth Water Bulk Supply ▪ Engagement with Local Authorities ▪ Begin Pulborough (1) (surface water) Drought Permit Preparation and Pre-Consultation
Level 2 Drought	▪ Cumulative Flow Deficit falls below Level 2 Trigger	▪ Temporary Use Bans ▪ Distribution Network Modifications ▪ Submit application for Pulborough (1) (surface water) Drought Permit ▪ Pulborough (2) (surface water) Drought Permit pre-consultation with Environment Agency
	▪ River Rother Flows <63.65Ml/d	▪ Implement Pulborough (1) (surface water) Drought Permit ▪ Pulborough (3) (surface water) Drought Order pre-consultation with Environment Agency ▪ Weir Wood Reservoir Drought Order pre-consultation with Environment Agency ▪ Submit application for Pulborough (2) (surface water) Drought Permit
	▪ River Rother Flows <53.65Ml/d	▪ Implement Pulborough (2) (surface water) Drought Permit ▪ Submit application for Level 3 Drought Order Restrictions ▪ Submit application for Pulborough (3) (surface water) Drought Order ▪ Submit application for Weir Wood Drought Order
Level 3 Severe Drought	▪ Cumulative Flow Deficit falls below Level 2 Trigger	▪ Phased Implementation of Level 3 Drought Order Restrictions
	▪ River Rother Flows <43.65Ml/d	▪ Implement Pulborough (3) (surface water) Drought Permit ▪ Implement Weir Wood Drought Order
Level 4 Extreme Drought	▪ River Rother Flows <33.65Ml/d	▪ Emergency Drought Orders

Figure 3-7: Linking drought triggers and actions – Central area

3.4.7. Level 2 bespoke actions for the Central area

The move to Level 2 conditions for our Central area would be triggered by any of the following conditions:

- SPI and/or SPEI triggers and/or groundwater level triggers falling below 1-in-10 years levels
- Cumulative flow deficit falls below Level 2 trigger
- River Rother flows fall below 63.65Ml/d
- River Rother flows fall below 53.65Ml/d

Supply actions

When the cumulative flow deficit falls below the Level 2 trigger, we would look to submit an application for the Pulborough Level 1 surface water drought permit and the East Worthing groundwater drought permit.

We would enter the pre-consultation with the EA to apply for the North Arundel groundwater drought permit. This will increase the abstraction licence daily limit from 4.5Ml/d to 7.0Ml/d. As part of this we would look to enact infrastructure changes and increase pump capacity.

We would at this stage begin a pre-consultation with the EA to apply for the Weir Wood[28] reservoir drought order. This aims to reduce the statutory compensation flow from Weir Wood reservoir to the river Medway from 3.64Ml/d to 2.5Ml/d in Winter and 5.64Ml/d to 2.5Ml/d in summer yielding a max daily benefit of 1.14Ml/d in winter and 3.14Ml/d in summer. This drought order is reliant on our outage recovery plan of bringing Weir Wood source back online in 2024-25.

We would enter the pre-consultation with the EA to apply for the Pulborough Level 2 surface water drought permit. This drought permit aims to reduce the MRF at Pulborough source Weir from 63.65Ml/d to 43.65Ml/d allowing a further 10Ml/d abstraction on top of that offered under Level 1.

When the flows in the River Rother reach less than 63.65Ml/d, we would implement the Pulborough Level 1 surface water drought permit, would submit the application for the Pulborough Level 2 surface water drought permit and enter pre consultation with the EA to apply for the Pulborough Level 3 surface water drought order. The Pulborough Level 3 drought order looks to reduce the MRF at Pulborough source weir from 63.65Ml/d to 33.65Ml/d, allowing a potential further 10Ml/d on top of Level 2.

When flows in the River Rother reach less than 53.65Ml/d we would implement the Pulborough Level 2 surface water drought permit and submit applications for both the Pulborough Level 3 surface water drought order and the Weir Wood drought order.

Further details for our Level 2 drought permits are summarised in Table 3.10.

[28] We are currently upgrading the water treatment works at Weir Wood reservoir.

Table 3-10: Central area Level 2 drought permits.

Trigger for action to be used	Type of action	WRZ	Summary of action	Likely benefit / saving	Risks, constraints and requirements	Environmental impacts category	Confidence level	Time to implement	Sequencing of implementation within WRZ
Level 2: Drought conditions	Drought permit Pulborough (1) (surface water source)	SNZ	Reduce MRF at Pulborough Source Weir from 63.65Ml/d to 53.65Ml/d allowing greater surface water abstraction.	10.0M/d max yield	Work closely with the EA when applying for, during the course of, and after the end of a drought permit. EA determine the outcome of whether the drought permit is granted. Advertise drought permit and discuss with any impacted organisations. Max benefit is reduction in MRF from 63.65 to 53.65M/d (10M/d).	Up to Minor	Medium	3 months	1
Level 2: Drought conditions	Drought permit Pulborough (2) (surface water source)	SNZ	Reduce MRF at Pulborough source Weir from 63.65Ml/d to 43.65Ml/d, allowing greater surface water abstraction.	20.0M/d max yield	Work closely with the EA when applying for, during the course of, and after the end of a drought permit. EA determine the outcome of whether the drought permit is granted. Advertise drought permit and discuss with any impacted organisations. Max benefit is reduction in MRF from 53.65 to 43.65M/d (10M/d).	Up to Major	Medium	3 months	2
Level 2: Drought conditions	Drought permit East Worthing (groundwater source)	SWZ	Increase abstraction licence daily limit from 4.5Ml/d to 7.0Ml/d between October and December inclusive.	2.5Ml/d (Oct to Dec only)	Work closely with the EA when applying for, during the course of, and after the end of a drought permit. EA determine the outcome of whether the drought permit is granted. Advertise drought permit and discuss with any impacted organisations. Site is normally throttled to meet typical demands. Output would need to be manually increased to achieve benefits. Drought permit benefit is assumed for winter period when output is restricted to 4.5Ml/d. Note there are no relevant groundwater level constraints, so benefit is constant across different drought severities.	Up to Moderate	Low	3 months	1

Demand actions

It is likely that TUBs would be applied if the Level 2 triggers are reached. This is consistent with EA guidance for drought permits/orders in that steps to reduce demand should be taken before the implementation of drought permits/orders.

If flows on the River Rother continue to recede towards the Level 3 triggers, then we will begin preparation for the drought order to bring in Phase 1 water use restrictions (NEUBs)

3.4.8. Level 3 bespoke actions for the Central area

The move to Level 3 conditions for our Western area would be triggered by any of the following conditions:

- SPI and/or SPEI triggers and/or groundwater level triggers falling below 1-in-20 years Level 3 trigger levels
- Cumulative flow deficit falls below Level 2 trigger
- River Rother flows fall below 43.65Ml/d

Supply actions

Level 3 conditions would lead to a significant escalation in drought interventions in our Central area. We would already expect Pulborough Level 1 and Level 2 surface water Drought Permit and the East Worthing groundwater Drought Permit to be implemented.

We would look to implement the Weir Wood[29] drought order and North Arundel groundwater drought permit and once River Rother flows fall below 43.65Ml/d we would implement the Pulborough Level 3 surface water drought order.

Further details on each individual Central area Level 3 Drought Permit and Order are provided in Table 3.11.

Demand actions

Once cumulative flow deficit falls below the Level 2 trigger, we would implement our Phase 1 Drought Order (NEUBs) to restrict water use.

[29] We are currently upgrading the water treatment works at Weir Wood reservoir.

Table 3-11: Central area Level 3 drought permits/orders.

Trigger for action to be used	Type of action	WRZ	Summary of action	Likely benefit / saving	Risks, constraints and requirements[3]	Environmental impacts category	Confidence level	Time to implement	Sequencing of implementation within WRZ
Level 3: Severe Drought conditions	Drought order Pulborough (3) (surface water source).	SNZ	Reduce MRF at Pulborough source weir from 63.65Ml/d to 33.65Ml/d, allowing greater surface water abstraction.	23.0M/d max yield.	Work closely with Defra when applying for, during the course of, and after the end of a drought order. Defra determine the outcome of whether the drought order is granted. Advertise drought order and discuss with any impacted organisations. Max benefit is reduction in MRF from 43.65 to 33.65M/d (10M/d)	Up to Major	Medium	3 months	3
Level 3: Severe drought conditions	Drought order Weir Wood reservoir (surface water source).	SNZ	Reduce statutory compensation flow from Weir Wood reservoir to the River Medway: From 3.64Ml/d to 2.5Ml/d in winter and 5.64Ml/d to 2.5Ml/d in summer.	Propose reduction in compensation flow from 3.64Ml/d to 2.5Ml/d in winter and 5.64Ml/d to 2.5Ml/d in summer.	Work closely with Defra when applying for, during the course of, and after the end of a drought order. Defra determine the outcome of whether the drought order is granted. Advertise drought order and discuss with any impacted organisations. Max daily benefit is 1.14Ml/d in winter and 3.14Ml/d in summer.	Up to Minor	Low	3 months	4
Level 3: Severe drought conditions	Drought permit North Arundel (groundwater source).	SWZ	Increase abstraction licence daily limit from 4.5Ml/d to 7.0Ml/d.	2.5Ml/d max yield.	Work closely with the EA when applying for, during the course of, and after the end of a drought permit. EA determine the outcome of whether the drought permit is granted. Advertise drought permit and discuss with any impacted organisations. North Arundel output and peak week production capacity (4.16Ml/d) is constrained by pump capacity. Drought permit yields of 7Ml/d are unlikely without infrastructure changes.	Up to Moderate	Low	6 months	2

3.4.9. Agreements with other licenced water suppliers

We have a number of bulk transfer agreements with our neighbouring water companies in our Central. These are listed in Table 3.12.

Table 3-12: Agreements with other licenced water suppliers in the Central area.

Import/Export	Water undertaker	WRZ	Amount (Ml/d)	Details (including pain share agreements)
Import	PRT	SNZ	PDO +15Ml/d MDO +15Ml/d ADO +15Ml/d	SWS would seek to maximise its import from PRT during a drought event, subject to the terms of the contract. Alternatively, PRT may seek to reduce it. This reflects the different impacts that a drought of different severity or duration can have on different supply areas which have different mixes of water sources and demand pressures. As a drought situation develops the companies will hold regular discussions to agree the volumes of bulk supplies. There is uncertainty with regards to the availability of the bulk supply in an extreme (above a 1-in-200 years) drought event. As part of our planning assumptions, we have assumed a 50% reduction in supply availability in an extreme drought event based on a best estimate of resource availability however this is not a commitment to the transfer. There is no formal pain share clause in the current contract. However, upon entering a drought the companies will start a dialogue to agree the approach that would be taken and discuss relevant pain share agreements. Recent discussion with PRT has identified mutual interest in updating the contract document soon. This would be an opportunity to include standard recognition of pain share.
Import	PRT	SWZ	PDO +0Ml/d MDO +0Ml/d ADO +0Ml/d	There is a bulk supply agreement with PRT into the Central area, which can be brought into the SWZ WRZ directly at North Arundel. This is intended only for use in extreme conditions when modelling suggests that DO failures would occur in either SNZ or SBZ, not SWZ. This capability would therefore only be required during outage events and not under normal system operation. If the transfer was used it would mean that the 15Ml/d import to SNZ from PRT is not available. There is a net gain of 4Ml/d (transfer in 8Ml/d, losing 4Ml/d of North Arundel output). This option cannot be implemented simultaneously with the option above. There is no formal pain share clause in the current contract. However, upon entering a drought the companies will start a dialogue to agree the approach that would be taken and discuss relevant pain share agreements.
Export	SEW	SNZ	PDO -5.4Ml/d MDO -5.4Ml/d ADO -5.4Ml/d (4.27M/d in a 1-in-500 years drought event)	A new contractual agreement signed by both companies in 2021 formalises the pain share arrangements and will be effective to 2030-31. Although we cannot guarantee the agreed normal maximum volume of the bulk supply contract before 2024 to any extent that supply depends on Weir Wood WSW, SEW's typical requirement within the contract can be routinely supported by SWS from other sources. The contract terms recognise this. There is regular communication between both companies and trigger levels are in place for drought situations. As trigger levels are approached, there will be discussions as to whether the full agreement volumes can be provided. SEW has an override trigger which means that they can be agile and take proactive actions depending on what volumes can be provided.

3.5. Eastern area

This section sets out the bespoke drought management measures and interventions we will use in our Eastern area at each level of drought severity. These actions are linked to the different drought trigger levels (see Section 2.3 and Section 3.1).

The principal drought risks in our Eastern area relate to storage in our three reservoirs at Bewl, Darwell and Powdermill and the ability to refill the reservoirs during periods of low flow in the associated river systems. There are also many groundwater sources, which offer some drought resilience as the majority are constrained by infrastructure or abstraction licence limits though some are vulnerable to low groundwater levels, particularly in our KTZ WRZ.

Our primary and supporting triggers for each WRZ are defined.

- KTZ: Little Bucket observation borehole groundwater level.
- KME and KMW: The combined storage volume for the Bewl, Darwell and Powdermill reservoir system with Riddles Lane observation borehole groundwater level as a supporting trigger.
- SHZ: The combined storage volume for the Bewl, Darwell and Powdermill reservoir system.

3.5.1. Linking our drought triggers and actions

Figure 2.13 sets out the phasing of how each of our four drought levels is recognised in our Eastern Area based on our drought trigger levels. Details on the derivation of these triggers are given in Annex 4.

Figure 3.1 and Figure 3.8 summarise the links between the drought triggers and the initiations of drought intervention actions we will take at each stage of a drought. Figure 3.1 is a general set of actions that is applicable to any groundwater dominated WRZ. In our Eastern area this includes KME and KTZ WRZs.

Figure 3.8 sets out the bespoke actions for our KMW and SHZ WRZs.

The following sub-section set out our specific drought actions for the Eastern area at each drought level.

Drought Level	Trigger Status	Drought Actions
Normal Conditions	▪ SPI, SPEI > Level 1 Trigger ▪ Groundwater > Level 1 Triggers ▪ Reservoirs > Level 2 Triggers	▪ Routine drought monitoring ▪ Normal Patterns of abstraction under Sustainable Abstraction Policy ▪ Normal Water Efficiency Actions ▪ On recovery conduct lessons learned review
Level 1 Minor or developing drought	▪ SPI, SPEI < Level 1 Trigger ▪ Groundwater < 1 Trigger ▪ Reservoirs > Level 2 Trigger	▪ Maximise use of Run-of-River and "Leakage" groundwater Sources. ▪ Minimise use of "Storage" groundwater sources ▪ Issue early warning on Inter-company bulk supplies ▪ Reduce transfers out of affected WRZs, increase transfers from unaffected zones ▪ Increased Water Efficiency Messaging ▪ Engagement with Local Authorities
Level 2 Drought	▪ SPI, SPEI < Level 2 Trigger ▪ Groundwater, Reservoirs < Level 2 Triggers	▪ Temporary Use Bans ▪ Increased leakage reduction activity ▪ Mains pressure reduction management ▪ Recommission unused sources ▪ Distribution Network Modifications ▪ Enhancement of abstraction at existing sources ▪ Level 2 and 3 Drought Permit and Order Preparation and submission ▪ Level 2 Drought Permit and Drought Order Implementation ▪ Implement Bewl Water reservoir / River Medway Scheme - Stage 1 Drought Permit
Level 3 Severe Drought	▪ SPI, SPEI < Level 3 Trigger ▪ Groundwater, Reservoirs < Level 3 Trigger	▪ Implement Drought Orders to restrict Water Use ▪ Implement Bewl Water reservoir / River Medway Scheme - Stage 2 Drought Permit ▪ Implement Bewl Water reservoir / River Medway Scheme - Stage 3 Drought Order ▪ Implement Bewl Water reservoir / River Medway Scheme - Stage 4 Drought Order
	▪ Eastern Rother Flows Jun-Sep <28.5Ml/d	▪ Implement Darwell Resevoir (1) Drought Permit
	▪ Eastern Rother Flows Mar-May <40Ml/d	▪ Implement Darwell Resevoir (2) Drought Permit
Level 4 Extreme Drought	▪ River Flows approach or below MRF/HoF conditions even after modifications by Drought Permits and Orders ▪ Groundwater yields reduce and demand exceeds available supply ▪ Reservoirs at emergency storage	▪ Emergency Drought Orders

Figure 3-8: Linking drought triggers and actions – KMW and SHZ

3.5.2. Level 1 bespoke actions for the Eastern area

The key drought trigger for entering Drought Level 1 in our Eastern area is if any of the following occur:

- Combined Bewl, Darwell and Powdermill volumes fall below their Level 1 trigger curve (1-in-5 years drought trigger).
- SPI or SPEI to fall below their Level 1 (1-in-5 years) drought trigger
- Groundwater levels fall below their Level 1 (1-in-5 years) drought trigger

Supply actions

The key bespoke supply intervention at this level would be to optimise the various interzonal and intercompany transfers, changing from a cost-efficient mode of supply to an optimised resource mode designed to maximise groundwater and reservoir storage. This would include adjusting the following:

- Reducing internal transfers from KMW to KME and increasing groundwater output in KME
- Increasing transfers from KME to KTZ to provide support for more drought vulnerable groundwater sources as necessary
- Optimising storage volumes in KMW and SHZ via the Bewl-Darwell transfer
- Issue early warning and begin discussions with neighbouring companies for inter-company transfers including SEW from KME and KMW and AFW in KTZ. After 2025 this would also include a new transfer from SEW to our Canterbury Source in KTZ.

Demand interventions

We would increase our water efficiency messaging and engagement with customers and consider if there are any further appropriate opportunities to reduce demand at this time. To date, metering seems to have had a much larger effect on the Eastern area that the other two areas (Annex 5). As well as affecting the underlying demand more, the relative impact on the peak demand is also much higher when compared with the Central and Western areas. In the Eastern area the overall summer peak for a 2005-06 style event (theoretical, without demand restrictions) has reduced by around 60%, compared with a 35% reduction in the Central and Western areas. A small amount of this is due to a smaller actual measured population at the time (circa 23% versus 26% in Western and Central areas at the end of 2006) but the majority represents a different behavioural response.

3.5.3. Level 2 bespoke actions for the Eastern area

The move to Level 2 conditions for our Eastern area would be triggered by any of the following conditions:

- SPI and/or SPEI triggers and/or groundwater level triggers falling below 1-in-10 years levels
- Groundwater levels fall below their Level 2 (1-in-10 years) drought trigger
- Reservoir Storage falls below the Level 2 (1-in-10 years) drought trigger

Supply actions

The key bespoke supply intervention at this level would be preparation and implementation of the Level 2 drought permit for Bewl Water reservoir / River Medway Scheme Stage 1 (Table 3.13). This is a winter refill permit and would only be in place between November and April with different levels of reduction to the River Medway MRF depending upon the time of year. To be in place it is likely that preparation would need to begin in late summer and would likely be triggered by a combination of a dry preceding winter leading to low groundwater levels and development of rainfall deficits which intensify through the autumn and winter. Low

autumn rainfall would then lead to poor recovery of reservoir storage necessitating the use of the drought permit through the winter to ensure secure supplies for the following summer.

Demand actions

Under Level 2 conditions we would impose TUBs. These are likely to have the greatest impact when employed through the summer and would help to preserve reservoir storage.

Our recent modelling has demonstrated that the ratio of summer demand to underlying (winter) demand has decreased as a result of the universal metering programme, with the relative size of the summer peak (as calculated relative to winter demand) now approximately 60% lower for the Eastern area than it was in the early to mid-2000s. The Eastern area is therefore expected to have a lower saving in response to TUBs than the other areas at around 3% reduction on peak weekly demand for TUBs and up to 4% for TUBs plus NEUBs.

As in our 2017 Winter Drought Permit Application, we would discuss the implementation of TUBs associated with any winter drought permit with the EA but given demand is typically lower during this season the benefit of any restrictions may be limited.

Table 3-13: Summary of our Level 2 drought permit/order options in our Eastern Area

Trigger for action to be used	Type of action	WRZ	Summary of action	Likely benefit / saving	Risks, constraints and requirements[3]	Environmental impacts category[4]	Confidence level	Time to implement	Sequencing of implementation within WRZ
Level 2: Drought conditions	Drought permit Bewl Water reservoir / River Medway Scheme - Stage 1 (surface water source)	KMW	Winter drought permit to reduce the MRF on the River Medway Scheme: From 200Ml/d in November to January to 150Ml/d From 250Ml/d in February to 150Ml/d From 275Ml/d in March and April to 150Ml/d	9M/d ±2.5M/d at 1-in-200 years 8M/d ±2M/d at 1-in-500 years	Work closely with the EA when applying for, during the course of, and after the end of a drought permit. EA determine the outcome of whether the drought permit is granted. Advertise drought permit and discuss with any impacted organisations. Based on assessment of benefit of measure to reduce reservoir release requirements from Bewl through duration of measure in severe/extreme drought events - from WRMP19 2000-years synthetic hydrological record. Assessment does not account for risk of reservoir emptying.	Up to Moderate	Medium	3 months	1

[3] Note the EA determines and approves drought permits. The Secretary of State determines and approves drought orders (subject to representation from the EA and other stakeholders).
[4] Detailed environmental impacts found in the respective EARs on request.

3.5.4. Level 3 bespoke actions for the Eastern area

The move to Level 3 conditions for our Eastern area would be triggered by any of the following conditions:

- SPI and/or SPEI triggers and/or groundwater level triggers falling below 1-in-20 years levels
- Groundwater levels fall below their Level 3 (1-in-20 years) drought trigger
- Reservoir Storage falls below the Level 3 (1-in-20 years) drought trigger

Supply actions

As a drought intensifies to Level 3, we will require a range of drought permits/orders to provide resilient supplies.

- KMW: 8Ml/d
- SHZ: 3.1Ml/d

We have removed the Faversham Drought Permit and the Sandwich Drought Permit that were included in the drought plan we consulted on because the abstraction licence variations we mentioned in that version of the drought plan are now complete. These variations in the licences mean that these drought permits would not provide a supply benefit in a drought, so we no longer require them.

Our supply interventions relate to an escalation of drought permits/orders for the River Medway and Eastern Rother to support refill of Bewl and Darwell reservoirs.

- As a first priority, we would seek to implement the winter drought permit for refill of Darwell Reservoir and would likely employ this alongside the Level 2 drought permit for Bewl winter refill to reduce reliance on the Bewl-Darwell transfer.
- If necessary, and river flows fall below the reduced MRF the Level 2 Drought Permit for Bewl winter refill would be escalated to the Level 3 Bewl Water reservoir / River Medway Scheme - Stage 2 (surface water source).
- In the summer following a dry winter, especially if either of the above permits were used in the preceding winter and reservoir levels remained low, we would implement the summer permits for Darwell reservoir and Bewl reservoir (Bewl Water reservoir / River Medway Scheme - Stage 3 Drought Order. We would apply for these in the early spring if it was evident that winter refill had been unsuccessful at maintaining levels in the reservoirs due to prolonged dry weather.
- In an extremely dry winter or severe drought we would escalate to the Bewl Water reservoir / River Medway Scheme - Stage 4 Drought Order. This provides the greatest resource benefit, albeit at significant environmental cost, through reduction of MRF conditions and compensation discharges.

Demand actions

As our Level 3 triggers are approached and crossed, we will escalate our restrictions on water use through implementation of Drought Orders to impose NEUBs.

Our modelling has shown that we can expect the Eastern area to show a 4% reduction on peak weekly demand under NEUBs. As with TUBs, the impacts of NEUBs appear to be much smaller than our other areas due to the smaller difference between normal peak and average demand and the high meter penetration.

3.5.5. Agreements with other licenced water suppliers in our Eastern area

We have a number of bulk transfer agreements with our neighbouring water companies in our Central Area. These are listed in Table 3.15.

Our WRMP19 includes an option to provide a new bulk supply from 2025 from SEW to our KTZ near Canterbury. As this transfer comes online, we will reflect the changes to our bulk supply arrangements in our Drought Plan annual review.

Table 3-14: Summary of our Level 3 drought permit/order options in our Eastern area.

Trigger for action to be used	Type of action	WRZ	Summary of action	Likely benefit / saving	Risks, constraints and requirements[1]	Environmental impacts category[2]	Confidence level	Time to implement	Sequencing of implementation within WRZ
Level 3: Severe drought conditions	Drought permit Darwell reservoir (2) (surface water source)	SHZ	Maintain the winter MRF of 4.545Ml/d (October to February) and increase the daily licence from 56.8Ml/d to 70Ml/d to capture more water under high flow events	3.1M/d at 1-in-200 years 1.4M/d at 1-in-500 years	Work closely with the EA when applying for, during the course of, and after the end of a drought permit. EA determine the outcome of whether the drought permit is granted. Advertise drought permit and discuss with any impacted organisations. There is a requirement to reassess the likely benefit of this option following the recent adjustment to a winter permit.	Up to Minor	Medium	3 months	1[3]
Level 3: Severe drought conditions	Drought permit Bewl Water reservoir / River Medway Scheme - Stage 2 (surface water source)	KMW	Winter drought permit to reduce the MRF in the River Medway: From 200Ml/d in November to January to 150Ml/d From 250Ml/d in February to 150Ml/d From 275Ml/d in March and April to 150Ml/d Modify the Bewl Water reservoir regulation release factor from 1.1 to 1.0 to support abstraction from the River Medway	11M/d ±2M/d at 1-in-200 years 11M/d ±2M/d at 1-in-500 years	Work closely with the EA when applying for, during the course of, and after the end of a drought permit. EA determine the outcome of whether the drought permit is granted. Advertise drought permit and discuss with any impacted organisations. Based on assessment of benefit of measure to reduce reservoir release requirements from Bewl through duration of measure in severe/extreme drought events - from WRMP19 2000-years synthetic hydrological record. Assessment does not account for risk of reservoir emptying.	Up to Moderate	Medium	3 months	2
Level 3: Severe drought conditions	Drought permit Darwell reservoir (1) (surface water source)	SH	Reduce the MRF in the River Rother in June to September from 28.5Ml/d to 10Ml/d to allow additional abstraction from the River Rother to Darwell reservoir.	2.2M/d at 1-in-200 years 1.6M/d at 1-in-500 years	Work closely with the EA when applying for, during the course, of and after the end of a drought permit. EA determine the outcome of whether the drought permit is granted. Advertise drought permit and discuss with any impacted organisations. Based on assessment of extra amount of water available to abstract under revised licence conditions throughout duration of Permit in severe/extreme drought events -	Up to Moderate	Medium	3 months	2

Trigger for action to be used	Type of action	WRZ	Summary of action	Likely benefit / saving	Risks, constraints and requirements[1]	Environmental impacts category[2]	Confidence level	Time to implement	Sequencing of implementation within WRZ
					from WRMP19 2000-years synthetic hydrological record				
Level 3: Severe drought conditions	Drought order Bewl Water reservoir / River Medway Scheme - Stage 3 (surface water source)	KMW	Summer drought order to reduce the MRF in the River Medway at Teston for abstractions at three locations: From 350Ml/d in May to August to 275Ml/d Modify the Bewl Water reservoir regulation release factor from 1.1 to 1.0 to support abstraction from the River Medway.	5M/d ±0.7M/d at 1-in-200 years 4M/d ±0.3M/d at 1-in-500 years	Work closely with Defra when applying for, during the course of, and after the end of a drought order. Defra determine the outcome of whether the drought order is granted. Advertise drought order and discuss with any impacted organisations. Based on assessment of benefit of measure to reduce reservoir release requirements from Bewl through duration of measure in severe/extreme drought events - from WRMP19 2000-years synthetic hydrological record. Assessment does not account for risk of reservoir emptying.	Up to Moderate	Medium	3 months	3
Level 3: Severe drought conditions	Drought order Bewl Water reservoir / River Medway Scheme - Stage 4 (surface water source)	KMW	Winter drought order to reduce the MRF requirement in the River Medway in relation to Bewl pumped refill. Reduce MRF at Teston to 100Ml/d (Nov-Apr), 200Ml/d (May-Aug), 150Ml/d (Sep-Oct). Modify the Bewl Water reservoir regulation release factor from 1.1 to 1.0 to support abstraction from the River Medway.	17M/d ±1M/d at 1-in-200 years 17M/d ±2.5M/d at 1-in-500 years	Work closely with Defra when applying for, during the course of and after the end of a drought order. Defra determine the outcome of whether the drought order is granted. Advertise drought order and discuss with any impacted organisations. Based on assessment of benefit of measure to reduce reservoir release requirements from Bewl through duration of measure in severe/extreme drought events - from WRMP19 2000-years synthetic hydrological record. Assessment does not account for risk of reservoir emptying. There is a need to reassess the benefit following the recent adjustment to Stage 4 details.	Up to Major	Medium	3 months	4

[1] Note the EA determines and approves drought permits. The Secretary of State determines and approves drought orders (subject to representation from the EA and other stakeholders).
[2] Detailed environmental impacts found in the respective EARs on request.
[3] The winter Darwell reservoir option would be the first priority for implementation in SHZ subject to the timing of need and further assessment of its deliverability and application readiness
We have removed the Faversham and Sandwich drought permits from this table for the reason described in section 3.5.4.

Table 3-15 Agreements with other licenced water suppliers in the Eastern area.

Import/Export	Water undertaker	WRZ	Amount (Ml/d)	Details (including pain share agreements)
Export	SEW at Darwell reservoir	SHZ	PDO -12.0Ml/d ADO -8.0Ml/d	SEW i can abstract up to 8Ml/d over any rolling 28-day period and up to 12Ml/d during any period as long as it does not exceed the former condition above. SEW have specified in their draft Dry Weather Plan that they are entitled to 8Ml/d and clarified the conditions in their text. SWS and SEW are in agreement with the contractual volumes of the transfer from Darwell. The abstraction takes place from Darwell reservoir. We intend to alter the Bewl-Darwell transfer to remove the risk of transfer of invasive species into Darwell but the transfer is to be maintained until 2025 when SEW will implement an alternative solution. In more extreme droughts we have agreed a pain-share arrangement with SEW relating to the availability of supply from Bewl to Darwell reservoirs. SEW has correctly stated that 'under developing drought conditions, the supply would be progressively limited to 8/17 of flow in the [Bewl to Darwell transfer] pipeline subject to a minimum of 1Ml/day'. Both companies have also agreed to 4Ml/d as the maximum available supply in a 1-in-500 years drought for supply-demand modelling purposes.
Export	SEW at Bewl reservoir and WSW near Rochester	KMW	PDO -18.8Ml/d (-18.8Ml/d in extreme drought) ADO -12.3Ml/d (-11.03Ml/d in extreme drought)	SEW can take their entitlement at Bewl Water and a WSW near Rochester. The maximum volume of water that SEW can take at Bewl Water is governed by the River Medway Scheme abstraction licence issued to SWS. The maximum volumes are 4750Ml/a and 20Ml/d. The overall amount available to SEW from the supplies at Bewl and the WSW near Rochester is defined as 25% of the yield of the River Medway Scheme. The yield is the DO calculated for WRMP19 and subsequently shared with SEW. As a drought situation develops the companies hold regular discussions to agree any restrictions or concessions for bulk supplies. The nature of the bulk supply will depend on how both companies are affected by any given drought. Planned works to increase capacity at the WSW near Rochester in early AMP7 will provide additional peak supply to SEW which are included in the DO assessment. Pain share agreement will be included in the new contract which will be drafted in 2021 and completed before 2025. When either or both companies experience a drought, they have agreed to discuss the operation of the transfer and relevant pain share agreements.
Export	SEW at Sheldwich (Belmont)	KME	PDO -7.39Ml/d ADO -6.80Ml/d (5.54Ml/d PDO and 5.14M/d ADO in a 1-in-500 years drought)	As part of the Sheldwich scheme, SEW can take its entitlement. There is also the provision for SEW to pump water into the Eastling main at Stockbury Valley and take water out at another location. However, the net maximum daily and annual average volumes that SEW is entitled to remain the original volumes given in the Sheldwich scheme agreement. Pain share agreement will be included in the new contract which will be drafted for continuation in 2021. When either or both companies experience a drought, they have agreed to discuss the operation of the transfer and relevant pain share agreements.
Export	AFW at Deal	KTZ	PDO / ADO-0.07Ml/d Increase to 2.0Ml/d in 2025, then -4.0Ml/d in 2029	This was agreed with AFW in AMP6. In the event of a drought, we would discuss relevant pain share agreements.
Import	AFW at Napchester	KTZ	PDO +0.1Ml/d ADO +0.1Ml/d	There is no specific contract for this small supply. In the event of a drought, we would discuss relevant pain share agreements

3.6. Emergency drought (Level 4)

All actions considered Level 4 are beyond normal drought planning and are part of the Emergency Plan. The specific details of the Emergency Plan are not made publicly available for security reasons but more general information on the transition from normal drought planning to emergency drought planning and the measures

included in this plan are provided below. The triggers for Level 4 drought measures have earlier been discussed in Section 2.

3.6.1. More before 4

This section describes the actions that we could implement as a severe drought (Level 3) gradually moves towards an extreme drought (Level 4). This would be after Level 3 restrictions are applied but before the need for Level 4 Emergency Drought Orders. These actions are exceptional and would not be used in normal drought conditions but would instead be used to prevent or delay the implementation of our Emergency Plan in which emergency measures such as standpipes and rota cuts would be deployed where necessary.

These actions termed ‘more before four’ measures have been discussed as part of the WRSE group and they have been considered for viability in terms of cost, environmental impacts, feasibility and effectiveness. Depending on the nature of the drought and the situation, we would consider the measures in Table 4.13 as part of our Level 3 drought measures beyond a severe drought as it gradually became an extreme drought.

Table 3-16: More before 4 interventions.

Trigger for action to be used	Type of action	WRZ	Summary of action	Likely benefit / saving	Risks, constraints and requirements	Environmental impacts	Timescales for implementation	Priority
Level 3/4	Media and communications	Affected area	Enhanced hard hitting communications to encourage water conservation measures to reduce PCC to 80 or 50 litres/person/day.	Up to 70 litres/person/day depending on existing water use.	Require customer campaigns, liaison with regulators and working with neighbouring water companies. Large social impacts as a result of this measure.	Potential environmental impacts from reduced wastewater treatment works discharges at a higher concentration. Would need to increase monitoring and consider what mitigation is possible. High social and economic impacts.	Quick impact as already on Level 3 communications.	4
Level 3/4	Removal of exceptions	Affected area	Consider removal of exceptions in place for imposed TUBs and NEUBs.	Limited as reductions will already be high and exceptions will affect a small proportion	Require customer campaigns, liaison with regulators and working with neighbouring water companies. Large social and economic impacts because of this measure.	Limited environmental impacts but high social and economic impacts.	Quick impact as already on Level 3 communications.	4
Level 3/4	Wastewater effluent recycling	Affected area	Provision of treated effluent for agricultural and/or horticultural use to reduce demand on public water supply.	Low to moderate.	High cost. Requires close working and coordinated discussions with the EA. Requires discussions with other south east companies.	Carbon increase. Public perception issues. Potential environmental impacts from the treated effluent.	Quick implementation depending on availability of portable supplies.	4
Level 3/4	Tankering - Sea tankering from Norway	HSW, IOW, SWZ, SBZ, SHZ, KME, KMW, KTZ	Sea tankering from Norway is being explored as part of WRSE group.	20Ml/d maximum as could be apportioned to other companies in the south east.	Water quality risks (blending of water), network constraint risks, require tanks, require deep-sea port.	Potentially extremely high increase in Carbon emissions from transporting supplies. Increased abstraction at source of tankering. Investigative work is required to identify overseas exporting ports and required infrastructure to facilitate the loading of water onto tankers, concurrent with potential receiving South Coast ports and onshore infrastructure. Some receiving ports have indicated that space could also be provided for storage reservoirs, this would then involve feasibility studies into appropriate downstream network reinforcement and treatment facilitates at source.	A lead time of 2 years is quoted to cover ‘a pilot delivery, any necessary infrastructure provision and all necessary legal agreements’. There is significant uncertainty around the 2-3 months ramp-up time for the service.	4

Trigger for action to be used	Type of action	WRZ	Summary of action	Likely benefit / saving	Risks, constraints and requirements	Environmental impacts	Timescales for implementation	Priority
Level 3/4	Tankering - Sea tankering from Scotland	HSW, IOW, SWZ, SBZ, SHZ, KME, KMW, KTZ	Sea tankering from Scotland considered as part of 2018 dry weather impact.	High.	Water quality risks (blending of water), network constraint risks, require tanks, require deep-sea port.	Potentially extremely high Carbon emissions from transporting supplies. Increased abstraction at source of tankering.	A lead time of 2 years is quoted to cover 'a pilot delivery, any necessary infrastructure provision and all necessary legal agreements. There is significant uncertainty around the 2-3 month ramp-up time for the service	4
Level 3/4	Bulk transfers	HSE, HAZ, SNZ, SWZ, KME, KMW, KTZ, SHZ	Discuss with neighbouring companies the opportunities for additional bulk supplies beyond existing contractual arrangements.	Limited depending on source company excess water.	Not guaranteed volume (depends on regional / national drought).	Extra abstraction at source of transfer	Ongoing activity throughout duration of drought	4
Level 3/4	Alternative supply tanks (tanks / bowsers)	Affected area	Smaller volume tanks distributed to support customers in smaller areas of impact.	Small size makes likely benefit uncertain.	Would need sufficient tankers and water availability. Potential risks to security and water quality.	Limited	Potentially high local demand for the system from other water companies in an extreme drought scenario would increase timescales	4

Media and communications - Enhanced hard hitting communications to encourage water conservation measures to reduce PCC to 80 or 50 litres/head/day

In 2018, after the worst drought in recorded history, Cape Town was on the verge of becoming the first major urban centre to run out of water. In order to avert the crisis, water use restrictions of just 50 litres/person/day were imposed. This scenario was explored by WRSE for viability should we find ourselves in a similar severity of drought.

As the measure is extreme, we would only consider implementing such a requirement after we have exhausted all of the drought actions in Levels 1 to 3 with the aim of avoiding Level 4 requirements of standpipes and rota cuts.

In order to achieve such large PCC reductions (from a 2019-20 PCC of 126 litres/person/day) we would require a significant change in water use and customer behaviour. There is a large uncertainty around the level of adherence to the messages that will be achieved, particularly if there is no legal requirement for customers to comply with the restrictions.

Further to this, there are potential environmental effects as there would be lower flows and higher concentrations from wastewater discharges and the receiving waterbodies will be naturally low as well. Monitoring would need to be increased to help consider what mitigation is possible.

Removal of exceptions - Consider removal of exceptions in place for imposed TUBs and NEUBs

A number of exceptions are available under TUBs and NEUBs. As a drought goes past Level 3, but before the severity reaches Level 4, we would consider removing some or all of these exceptions. However, there is large uncertainty around how much of an effect this will have on the demand and as such the demand levels will continue to be monitored throughout the drought and assessed as to whether this ‘more before 4’ drought action would be needed. It is expected that should customers reduce water usage to 80 or 50 litres/person/day then that would have far greater effect than removing exceptions.

Wastewater effluent recycling - Provision of treated effluent for agricultural and/or horticultural use to reduce demand on public water supply

Whereas we already have wastewater effluent re-use in our WRMP19, we would consider other viable wastewater recycling options that could be used during extreme drought scenarios. This could be using treated wastewater effluent for agriculture and horticultural use, in order to free up water supply for use elsewhere. There are ongoing discussions with the National Farmers Union (NFU) and the EA as to the environmental impact of this.

This could also include using treated effluent to fight fires, which would require close liaison with the local fire departments to ensure that they are assured that there are no risks involved in using treated effluent in this manner. This could also help to overcome any issues surrounding low water pressure affecting firefighting capabilities during a drought.

Tankering - Sea tankering from Norway

As part of collaborative WRSE projects, we have been exploring the possibility of tankering water from Norway to the south east of England. This would involve the use of large chemical tankers to transfer 20Ml/d from sources in Norway to ports in the south east of England. The water would be treated to potable standards in Norway before being transported here. There would still be a requirement to ensure the water is compatible with our networks and for further water quality testing to ensure that there is no contamination of our water supplies.

In order to achieve 20Ml/d it is assumed that seven tankers would be required as there is an estimated seven-day turnaround. Two months' notice would be needed for the first delivery. The constraints are the environmental impacts, availability of tankers, the suitability of water for our network, the potential requirement for further treatment to avoid water quality issues, any requirement for package plants and the availability of enough storage once the water arrives. Ongoing work with WRSE will continue to explore and develop this option.

Tankering - Sea tankering from Scotland

Tankering from Scotland was considered as part of the 2018 dry weather event. This would work in much the same way as tankering from Norway. The constraints are the same as for the sea tankering from Norway option above.

Bulk transfers - Discuss opportunities with neighbouring companies for additional bulk supplies beyond existing contractual arrangements

We would discuss with our neighbouring companies the opportunity to increase the bulk transfers from existing contractual arrangements. There is high uncertainty surrounding the effectiveness of this action as the neighbouring companies will likely be affected by drought at the same time.

Alternative supply tanks (tanks/bowsers)

Smaller volume tanks distributed to support customers in smaller areas of impact. Requirements are that the water to fill the storage tanks is available as well as the tankers to transport the water. There would be potential security risks and water quality risks. A constraint would be on the size of the storage tank and how long it could supply water for. Should there be high demand for the system from other water companies in an extreme drought then this would increase the timescales for implementation as availability of the system would become an issue.

Regional and national collaboration

Regional and national collaboration will be vital at this stage in drought management. As we approach a Level 4 drought, we would continue to work with our neighbouring water companies, suppliers, customers and regulators to avoid implementing Level 4 restrictions.

Some of these measures need to be developed further in discussion with relevant organisations and the EA and we will progress these for inclusion in the final plan. Specifically, we will consider the potential benefits, barriers and degree of environmental assessment needed.

Additional options

In parallel to the supply interventions previously explored, we have also considered wastewater recycling and new satellite boreholes (Table 3.14) in severe drought. The timeline is indicative as it may take longer due to planning issues etc.

Table 3-17: Additional options considered for emergency droughts and the associated risks.

Options	Wastewater recycling	New satellite boreholes
DO (Ml/d)	Maximum 20Ml/d depending on the scale of the scheme.	Maximum 10Ml/d
Timeline from trigger to implementation	2 years.	1 year
Risks associated	Poor quality of water may lead to a risk of drinking water compliance failure.	Environmental (lower groundwater levels)

Wastewater recycling

Wastewater recycling is generally not considered to be an option within the timescale of a Drought Plan due to the lead-in time of implementing such schemes. However, if there is a scheme under development for the long-term WRMP, there could be potential to increase investment to accelerate this activity during a drought.

Construction of new satellite boreholes

New boreholes could be drilled at existing sources (where appropriate) to spread the load of abstraction and reduce the risk of existing boreholes failing. This intervention is part of the resilience options of our WRMP; however due to the time needed to implement these schemes they are not considered to be part of the Drought Plan.

3.6.2. Level 4 drought measures

Much like Level 1 to Level 3 actions, the actions we will take in an emergency as a result of extreme drought will vary, depending on the risks and uncertainties at the time including hydrological conditions, time of year, customer response to water use restrictions and long-term weather forecasts. We will make full use of all other measures, where possible, before level 4 Emergency Drought Orders are implemented.

The actions we would take in advance of the application for Emergency Drought Orders are summarised as follows:

- Applications for drought permits/orders to maintain abstraction through reductions in MRFs, river regulation releases from reservoirs and/or reservoir compensation flow releases
- Applications for drought orders to prohibit or limit the abstraction of water by third parties to allow us to maintain or increase our authorised abstractions
- Applications for drought orders to vary discharges to the environment
- Applications for drought orders to limit or restrict the use of water for certain activities as stated in the Drought Direction 2011

Some of the measures listed above may also need other consents, such as discharge consents and planning permissions.

Emergency Drought Orders, amongst other measures, can allow water companies to restrict supplies to customers through the imposition of rota cuts and/or the introduction of standpipes. These measures exist to deal with the possibility of a drought much worse than any seen in the last century or more in the UK. Emergency Drought Orders to restrict water supplies have not been put in place in England since 1976. Ministers have made it clear that such measures should be avoided at all costs and introduced only as a last resort. If similar conditions to those experienced in 1976 were to occur again, there should not be the need for an Emergency Drought Order given the investment by water companies since then to improve resilience to drought.

The legislation governing Emergency Drought Orders is contained within the Water Resources Act 1991 and gives powers to the Secretary of State on application by the water company to make such provision as appears to him/her to be expedient with a view to meeting the supply deficiency. In practice, such powers are generally held to include the following water use restriction measures:

- To limit the use of water for such purposes as it considers necessary (i.e. further measures not specified in the Drought Direction 2011)
- To introduce rota cuts

- To set up and supply water by means of standpipes or water tanks

Emergency Drought Orders may be granted for a period of 3 months and cannot be extended by the Secretary of State beyond 5 months.

In the event of Emergency Drought Orders being authorised and implemented to further restrict water use, we will give as much warning (minimum 72 hours) as is possible to the local fire authority before we decide to enact an Emergency Drought Order. We will also take all reasonable measures to secure adequate supplies of water for the fire authority's use in the event of fire. Fire authorities will be consulted closely during all stages of a drought event (not just when considering Emergency Drought Orders) and will be made aware of the implications that any measures taken by us might have on the availability of adequate supplies for firefighting. Due to the importance of water for firefighting, the relevant local fire authorities in our supply area will receive formal notice in writing of the introduction of an Emergency Drought Order, and we will inform these fire authorities of any forecast shutdowns to the water distribution network.

An Emergency Drought Order could also be sought to further reduce MRFs or increase abstraction from licensed and unlicensed water sources, which is likely to lead to additional and more severe environmental impacts. The scope of monitoring, environmental assessment work and mitigation measures that might be required under such circumstances will be reviewed with the EA if drought conditions become more severe.

4. Environmental monitoring and mitigation

4.1. Our obligation

We have a responsibility to monitor, assess and, where possible, mitigate the environmental impacts of the supply-side actions we take during a drought. EA guidance governing the Drought Plan requires us to produce an Environmental Monitoring Plan (EMP) that demonstrates our compliance with the requirements for environmental monitoring and mitigation set in the guidance. Consequently, we have produced a detailed EMP (Annex 7) to accompany our Drought Plan. A summary of the key points covered in the EMP is presented in this section.

4.1.1. The Section 20 Agreement

Under the Section 20 Agreement (Section 3.3.1), we committed to a significant package of environmental monitoring, mitigation and compensation measures associated with the potential drought permits/orders which were approved by the EA and Natural England (NE). Many of these measures are to be carried out in advance of (and irrespective of the implementation of) any drought permit/order. This results in an overall positive benefit to the environment and an improved ecological resilience on both the River Test and River Itchen.

Delivery partner agreements are in place with the EA, Hampshire and IOW Wildlife Trust and Wessex Rivers Trust and both mitigation and compensation measures are underway. A Programme Steering Group (including NE) and governance structure has been established, and funding payments have been made since 2018-19. Monthly stakeholder updates take place.

Despite the delivery programme experiencing some minor delays, none are expected to have an adverse or material impact and implementation is still in line with the delivery timetable.

Progress since DP19 includes:

- Baseline data monitoring
- Ecological monitoring on Itchen and Candover since summer 2018
- Some Lower Test ecological monitoring during 2019
- In-river habitat survey at the River Test by on-the ground and aerial imagery surveys by specialist consultants
- Salmon spawning area survey of Blackwater tributary
- Cattle poaching and shrub clearance/vegetation mitigation measures, completed in 2020
- Installation of water quality stations on the Lower Test & Blackwater
- Support to the Test and Itchen Catchment Partnership to develop data and an information sharing/story board platform
- Commencement of river mitigations
- Financial support to the White Clawed Crayfish captive breeding programme
- Development of the mitigation and compensatory habitats delivery plan and identification of preferred and alternative sites
- Commencement of landowner discussions for compensatory habitats

- Start of the physical compensation delivery works in October 2021

Existing monitoring stations and further installation of new stations on the Itchen and Candover were installed summer 2021. Revisions to installation and maintenance contracts were made in order to improve data quality.

Financial support is also being given to the Test and Itchen Catchment Partnership and the Watercress and Winterbournes Landscape Partnership.

Full delivery of mitigation is expected by April 2024. Discussions have commenced with landowners relating to areas for compensatory habitats, the first batch of compensatory habitat delivery began and was delivered in 2021. The delivery plan identifies several alternative sites if not all preferred sites are successful.

Between March 2018 and February 2021 substantial efforts were made to reach an agreement for access towards monitoring and mitigation at the Lower Test. The EA were notified in February 2021 that agreement had unfortunately not been reached and we feel that we have exhausted negotiation opportunities.

4.2. Data and monitoring

4.2.1. Baseline monitoring

For this Drought Plan, we carried out a comprehensive review of existing baseline data that forms the basis for assessing the environmental impacts of supply-side Drought Plan measures in addition to the effects of the drought itself. A wide range of hydrological, hydrogeological and environmental data were collected from various sources, including the EA, NE, studies we have carried out in the past as well as nationally available datasets. We also began a series of baseline monitoring from 2019, as detailed in DP19, where we looked to address gaps in our understanding of the environment. This work will continue beyond this Drought Plan to support the development of our knowledge. This information is used in the preparation of our 2022 Drought Plan, EARs, Habitats Regulation Assessment (HRA) (Annex 8), Strategic Environmental Assessment (SEA) (Annex 9) and WFD assessment (Annex 10).

The review also identified the need for collecting any additional baseline data and/or monitoring to reduce uncertainty regarding the presence, distribution, composition and/or quality of the physical environment and relevant environmental features (including heritage, recreation, navigation and landscape), which could inform future environmental assessments. Discussions were subsequently held with the EA, NE and other stakeholders to agree the precise locations and nature of the monitoring activities, the datasets that needed to be collected and any analytical methods that need to be employed for analysis and reporting. The additional data needs identified are shown in individual EARs for each drought permit/order, accompanying this Drought Plan.

As part of the EMP that accompanied our DP19, we set out a timetable for finalising and agreeing the details of baseline monitoring programme (as well as in-drought monitoring) with the EA and NE (where applicable), together with a prioritised timetable for a continued programme of baseline monitoring. The programme has progressed since 2019 which consisted of both one-off surveys (e.g. habitat walkover), prior to requirement of a drought permit/order, as well as monitoring that is to be carried out periodically with frequency varying from seasonal (e.g. spring and autumn macroinvertebrate sampling) to annual (e.g. fish in sensitive water environments) to every 3 years (e.g. most fish and macrophyte surveys). We are currently progressing this programme of baseline monitoring.

In addition to agreeing a timetable for baseline monitoring, we also assigned priority levels (highest, higher and lower) to each drought permit/order source (Table 4.1). The priority levels have been assigned based on

the likelihood of the drought permit/order being required and/or the potential magnitude of any environmental impacts.

Baseline monitoring to date is aligned to the programme detailed in DP19 (Table 4.2). We progressed into Year 3 baseline monitoring in 2021 for the highest/higher drought permits/orders and Year 2 for the lower priority permits/orders. There are some one-off baseline monitoring elements for the highest/higher drought permits/orders that are scheduled to be completed in 2022.

Table 4-1: Priority order for baseline monitoring programme.

Option name	Supply area	Priority
Test Surface Water	Western	Highest
Candover Augmentation Scheme	Western	Highest
Lower Itchen Sources	Western	Highest
Bewl Water Reservoir/River Medway Scheme	Eastern	Highest
Pulborough	Central	Higher
Eastern Yar	Western	Higher
Caul Bourne	Western	Higher
Lukely Brook	Western	Higher
Stourmouth	Western	Lower
Darwell Reservoir	Eastern	Lower
Weir Wood Reservoir	Central	Lower
East Worthing	Central	Lower
North Arundel	Central	Lower

We have removed the Faversham and Sandwich drought permits from this table for the reason described in section 3.5.4.

Table 4-2: Drought permit/order monitoring programme timetable (excluding Test Surface Water, Candover Augmentation Scheme and Lower Itchen sources).

Target Date	Drought permits/orders priority	Action
June 2018 to July 2019	All	Agree and sign-off survey sites, control sites, delivery approach (e.g. EA, SWS, River Trusts), frequencies of monitoring and analytical methods/reporting for baseline and in-drought monitoring
August 2018 to July 2019	All, with the highest / higher priority sites addressed first	Contracting and delivery plan development
Late September to November 2018	Highest priority permits/orders	Autumn baseline monitoring for appropriate features and/or species (where locations, methods and land access agreed in sufficient time)
Spring 2019 to Autumn 2019	Higher priority permits/orders	Baseline monitoring for Year 1 (where locations, methods and land access agreed in sufficient time)
Summer 2019 to December 2019	Higher priority permits/orders	Review Year 1 findings and confirm sites and activities for Year 2
Spring to Autumn 2020	All	Baseline monitoring for Year 2 (including those features not surveyed in Year 1)
Summer 2020 to December 2020	All	Review Year 1 and Year 2 monitoring findings and confirm sites and activities for Year 3
Spring to Autumn 2021	All	Baseline monitoring for Years 1-3, including any missed monitoring not already undertaken

Target Date	Drought permits/orders priority	Action
Spring 2021	All	Include monitoring results to date in updated drafts of EARs for Drought Plan 2022
Spring 2021	All	Review Year 1 and Year 2 monitoring and agree future monitoring to develop the updated Drought Plan 2022 EMP draft for consultation (and as part of updates to the EARs)
Summer 2021 to December 2021	All	Review Year 1 to Year 3 monitoring findings and confirm sites and activities for Year 4, taking account of any agreed changes made for the Drought Plan 2022 EMP
Spring 2022 to Summer 2022	All	Continue with agreed monitoring for Year 4
Summer to Autumn 2022	All	Review Year 1 to Year 4 monitoring and agree future monitoring for Year 5, taking account of any agreed changes made for the Drought Plan 2022 EMP
Summer 2022 to December 2022	All	Review Year 1 to Year 4 monitoring findings and confirm sites and activities for Year 5
Spring 2023 to Summer 2023	All	Continue with agreed monitoring for Year 5
Summer 2023 to December 2023	All	Review Year 1 to Year 4 monitoring findings and confirm sites and activities for Year 5

Following the Section 20 Agreement, the drought permit/orders for the Test Surface Water, Candover Augmentation Scheme and Lower Itchen sources in the Western area have been assigned highest priority. This is based on the environmental sensitivity of the River Test and River Itchen to drought permits/orders as well as the elevated risk of needing the Test Surface Water Drought Permit.

The Bewl Water reservoir/River Medway Scheme in our Eastern area has been assigned the highest priority given the likely frequency of drought permit and the strategic regional importance of this scheme.

4.2.2. Monitoring during drought

Our EMP details the surveys that will be carried out to inform environmental assessment of the prevailing conditions at the onset of drought during drought permit/order implementation as well as post-drought.

Monitoring during implementation of a drought permit/order helps assess the actual impacts on environmental features and helps to determine the timing of mitigation measures, where applicable by the agreed trigger conditions. The evidence collected also helps to verify the impacts predicted in the EARs and used to subsequently update the EARs.

Monitoring post-drought will help assess any impacts that continue despite the cessation of the drought permit/order and to assess the rate and nature of recovery of the environment. It will also help to establish any damage or loss linked to the drought permit/order implementation and guide any applicable mitigation or post-implementation compensation measures.

There are two key elements of monitoring during drought:

1. **Control site selection:**
   Control sites are the sites that are not impacted by drought permit/order. These sites therefore provide a basis for assessing the extent to which drought permit/order has had an impact above and beyond the impacts of environmental drought alone at the impacted sites. The assessment is done both during and after a drought. The precise locations of these sites are finalised in discussions with EA, NE and other relevant stakeholders.

Ideally:

a. The location of control sites will be consistent with baseline monitoring.
b. The control sites will be situated in the un-impacted reaches of the same catchments containing the impacted sites. However, this may not always be possible and comparable locations in neighbouring catchments may need to be used.
c. The total number of sampling sites should be split equally between control and impact locations to provide balanced statistical assessments.

2. **Specific monitoring requirements:**
Each drought permit/order requires specific environmental monitoring at the onset of drought conditions, during and post implementation of drought permit/order. In many cases, habitat and features walkover surveys are recommended as part of the monitoring requirements for each of the three drought stages. These would build on the recommended walkover surveys carried out for the baseline monitoring and enable a rapid review of the prevailing environmental conditions and to identify those features likely to be at greatest risk in the specific drought conditions arising (e.g. risks in winter will be different to those in summer). In some cases (e.g. fish), the walkovers are a substitute for in-river monitoring of the feature as the monitoring would lead to additional stress on the feature under drought flow conditions.

   All the monitoring activities are the responsibility of SWS, but we may work with other parties to deliver the activities taking account of the organisations that would be best placed to carry out the requirements. Where relevant, appropriate licences and approvals will be needed to carry out the monitoring and we have a responsibility to ensure that all surveyors have the appropriate licences, approvals and experience to carry out the monitoring to the required standards.

Annex 7 provides details of the control sites and the specific monitoring requirements at each drought stage at each of the sites where a drought permit/order is likely to be implemented.

We have provided comments on updates we have made to our monitoring programme in our environmental monitoring plan (EMP) which is annex 7 to this drought plan.

4.3. Mitigation measures

4.3.1. Requirements

The development of mitigation requirements is based upon the assessment of sensitive features identified in the EARs as having a significant risk of impact as a result of implementing drought permits/orders. Following the EA guidance, significant risk is where the significance of impacts is identified as being moderate or major in the EARs.

Walkover surveys and other in-drought monitoring provide information on the effects of the drought and drought permit/order implementation to inform decisions on the application of any mitigation measures. Further targeted surveys would then be required following implementation of mitigation measures to assess their benefit and make adjustments as may be necessary (or to suspend the mitigation measure if it is shown to have an adverse effect).

Monitoring at the onset of environmental drought will inform the risks of adverse effects of any drought permit/order implementation and inform the agreement as to the precise mitigation measures to consider and

the appropriate trigger for their implementation in dialogue between SWS, EA, NE and other stakeholders, as appropriate.

The mitigation measures set out in the EMP accompanying this Drought Plan (see Annex 7) are based on the likely impacts to sensitive features and these should be further reviewed in a drought, particularly if monitoring identifies additional 'new' risks or indicates that the stated measures are not appropriate in the specific drought conditions faced. Similarly, post-drought monitoring should inform the precise nature of any required post-drought compensation measures. The compensation measures, except for statutory compensation measures required under the Habitats Regulations which must normally be 'secured' prior to damage occurring, are therefore not precisely defined as they will necessarily need to reflect the precise nature of the loss or damage identified post-drought.

4.3.2. Potential mitigation measures

The mitigation recommendations adopt a hierarchy of approach which follows the general principle of:

- Reducing the pressure at source
- Pressure management in the water body
- Direct ecological interventions (which require careful consideration before implementation and consequently should not be the 'first resort')

The implementation of mitigation measures during the in-drought and post-drought periods should follow this principle, with movement to mitigation measures in the next level of the hierarchy dependent upon the success or failure of mitigation in the lower hierarchy.

Table 4.3 sets out the 2022 Drought Plan mitigation measures timetable. The prioritisation for mitigation measures follows the same prioritisation as for drought permits/orders as shown earlier in Table 4.1. The drought permit/orders for the Test Surface Water, Candover Augmentation Scheme and Lower Itchen sources have the highest priority along with stages 1 and 2 of Bewl Water/River Medway scheme. This has been agreed with the EA.

We have now established a project to progress the development and delivery of mitigation actions specific to drought permit and order options in our Drought Plan unless mitigation programmes exist already (such as for the Test, Itchen and Candover drought options). We will provide updates on the programme in the WRMP Annual Review and at other appropriate intervals as required.

Table 4-3: 2022 Drought Plan mitigation measures timetable (excluding Test Surface Water, Candover Augmentation Scheme, Lower Itchen sources and Bewl Water/River Medway Scheme Stages 1 and 2).

Target dates	drought permits/orders priority	Action
Throughout 2022	All, with the highest / higher priority sites addressed first.	Review of SWS projects and plans that provide drought resilience mitigation.
		Develop mitigation options for each scheme based on consultation with EA and NE, outputs from walkovers surveys from 2019-20, cost benefit and business planning.
		Engage delivery partner to develop delivery options and opportunities.
2022-23	Highest / higher priority permits/orders.	Agree full package of embedded mitigation options with EA and NE.
2023-25		Begin embedding mitigation or resilience measures.

Target dates	drought permits/orders priority	Action
	All, with the highest / higher priority sites addressed first.	Add resilience measures to business planning.

In September 2022 we developed a Memorandum of Understanding (MoU) and shared this with catchment partners in Kent, Sussex, Hampshire and the Isle of Wight. This MoU sets out the framework for building a strong, strategic regional partnership together. This partnership will help enable the development of long-term catchment plans which contribute to catchment resilience and delivery of wider benefits and will drive significant environmental improvements and set out our contribution to strategic plans such as the Government's 25 Year Environment Plan. It will facilitate the co-development of schemes that are a shared priority for each catchment. It also sets out Southern Water's long-term commitment to collaborate with the Catchment Partnerships, recognising the opportunities and benefits to all parties of this approach.

As we stated in section 4.3.1, the in-drought monitoring that we carry out will inform the selection and timings of the mitigation measures we implement. Because each drought has different characteristics, the ecological impacts of any drought measure or combination of measures will differ. During the period covered by this drought plan we will look to make continuous improvements and refinements to the monitoring and mitigation measures set out here. For example, we will be informed by any permit applications or updated HRAs and will report on these improvements either via the WRMP annual review process or we will incorporate that learning into the next drought plan we produce.

We have provided comments on updates we have made to our drought related mitigation in our environmental monitoring plan (EMP) which is annex 7 to this drought plan.

Non-ecological features

Mitigation actions may be necessary to prevent derogation of other abstractions (e.g. by lowering pumps in third party boreholes and/or providing alternative water supplies). Compensation may be agreed otherwise in accordance with the provisions of Section 79 and Schedule 9 of the Water Resources Act 1991 (as amended).

4.3.3 Habitat Regulation Assessment (HRA)

We have carried out numerous environmental assessments to accompany this plan. These include a strategic environmental assessment (SEA), environmental assessment reports (EARs) and HRAs. We provide the HRA for this plan as annex 8. This separate HRA contains assessments of the individual drought permits and drought orders as well as in-combination assessments.

In addition, following engagement with the Environment Agency and Natural England, we have collated a summary table to show, at a high level, the outcomes of the individual HRAs that we have carried out. The HRA process has different stages, with all assessments needing to go through stage 1. Where this initial stage 1 assessment is not sufficient to rule out potential impacts then we carry out a stage 2 or, if required, stage 3 assessment. The following table shows which drought permit or drought order assessments required a stage 2 or stage 3 assessment:

Table 4-4: Summary of the HRAs that have progressed past stage 1 of the HRA process

	Stage 2		
Drought order/permit	**Mitigation**	**Monitoring**	**Effect on site integrity**
Caul Bourne drought order **Groundwater**	Additional reactive measures proposed for during Drought Order implementation.	Detailed monitoring, including monitoring for WQ compared to the antecedent environmental drought conditions and fish distress monitoring. Further pre-permit assessments also proposed.	Conclude no adverse effect on site integrity
Bowcombe (Lukely Brook) drought order **Groundwater**	No additional mitigation but, compensation flow to downstream watercourse is expected as in drought order scope.	No additional monitoring	Conclude no adverse effect on site integrity
Eastern Yar (*Blackwater)* Augmentation Scheme Permit **Surface Water**	Pre and during drought permit monitoring is proposed such that mitigation would be in the form of temporary suspension of operation of the drought permit should thresholds be breached.	Detailed monitoring (and further pre-permit assessments) proposed.	Conclude no adverse effect on site integrity. Southern Water to review viability of the drought permit with temporary suspension requirement.
River Test Drought Permit & River Test drought order **Surface water**	Mitigation agreed via Section 20 Agreement with EA and, additional mitigation committed in December 2022, especially in respect of increased EA concerns about risk of impact on the River Itchen Atlantic Salmon population via abstraction under the permit impacting on Itchen salmon straying to the River Test.	Agreed via Section 20 and, additional monitoring and assessment committed in December 2022, especially in respect of increased EA concerns about risk of impact on the River Itchen Atlantic Salmon population via abstraction under the permit impacting on Itchen salmon straying to the River Test.	The July 2024 drought permit project level HRA Appropriate Assessment (AA) found no likely significant effect for all European sites except for the River Itchen SAC. It found that for "the River Itchen SAC, the assessment concludes that adverse effect on integrity cannot be excluded with certainty, at this juncture, with the various mitigation measures, as proposed. Further discussion with the EA on the mitigation measures is welcomed to progress this assessment." * Passes to Stage 3 assessment.
Candover Augmentation scheme order **Groundwater**	Mitigation agreed via Section 20 Agreement with EA. Mitigation commitments signed-off by EA and NE.	Monitoring agreed via Section 20 Agreement with EA. Monitoring commitments signed-off by EA and NE	Even with the agreed mitigation, not possible to conclude no adverse effects on Candover stream designated chalk stream habitat features, Southern damselfly habitat and population, and the White clawed crayfish habitat and population. Passes to Stage 3 assessment.
Lower Itchen drought orders ***- Itchen groundwater, Itchen surface water, Twyford groundwater,*** ***- Portsmouth Water surface water abstraction (for supply to SWS)***	As above	As above	Even with the agreed mitigation, not possible to conclude no adverse effects on the River Itchen (downstream of Itchen surface water) in respect of designated chalk stream habitat, Southern damselfly habitat and population, and the Atlantic salmon habitat and population. Pass to Stage 3 assessment.
Pulborough drought order **Surface Water**	Mitigation measures agreed as a result of the Tidal Arun Abstraction Licence renewal application (December 2021) and Pulborough Groundwater abstraction licence variation are also relevant to the drought order; documented in the March 2023 version of the resultant	Enhanced monitoring has been agreed and documented as with the mitigation. Much of the monitoring is being undertaken within the Pulborough Basin Environmental Study. Specific to the in-river salinity risks and associated mitigation	Assuming implementation of the monitoring and mitigation plan, including that all the sluices between the River Arun and Arun Valley SAC are repaired and operating correctly it is concluded that there is no adverse effect on site integrity for the all identified sites and features, alone or in-combination with other plans and projects.

	Stage 2		
Drought order/permit	Mitigation	Monitoring	Effect on site integrity
	monitoring and mitigation plan for the licence applications.	commitments of the Pulborough surface water drought order, Southern Water will install the in-river (Arun) real time WQ monitoring during 2023/24.	
Bewl Water / River Medway Scheme 'winter' drought permit **Surface Water**	Mitigation as 2016/17 granted permit and updated in draft application 2022.	Monitoring as 2016/17 granted permit and updated in draft application 2022.	Conclude no adverse effect on site integrity, with committed mitigation.
Bewl Water / River Medway Scheme 'summer' drought permit **Surface Water**	Mitigation to improve resilience of SPA mudflat feeding birds by agreeing alternative operation of flows from the Allington locks at low tide to reduce the potential for lower water levels at low tide. in advance of drought. Specified removal of invasive species in the upper creeks of the River Medway that are most likely to be affected by the reduction in freshwater flows.	Enhanced pre and during permit monitoring proposed	Conclude no adverse effect on site integrity, with committed mitigation.
Darwell Reservoir *(River Rother)* summer drought permit **Surface Water**	Extensive, detailed mitigation required of risk to flow feeds to associated channel system; mitigation viability currently uncertain.	Extensive enhanced and monitoring and assessment required,	If mitigation feasible, then no adverse effect could be concluded but, mitigation requires further review. The viability of the drought permit is in question. To be updated in Annual Review and/or preparation of next drought plan.
East Worthing drought permit **Groundwater**	Specific assessment pending	Specific assessment pending	Specific assessment pending but, considered likely to conclude no adverse affect.
North Arundel drought permit **Groundwater**	Specific assessment pending	Specific assessment pending	Specific assessment pending but, considered unlikely to conclude no adverse affect and, viability of this drought order may be questioned. To be updated in Annual Review and/or preparation of next drought plan.

* We continue to work with the Environment Agency and Natural England specifically on the River Test drought permit assessment and discuss this project level HRA further below and provide an indicative timeline in table 4-6.

The table above does not include Faversham or Sandwich drought permits because we have varied these abstraction licences in a way that means these drought permits would not provide a supply benefit in a drought, so we no longer require them.

Table 4-5: Summary table of HRAs that have progressed to stage 3

	Stage 3	Stage 3	
Drought Order/Permit	**Alternative options**	**Imperative Reasons of Overriding Public Interest (IROPI)**	**Compensation measures**
Candover Drought Order	Until Measures to improve supply resilience of Hampshire Southampton East supply area are delivered via the Hampshire Water for Life programme, there are no other feasible and acceptable alternatives solutions to negate or mitigate the need for the Lower Itchen Sources drought order during the lifetime of the Drought Plan 2022; the Candover Drought Order's role is to delay, avoid or reduce the scale of requirement of the Lower Itchen Drought Orders, where the risk and impact on the Lower Itchen SAC is greatest.	The IROPI case is to avoid the economic costs of severe water use restrictions (water rationing via standpipes and/or rota cuts). This is weighed against the short-term, reversible effects of the Drought Order on the River Itchen SAC, mitigated and compensated by SWS as set out in the Section 20 Agreement.	The agreed compensation package is set out in Annex 4 of the Section 20 Agreement, and in subsequent SWS Drought Plans (2019 and 2022).
Lower Itchen Drought Orders	As above, here with respect of risk of direct impacts on the Lower Itchen SAC.	As above.	As above.

The River Test Drought Permit & River Test drought permit and drought order has progressed to Stage 3 in accordance with the indicative timetable at Table 4-6.

The July 2024 project level HRA Appropriate Assessment (AA) for the River Test Drought Permit concluded that there was no likely significant effect for all European sites except for the River Itchen SAC. It found that for "*the River Itchen SAC, the assessment concludes that adverse effect on integrity cannot be excluded with certainty, at this juncture, with the various mitigation measures, as proposed. Further discussion with the EA on the mitigation measures is welcomed to progress this assessment*."

These discussions with regulators relating to the River Test surface water drought permit project level HRA indicated that the EA did not consider the mitigation proposed to be sufficient to prevent any potential adverse effects. Adopting the precautionary principle in relation to what may be functionally linked habitat, we decided that this project level HRA would progress to stage 3 and, if required, stage 4 of the HRA process. We wrote to the EA on 21 November 2024 to confirm this decision. This is part of the 'application ready' principles that we adhere to should such a drought option be needed in the future.

It was originally considered that the application for a relaxation of the Hands off Flow (HoF) on the River Test could be made by way of an application for a Drought Permit (consistent with the Section 20 Agreement). However, the conclusion of the Stage 2 assessment was that "*for the River Itchen SAC, it is not possible to conclude there will be no adverse effect on site integrity for the River Itchen SAC even with mitigation in place*". In consequence, consistent with the Environment Agency's guidance and advice, it was considered that an application should be made to the Secretary of State for Environment, Food and Rural Affairs for a Drought Order in relation to the proposed HoF relaxation, having considered imperative reasons of overriding public interest and provided compensation. The application for a River Test Drought Order was submitted on 18th July 2025 to Defra together with the HRA (stages 1 to 4) and a Notice of a proposed HRA derogation. We consulted with the EA and Natural England on the HRA prior to submission.

We are currently expecting to conclude this process by summer 2025 and set out an indicative and updated timeline for the process in table 4-6 of the main drought plan report. We shared a previous version of this timeline with the EA in December 2024. We will update the EA on the latest position with the project level HRA via the annual review process however we do not expect this ongoing process with the project level HRA to impact upon the finalisation of this drought plan.

In-combination assessments of drought plan HRAs

We have updated the in-combination assessments in our drought plan HRA, which is annex 8 to this drought plan. Project level HRAs are being reviewed by the EA and Natural England. We are producing a further programme of updated HRAs and EARs that will accompany our next drought plan (that will cover the 2027 to 2032 period.)

We continue to work with the Environment Agency and Natural England on the River Test drought permit and drought order HRA and set out an indicative timeline for completing this process below:

The approach set out in the table below will be the same as for the Itchen WSW licence renewals and will be in collaboration with the regulators via calls, meetings and workshops.

Table 4-6: Indicative timeline for completing the River Test drought permit/ order level HRA

Target dates	Action	Comments
December 2024	Share working draft of indicative timeline with regulators.	As requested at 28/11/24 workshop, SWS will aim to share a draft timeline to assist with resource planning in 2025. This working draft will not have been through the full assurance and governance process.
January 2025	SWS to work on stage 3 (consideration of feasible and reasonable alternative options) and HRA stage 4 (IROPI and compensatory measures).	Due to compressed timescales SWS expects to start work on this stage whilst stage 3 is in progress. This risks abortive work but is essential to make progress at the desired rate.
Before March 2025	Workshop (date to be confirmed) at which SWS will share stage 3 and stage 4 documentation with regulators for feedback.	
Before March 2025	Incorporate regulatory feedback on stage 3 and 4 documentation.	
March 2025	Following discussion with the regulators, develop compensatory measures	
April 2025	Share and discuss stage 4 with regulators draft information on compensatory measures that SWS could implement if this is required.	SWS will receive and incorporate regulatory feedback on IROPI and compensatory measures.
April/ May 2025	Further development of compensatory measure in collaboration with the regulators.	Compensatory measures required will need to be considered alongside those already agreed as part of the Section 20. They will also need to account for any measures that may be agreed as part of ongoing discussions regarding abstraction licence renewal and the possible extension of the Section 20 agreement.
July 2025	Finalise appropriate assessment including agreed compensation and document this.	The compensation/ mitigation package for a River Test drought order (to reduce the HoF to 355Ml/d)

Target dates	Action	Comments
		was agreed with the EA and NE prior to the drought order application that was submitted on 18 July 2025.
After July 2025	Await determination from the Secretary of State for the River Test Drought Order application so that this drought option is available in 2025 should it be required to be implemented.	The Secretary of State decision is likely to be influenced by a public hearing/ inquiry on this application.
2026	Should a drought permit/ order be needed in 2026 SWS will work with regulators to understand whether any additional mitigation/ compensation is required.	Should any further mitigation/ compensation be required this is expected to take account of what has been already agreed within the Section 20 agreement as well as that agreed during 2025.

4.4. Permits and approvals

Many of the mitigation (and compensation) measures will require specific permits and/or approvals to be obtained by SWS (or its agents acting under contract to SWS) prior to implementation as summarised in Table 4.7.

Irrespective of the need for a permit or permission, all planned mitigation measures would be discussed with the EA in advance of implementation, as well as with NE, other authorities, stakeholders and site or land owners as appropriate.

All works will have regard to the requirements of protected species legislation and any necessary licences will be obtained in accordance with the provisions of the Wildlife and Countryside Act 1981 (as amended).

Where assent is required for works on a Site of Specific Scientific Interest (SSSI) under section 28i of the Wildlife and Countryside Act 1981 (as amended), this assent will be obtained as properly required under legislation.

Table 4-7: Mitigation and compensation measures, permits and approvals.

Mitigation measure	Likely permits or approvals required
Modification to pump levels in third party abstraction boreholes and/or financial compensation by SWS due to derogation of abstraction rights.	None, but agreement between the licence holder and SWS will be required. Compensation payments are provided for in Section 79 and Schedule 9 of the Water Resources Act 1991 (as amended).[30]
Modification to abstraction intakes at third party surface water abstractions and/or financial compensation by SWS due to derogation of abstraction rights.	May require an abstraction licence minor amendment and/or Flood Risk Permit (Main River) or Land Drainage Consent (Ordinary Watercourses) as appropriate. Agreement between the licence holder and SWS will be required. Compensation

[30] Under the rules of the act a claim may be made at any time not later than six months after the end of the period for which the permit or order authorises. Any disputes are referred by the claimant or applicant to the Upper Tribunal, and are not a matter dealt with at the hearing. The Upper Tribunal may make an award during the duration of the permit or order in respect of likely damage, though in so doing it may have regard to the amount of water which was likely to have been available to the claimant as against others.
When we advertise and consult on drought permit/order applications, to provide us with additional supplies in a drought, we will reference the above to ensure abstractors who are potentially impacted by the drought measures are made aware that they may make a claim for compensation to the Lands Tribunal. We will work with the EA at the time of making a permit application to ensure we have captured all abstractors downstream of drought permit/order sites that might be at risk of derogation due to drought permits/orders being implemented.

Mitigation measure	Likely permits or approvals required
	payments are provided for in Section 79 and Schedule 9 of the Water Resources Act 1991 (as amended).[31]
Provision of alternative water supply where derogation of abstraction rights occurs.	No specific requirements for a mains water supply or provision of water bowser/tanker. May require abstraction licence if alternative source of raw water supply proposed from a controlled water.
Provision of compensation flows to the river from a borehole to maintain a minimum residual flow.	Requires a discharge permit for the discharge to river; may require planning permission for laying of discharge pipe as well as approval from landowners and riparian owners.
Improving the effluent quality from a Wastewater Treatment Works.	Generally, none and within SWS's control assuming the improvement does not require major construction or construction adjacent to a watercourse when planning permission, Flood Risk Permit (Main River) or Land Drainage Consent (Ordinary Watercourses) may be necessary. Liaison with the EA is however recommended in respect of discharges to controlled waters.
Address point sources of effluent or nutrient loading that may be causing adverse water quality at times of very low flow.	This will generally require dialogue with the site owner to assess what measures could be carried out. This might include temporary tankering of the effluent to a wastewater treatment works. No specific approvals are likely to be required.
Creation of alternative refuges in deeper water (e.g. fish, white-clawed crayfish).	May require Flood Risk Permit (Main River) or Land Drainage Consent (Ordinary Watercourses) from EA depending on nature of the work and/or NE consent if works are in a SSSI or European[32] site.
Provision of in-stream structures and flow baffles to create functional refuges to support flow sensitive species.	Flood Risk Permit (Main River) or Land Drainage Consent (Ordinary Watercourses) from EA and/or NE consent if works are in a SSSI or European site.
Artificial channel narrowing to provide functional refuges and support habitat requirement for species, enabling a quick natural recolonisation of the reach post-drought (e.g. fish, macroinvertebrates).	Flood Risk Permit (Main River) or Land Drainage Consent (Ordinary Watercourses) from EA and/or NE consent if works are in a SSSI or European site.
Modification of flow structures across barriers to retain favourable conditions to facilitate the movement/migration of species (fish).	Flood Risk Permit (Main River) or Land Drainage Consent (Ordinary Watercourses) from EA and/or NE consent if works are in a SSSI or European site, plus permission from the owner of the barrier/structure will be required.
Provision of piscivorous 'visual' bird scaring measures (e.g. using streamers in riparian trees) to control predation upon species using refuges (fish).	None, but consultation with EA, NE, bird specialists and RSPB[33] would be important to ensure compliance with other nature protection legislation. Implementation would need to balance benefits to in-river species with maintenance of food sources for birds. Unlikely to be acceptable in SPA[34] or Ramsar[35] sites or associated functional habitat for birds.
Aeration or oxygenation of watercourse where significant mortality or change in species abundances are likely to be attributed to water quality deterioration.	Discussion with the EA on aeration and/or oxygenation methods necessary to determine whether any permits or formal permissions are required.

[31] See footnote 22
[32] Special Protection Areas (SPAs) and Special Areas of Conservation (SACs) protect species and habitats shared across Europe and originally designated under European legislation.
[33] Royal Society for the Protection of Birds.
[34] Special Protection Area.
[35] Wetlands of international importance designated under the Ramsar Convention.

Mitigation measure	Likely permits or approvals required
Capture and relocate individuals across significant barriers, taking into account migratory periods (immigration and emigration) (fish).	EA consultation and consent required (in consultation with NE for designated conservation sites or species).
Rescue of individuals or groups, in consultation with the EA or NE as appropriate, and relocation to suitable habitat where they are seen to be in distress or where artificially high densities are likely to result in significant impacts (e.g. fish, white-clawed crayfish).	EA consultation and consent required for fish movement and crayfish licence required (in consultation with NE)
Rescue of individuals or groups, in consultation with the EA or NE as appropriate, and retention for later release where they are seen to be in distress or where artificially high densities are likely to result in significant impacts (e.g. fish, white-clawed crayfish).	EA consultation and consent required for fish movement and crayfish licence required (in consultation with NE).
Enhancement of habitat beyond the impacted reach (e.g. macroinvertebrates, fish).	May require Flood Risk Permit (Main River) or Land Drainage Consent (Ordinary Watercourses) from EA depending on nature of the work and/or NE consent if works are in a SSSI or European site.
Restocking using juvenile lamprey ammocoetes within the catchment where monitoring indicates loss of lamprey abundance or recruitment.	EA consent required (in consultation with NE for designated conservation sites and as a European and NERC[36] species).
Restocking using offspring from broodstock from the catchment where monitoring indicates loss of fish abundance or recruitment.	EA consent required (in consultation with NE for designated conservation sites or species).
Restocking of coarse fish from the catchment where monitoring indicates loss of fish abundance or recruitment.	EA consent required (in consultation with NE for designated conservation sites or species).
Removal/treatment of Himalayan balsam (or other floral INNS[37]) where monitoring indicates an increase in abundance or distribution due to the drought permit/order.	EA consent may be required (in consultation with NE for designated conservation sites or species) depending on the nature of the removal and/or treatment, as well as the subsequent method of disposal.
Protection to heritage features through specific mitigation works.	Requires approval and agreement of site owner and may require approval and/or guidance from Historic England.
Mitigation measures to support water sports and boating/navigation facilities– various measures such as modifying boat slipways/moorings or provision of alternative sites, or local dredging; or, otherwise, compensation.	Requires dialogue with relevant owners/members of water sports organisations as well as riparian owners. May require Flood Risk Permit (Main River) or Land Drainage Consent (Ordinary Watercourses), dependent on nature of the works. Local dredging to be minimised and will invariably require consent and agreement of relevant regulator (dependent on location). Compensation is provided for under Section 79 and Schedule 9 of the Water Resources Act 1991 (as amended)[38]
Mitigation measures to support angling – various measures such as provision of alternative fishing sites, or otherwise compensation for loss of angling.	Requires dialogue with relevant owners of fishing rights/members of angling associations/clubs. Compensation is provided for under Section 79 and Schedule 9 of the Water Resources Act 1991 (as amended)[39]
Mitigation of predicted ecological risks to rivers and associated habitats and species. River restoration, re-connection to floodplains, and enhancement work to be provided pre-drought to build up ecological resistance to and recoverability from the effects of drought. To include reversing historic degradation from over-grazing, impoundments, simplification of the channel form, and removal of bankside and riparian shade in chalk streams in order to improve drought resilience.	EA consent required (in consultation with NE for designated conservation sites or species).

[36] Threatened species listed under Section 41 (S41) of the 2006 Natural Environment and Rural Communities (NERC) Act.
[37] Invasive Non-Native Species.
[38] See footnote 22
[39] See footnote 22

Mitigation measure	Likely permits or approvals required
Retaining of water via control structures for water dependent features within designated sites.	EA consent required (in consultation with NE for designated conservation sites or species).
If it is considered likely that a drought permit needs to be extended beyond 6 months, a river corridor survey should be undertaken of the medium and high risk reaches to note down features and their locations. This survey can then be used to help assist recovery in locations where it is not occurring naturally, by repeating the survey post drought and then at subsequent intervals (e.g. one year later).	EA consent required (in consultation with NE for designated conservation sites or species).

4.5. Data exchange

We will exchange data with and receive it from our stakeholders, the EA and NE under normal conditions, during a drought and post drought.

4.5.1. Data exchange during normal conditions

Under normal conditions, key routine baseline environmental monitoring data relevant to the Drought Plan (e.g. river flows, groundwater levels, water quality and ecological data) is exchanged between SWS, EA and NE on a regular basis. Data is exchanged electronically wherever possible and only after the appropriate quality assurance checks have been carried out. Any issues with the data are identified as part of the exchange process.

Each party is responsible for notifying the other parties of any planned changes to the monitoring programmes as early as possible such that the other parties have an opportunity to address any gaps in the dataset that this may cause.

Under the Section 20 agreement we are also committed to initiate liaison in relation to the Test Surface Water Drought Permit every six months. We have offered availability of the River Test Drought Permit documentation at six monthly stakeholder meetings. The main focus of most of the six-monthly meetings has been progress of application readiness in the sense of the progress of the monitoring, mitigation and compensation work as well as updates on the water resources situation and drought risk forecast.

4.5.2. Data exchange during drought

During a drought, we will liaise closely with the EA and NE regarding in-drought monitoring programmes of each party. In the initial stages of a developing drought, there will be regular communication established and the onset of drought environmental monitoring will be confirmed so that each party is aware of planned activities.

As far as practicable, any relevant environmental data collected by each party will be made available to the other parties (subject to appropriate licensing arrangements where necessary, which are assumed to have been agreed as part of the baseline data exchange process) through electronic transfer wherever possible in a timely manner (suggested as normally **within 1 working week** of the necessary data compilation and/or analysis having been completed).

In addition to the data exchange, each party shall share as early as possible their planned in-drought monitoring programmes together with any triggers established to enhance or extend the monitoring

frequency and/or spatial coverage. Any changes to the plans should be communicated in a timely manner so that other parties can react accordingly.

We will also establish communications with relevant contacts in the EA and NE to discuss potential mitigation measures in respect of proposed drought permits/orders and agree the specific monitoring and trigger conditions for their implementation, building on the information within the EMP but taking account of the prevailing environmental conditions.

4.5.3. Data exchange post drought

Post-drought, we will continue to liaise closely with the EA and NE to agree and confirm the targeted, specific post-drought monitoring programmes of each party. For SWS, this will be based on the monitoring measures set out in our EMP and further informed by the findings of the specific in-drought monitoring activities and the prevailing environmental conditions. Given that compensation measures may be required in light of the in-drought and post-drought monitoring of impacts linked to drought permits/orders, it is considered appropriate that the data exchange timeframes set out for the in-drought monitoring should apply in the initial weeks following the cessation of the drought permits/orders, but reverting to the baseline frequency once drought recovery has been agreed to have occurred (noting this will vary from location to location, and from feature to feature).

The post-drought monitoring data should be pooled by all parties and meetings arranged to review and agree the key findings arising from the data on a regular basis (frequency to be agreed dependent on the prevailing conditions) until it is agreed that environmental recovery has largely occurred. It is recommended that a joint summary paper is produced to set out the key findings of fact in relation to any damage and subsequent recovery of relevant key environmental features. This should be used to direct and target any required post-drought compensation measures which should be recorded for future reference.

All data collated during the drought and post-drought (to the point of recovery of the relevant environmental features) should be reviewed by SWS and used to update the EARs, HRA and WFD assessment reports as necessary in advance of the next Drought Plan submission.

5. After a drought

5.1. Identifying the end of a drought

A drought does not necessarily end as soon as it starts raining again. It is important to recognise that there is a difference and often a delay between the ending of a drought event in terms of normal rainfall patterns resuming and the recovery of water resources back to within the normal range of conditions. Depending on the severity of the drought, it can take time for the rain to recharge the aquifers and increase river flows. This time delay or lag between the rain and recovery in groundwater levels and/or river flows could be several months. Accordingly, we do not consider a drought to have ended until conditions have returned to normal.

Several indicators are used to determine that a drought has ended, these are set out in Table 5.1. This varies for each WRZ but, in general, consists of the primary trigger (river flow, reservoir storage or groundwater level) exiting the defined trigger thresholds and SPEI reaching a defined threshold. From comparisons against historical droughts we found that SPEI for the associated durations for each WRZ corresponds well to the progression of the primary triggers as it considers not just the significance of the rainfall deficit but also seasonality by accounting for the amount of PET and effective rainfall and recharge and hence providing a better metric of hydrological drought.

Table 5-1: Trigger Thresholds to define the end of a drought.

WRZ	End of drought triggers
HAZ, HKZ, HRZ, HWZ, SWZ, SBZ, KTZ	SPEI above -0.5 **AND** Groundwater level above Level 2 (1-in-10 years) trigger curve
HSE, HSW	SPEI above 0.0 **AND** Test total flow above 60-day HoF trigger threshold **AND** Itchen flow above 60-day HoF trigger threshold **AND** Groundwater level above Level 2 (1 in-10-years) trigger curve
IOW	SPEI above -0.5 **AND** Groundwater level above Level 2 (1-in-10 years) trigger curve **AND** End of drought conditions met in HSW
SNZ	SPEI above -0.5 **AND** Cumulative flow deficit above Level 2 (1-in-10 years) trigger curve
KME KMW	SPEI above -0.5 **AND** Reservoir storage above Level 2 (1-in-10 years) trigger curve **AND** Groundwater level above Level 2 (1-in-10 years) trigger curve
SH	SPEI above -0.5 **AND** Reservoir storage above Level 2 (1-in-10 years) trigger curve

It is important to track the recovery from a drought and recognise when it has ended. This allows a safe and considered de-escalation of drought related activities whereby any temporary impacts upon customers and the environment are reduced and finally removed in a timely manner.

We must also consider the implications of the Section 20 Agreement on our Western area and the drought management measures that might be needed in Hampshire. The agreement sets out the need to apply for a

drought permit for the River Test in Level 1 conditions as defined in the Drought Plan. This is earlier than we would need to apply for drought permits/orders elsewhere. Whilst we may not need to implement the River Test surface water Drought Permit until the Level 2 drought stage has been reached, the drought permit may need to stay in place for longer during the drought de-escalation process than other drought permits/orders. This is to minimise the risk of re-instating the drought permit immediately after it has been lifted. As such, the end of drought declaration in Western area may be delayed beyond that in other supply areas which have experienced similar drought conditions.

5.1.1. De-escalation of drought activities

Our de-escalation of drought activities will not necessarily take place using the same trigger levels as an escalation in activity when a drought develops. During the recovery to normal conditions, it is prudent for us to wait until there is a reasonable degree of certainty that sufficient recovery of both groundwater and surface water resources has occurred. This is to ensure that if there is a short-term return to drought conditions, there will not be a need to re-escalate communication and other activities, with the attendant time delay involved and the potential confusion that this could cause for our customers.

For instance, if water use restrictions have been in place over a summer, we may wait until February or March of the following year to establish whether replenishment of surface water storage and groundwater recharge over the winter period has been sufficient to restore the supply situation so that restrictions can be lifted. During this time, we will ensure that we keep our customers informed as part of our communication plan (Annex 6).

The necessity of using this approach after drought conditions have eased can often be difficult to understand, especially if periods of intense high rainfall led to flooding. Before de-escalating our drought activities, we will need to be reasonably certain that water resource conditions have returned to normal. This may lead to customer perception that the lifting of restrictions on the use of water is delayed longer than necessary. We must be sure that in the short-term we would not need to reverse our decision to lift restrictions.

In our de-escalation of drought activities, we would first seek to reduce those that have the greatest environmental impact, namely the use of drought permits/orders. These would be surrendered once flows or groundwater levels have returned above the relevant thresholds such that they were no longer required.

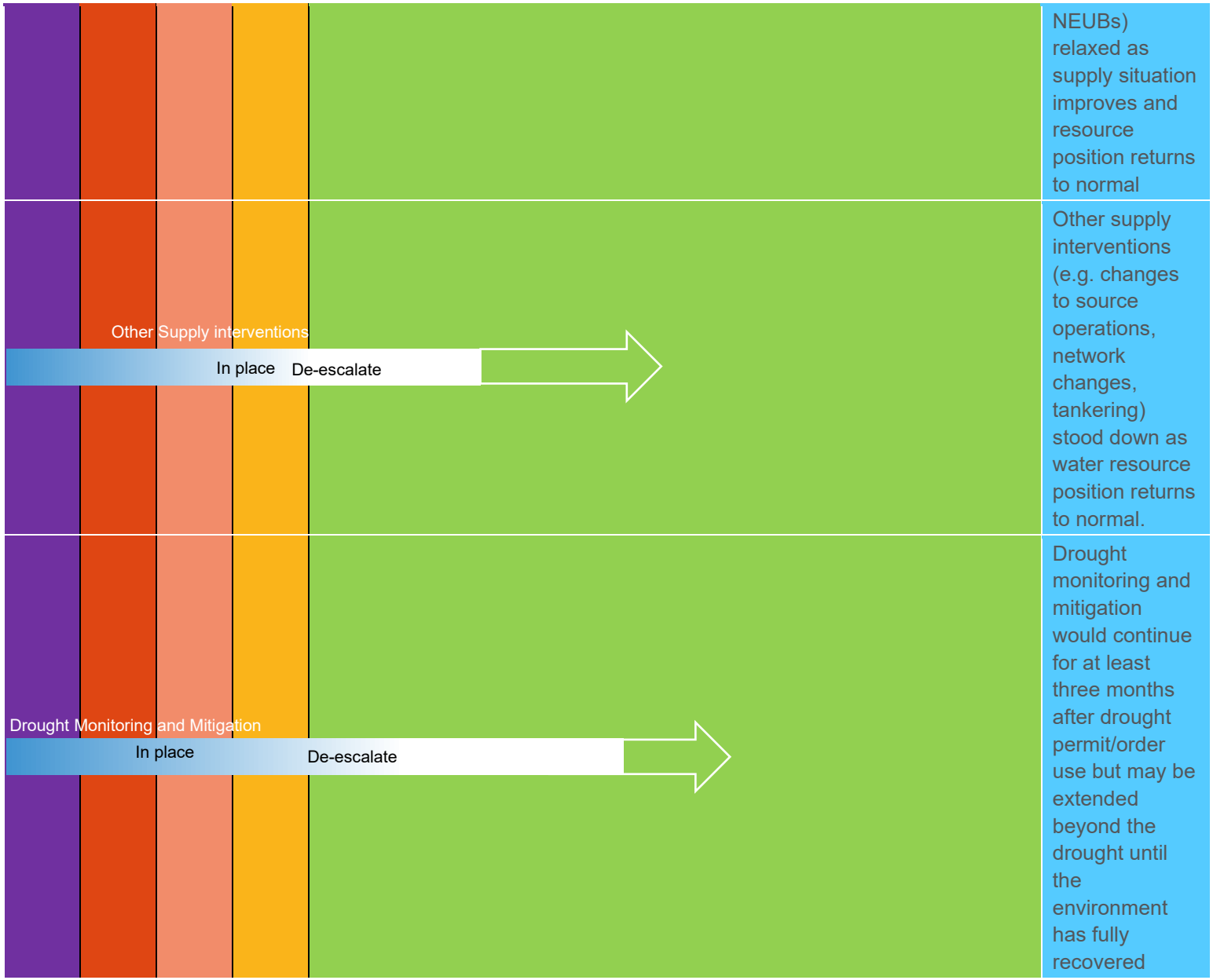
An important element of the de-escalation discussions will be the scope and frequency of post-drought monitoring. This will be agreed as part of the drought permit/order and may typically extend up to 3 months beyond the cessation of the drought permit/order but could be longer. Initially the scope of monitoring might be the same as during the period of the drought permit/order, but it could then progressively reduce in scale and frequency. We will keep this under review with the EA while the permit is in operation to ensure that it takes account of the findings arising from the monitoring programme.

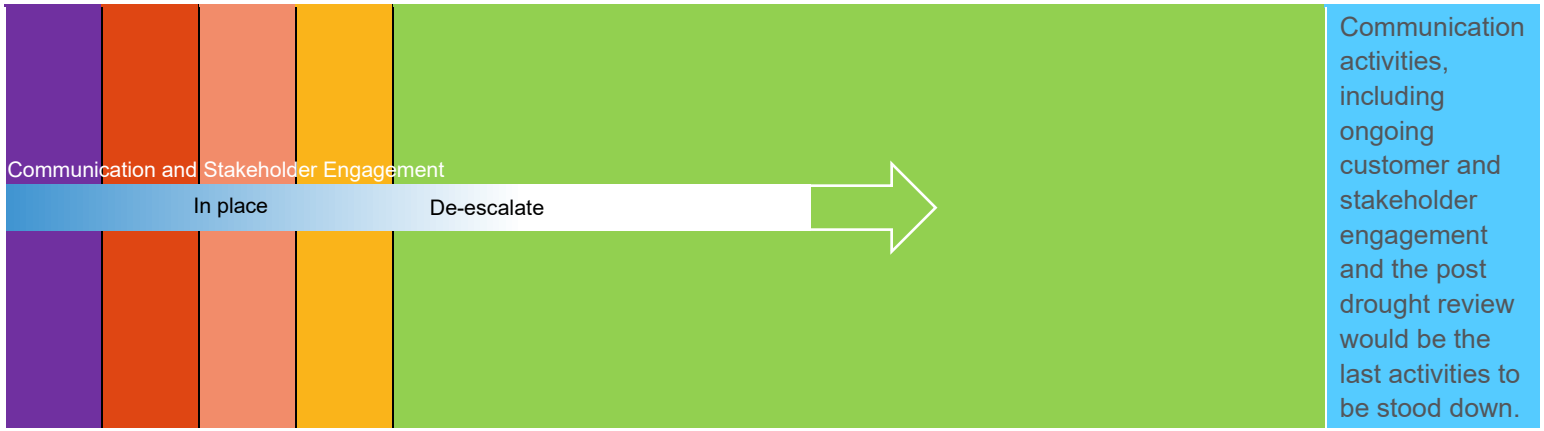
The regular communication established between us and statutory consultees such as the EA will be maintained throughout the de-escalation process to ensure that all parties understand and contribute to an agreed and co-ordinated programme of de-escalation. We will only declare the end of a drought after confirming with the EA that the water resource situation has returned to normal.

The process for de-escalation of our drought activities is summarised in Table 5.2.

Table 5-2: Summary of drought activities de-escalation process.

De-escalation Priority	Recovery of Drought and Trigger Levels					Drought De-escalation Activity
	Level 4	Level 3	Level 2	Level 1	Normal	
	Emergency Drought Orders: In place → De-escalate					Remove Emergency Drought Restrictions as supplies allow and water resources recover. Supply side drought permits/orders remain in place.
	Drought Permits and Orders to increase supplies: In place → De-escalate					Use of drought permits/orders to increase abstraction and/or conserve water storage will be de-escalated as flows, storage or groundwater levels climb above implementation thresholds.
	Demand restrictions (TUBS and NEUBs): In place → De-escalate					Restrictions to water use (TUBs and


NEUBs) relaxed as supply situation improves and resource position returns to normal
Other supply interventions (e.g. changes to source operations, network changes, tankering) stood down as water resource position returns to normal.
Drought monitoring and mitigation would continue for at least three months after drought permit/order use but may be extended beyond the drought until the environment has fully recovered
Other Supply interventions
In place
De-escalate
Drought Monitoring and Mitigation
In place
De-escalate


Communication and Stakeholder Engagement
In place
De-escalate
Communication activities, including ongoing customer and stakeholder engagement and the post drought review would be the last activities to be stood down.

5.2. Customer communication

It is important that we keep customers aware throughout the process of lifting restrictions and declaring the end of a drought. Since our water resources are dominated by groundwater, there can often be a lag between rainfall events and a rise in groundwater levels and groundwater levels only tend to recover through winter rainfall. Clear communication with customers is therefore important to help understanding of this relationship. A good example of this was the high amount of customer contact experienced during the ending of the 2012 drought when, despite higher-than-average rainfall, customer restrictions were maintained as groundwater levels had not recovered.

We have a robust communications plan which sets out the communication we will undertake with both household and non-household customer depending on the severity of the drought. This is to ensure we can communicate effectively with customers, stakeholders, regulators and other partners and critical organisations during all stages of a drought. Areas of the communication at each level is detailed in Section 3.3 to Section 3.5. The specific communication actions that we will take to inform customers that resource conditions have returned to normal are described in detail in Annex 6.

5.3. Post drought review

Once the end of a drought has been declared we will review our performance during the drought event. This will include an assessment of the effectiveness of the Drought Plan, and to determine the improvement actions that might be needed from lessons learnt.

To facilitate a common transparent understanding, both within the business and with regulators, we will develop and publish a post drought review report three months after the end of a drought has been declared. We will consult with the EA and other regulators during this time.

This review will include an assessment of the following:

- The hydrological and water resource evolution of the drought
- The impact on the delivery of customer promises and customer survey responses
- The performance of the drought intervention measures deployed
- The triggers and monitoring methods used
- The EARs for drought permits/orders. This will likely be needed to reflect new evidence collected of the impact of a drought permit/order on the environment and the effectiveness of any mitigation measures implemented. The monitoring data collected might allow an improved assessment of the potential impact of the drought permit/order. It may also inform an updated environmental monitoring and mitigation programme for the particular drought permit/order that would be reflected in an updated EMP. This would be discussed and agreed with the EA
- The estimated reduction in demand from any demand-side measures implemented
- The extra water delivered from any supply intervention implemented
- The need to reassess any DOs as a result of the drought

- Any updates required for WRMP and Drought Plan
- The effectiveness of the communication activities, based on feedback from representatives of customer groups, individual customers, and other institutional stakeholders, such as the EA

Table 5.3 below provides an indicative timescale for completing the post-drought review report.

Table 5-3: Indicative timescale for completion of the post drought review report.

Month after normal conditions have returned	Post drought review activities
1 Month	■ Appoint author of post drought review. ■ Hold internal workshop and interviews to collect summary of experiences of drought interventions.
2 Month	■ Meet with the EA, any affected neighbouring water companies, and other stakeholders, as appropriate, to discuss lessons learnt.
3 Month	■ Publish post drought review report internally and to the EA.
3-18 Months	■ Continue collecting environmental monitoring data. ■ Update EARs as appropriate. ■ Consider updating the WRMP and Drought Plan if necessary.

5.4. Always improving

In addition to the review of the effectiveness of our drought plan and actions following a drought event, we also believe that it is important to keep the Drought Plan under review and to update it when necessary, for example to reflect on any changes to our supplies, network, or drought actions.

We intend to undertake an annual internal review of the Drought Plan and will provide a summary of the outcomes to the EA alongside our annual WRMP reporting. This review will consider but is not limited to the following:

- Any changes to our drought interventions or the associated supply and demand benefits
- Any changes to our drought triggers from further technical work, data availability or drought experience
- Any changes to our environmental monitoring programme and mitigation packages
- A summary of any drought plan actions implemented in the reporting period and an assessment of and their effectiveness