REVISED DRAFT DROUGHT PLAN 2021

Changes and additions to the draft Drought Plan are highlighted in yellow.

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1 INTRODUCTION

1.1 Statutory Drought Plans

Legislation requires water companies to prepare and maintain a Drought Plan. Our Drought Plan is an operational plan that sets out the measures that we will take so that we are able to continue to maintain supplies of wholesome water to our customers with as little recourse as possible to Drought Orders and/or Drought Permits. The purpose of a Drought Plan is to set out the timely actions that a water company will take to ensure continuity of supply whilst at the same time continuing to protect the environment.

1.2 Portsmouth Water's water resources

Portsmouth Water provides an average of 170 million litres (megalitres) of drinking water per day to around 320,000 domestic properties and the majority of commercial businesses in an area of 868km² in south east Hampshire and part of West Sussex. We abstract water from a combination of boreholes, natural springs, and one abstraction close to the tidal limit on the River Itchen, which is groundwater dependent; our public water supply sources are therefore all groundwater based. We have no significant raw water storage and consequently we are reliant on the recharge of groundwater over the winter period. We currently have no surface water storage reservoirs and hence our ability to maintain supplies during a drought relies upon balancing demands with the yield from our sources. The greatest challenge for us is therefore likely to be during dry summers when peak demands are usually experienced.

In addition to supplying our own customers, we also provide bulk supplies to Southern Water under conventional agreements. In recent years we have also started to supply other licensed water undertakers, referred to as Newly Appointed Variations (NAVs).

Our whole supply area is a little more than 50 km x 30 km with well developed 'connectivity' between our sources and service reservoirs. The sources are not isolated and the connecting links enable transfers between areas if required. As a result, we treat the whole of our supply area as a single Drought Management Area (and Resource Zone).

1.3 Changes since the last plan

Portsmouth Water's previous Drought Plan was published in April 2019. The structure and tone of this Draft Drought Plan has been substantially changed in order to meet the requirements of the latest Water Company Drought Plan Guideline (Defra and Environment Agency, December 2020). A particular feature of the guidance is that plans should be clearer and easier for customers and other stakeholders to follow.

A number of other factors have influenced this Draft Drought Plan including the following:

- Unprecedented impacts on customer water use behaviour and hence peak demands for water resulting from covid-19 restrictions and short periods of intensely hot weather;
- Increased collaboration between water companies at the regional scale through Water Resources in the South East (WRSE) which has aligned technical approaches to Drought Plans and Water Resource Management Plans (WRMP);
- The effectiveness of local tailored messages to customers using social media platforms, rather than the more conventional general messaging.

2 WATER RESOURCE AND DROUGHT PLANNING

Drought Plans and Water Resource Management Plans (WRMP) are separate statutory requirements, however there are common principles that apply to each. These are:

- The need to maintain security of supply to all customers;
- The need to protect the environment; and
- That the level of restrictions imposed on customers matches stated Levels of Service (LoS)

2.1 Levels of Service (LoS)

We have agreed with our customers the frequency at which demand restrictions might need to be implemented. The agreed Levels of Service (LoS) are consistent between our WRMP19 and Drought Plan and are set out below:

- Temporary Use Bans > 1 in 20 years, representing an annual risk of 5%.
- Non-Essential Use Bans > 1 in 80 years, representing an annual risk of 1.25%.
- Emergency Drought Orders > 1 in 200 years, representing an annual risk of 0.5%.

2.2 Drought triggers

The yield of our groundwater sources is entirely dictated by groundwater levels, which are principally dependent upon aquifer recharge from rainfall during the winter period. We therefore monitor both rainfall and groundwater levels to enable us to estimate the expected output from our sources during the months ahead. We use drought triggers to identify when we need to take actions to manage in a drought, through all stages of drought development, from its onset to its end. It is important to us therefore, that triggers are of practical benefit to those managing the supply demand balance on a daily basis.

The Company has monitored groundwater levels at Well 'X', an observation borehole near Rowlands Castle, for over eighty years. It is centrally located within our area and unaffected by abstraction and therefore provides a good indication of groundwater resources for us.

For this drought plan update we aligned our triggers with the newly clarified Environment Agency classifications to ensure that there is consistency with neighbouring companies and

the national picture. Increasing levels of drought severity have been defined in line with the updated guidance, to ensure that the drought actions are proportionate to the level of drought risk being experienced as shown in the following Table:

Drought Plan Stage	**Normal**	**Developing**	**Drought**	**Severe Drought Phase 1**	**Severe Drought Phase 2**	**Emergency Plan**
Our WRMP19 drought severity reference	No Drought	Developing Drought	Dry Year to Extended Drought	Extended Drought to Serious Drought	Serious Drought to Severe Drought	Emergency Plan
Level of restrictions	Level 0	Level 1	Level 2	Level 3a	Level 3b	Level 4
Approximate drought severity return period	n/a	First year of a drought	<1-in-20 to 1-in-80	1-in-80 to 1-in-125	1-in-125 to 1-in-200	>1-in-200
Drought Plan demand side actions	n/a	Media campaign and water efficiency messaging. Voluntary reductions in usage. Enhanced leakage control & pressure management.	Temporary Use Bans (TUBs) for domestic customers.	Non-essential Use Bans (NEUBs)	Extreme actions – "More before 4" implemented after our Drought Permit (more severe drought than the 1-in-125)	Introduction of the Emergency Plan
Drought Plan supply side actions	n/a	n/a	Prepare for Drought permit applications		Apply for and implement North Arundel Drought Permit (DP) Extreme actions – "More before 4" implemented after our Drought Permit (more severe drought than the 1-in-125)	Introduction of the Emergency Plan

3 DROUGHT MANAGEMENT ACTIONS

We believe that our water sources are sufficiently resilient in periods of low rainfall such that we only anticipate the implementation of our Drought Plan for multi-season droughts. Having a long advance period of prolonged dry weather puts us in a good position to recognise when a drought is developing and gives us time to implement drought management actions.

When we need to implement drought management actions, we have different options available to us. The options for managing a drought can be divided into two types. Those

which focus on reducing the need for water are called demand-side options. Those which seek to increase the amount of water available are called supply-side options.

3.1 Demand-side actions

We already encourage our customers to use water wisely and we promote water efficiency measures. If our routine monitoring of rainfall, groundwater levels and customer demand suggests that drought conditions might be developing, then we will consider implementation of any of the following measures to reduce the overall demand for water:

- We can enhance our efforts to reduce water wasted by leaks
- We can reduce the pressure of water in the distribution network
- We can appeal to customers to use water more sparingly
- We can impose temporary water use restrictions on certain activities
- We can apply to the regulator to impose further restrictions, via a Drought Order

Mandatory restrictions on customer use fall into two categories: Temporary Use Bans (TUBs) and Non-Essential Use Bans (NEUBs). TUBs are essentially equivalent to what used to be called hosepipe bans.

TUBs would be implemented as the first stage of mandatory restrictions. We will fully comply with the regulations produced by the Environment Agency, and will follow the Water Industry's 'Code of Practice and Guidance on Water Use Restrictions', to ensure that we apply the TUB in a way that is consistent and transparent, and proportionate. We will clearly communicate the implementation of the Ban and what is restricted.

The legislation for TUBs allows water companies to specify exceptions or concessions to particular groups so they can remain unaffected by the Ban. These exceptions aim to minimise the impact on vulnerable customers and the economy.

Should the drought continue to deepen, we would then consider the implementation of NEUBs which are a set of measures granted to water companies to impose further restrictions on the use of water as long as certain legislative tests are met.

3.2 Supply-side actions

Our WRMP19 has demonstrated that even in the most severe drought scenarios, we only require a single drought permit to maintain supplies to our customers. The North Arundel drought permit was chosen as it has the least likely impact upon the environment (as described above) and is the only confirmed drought permit proposed within our drought plan. All of the demand management measures must be in place before the Drought Permit will be approved.

We have a responsibility to monitor, assess, and where possible, mitigate the impact of our supply-side actions in a drought. For this Drought Plan, we have prepared a detailed Environmental Assessment Report (EAR) for the North Arundel drought permit. The EAR identifies the environmental baseline and also the likely impacts of the drought permit on environmental features. It also sets out the approach that we will take to monitoring groundwater levels, surface water flows, water quality and ecology.

3.3 Summary of drought management actions

A summary of the drought management actions for Levels 1 to 3 is shown in the Table below.

Option Name	**Appeals for Restraint and Enhanced**	**Temporary Ban**	**Non-Essential Use Ban**	**North Arundel Drought Permit**
Trigger (or preceding actions)	Groundwater Level 1	Groundwater Level 2 (Following consultation on Temporary Ban)	Groundwater Level 3 (Follows Temporary Ban)	Groundwater Level 3 (Follows Temporary Ban) Serious Shortage of Rainfall (Relate to SPI indices levels)
Drought Plan Stage Description	Developing	Drought	Severe Drought	Severe Drought
Location Area affected or whole supply zone	Whole Company Area	Whole Company Area	Whole Company Area	North Arundel
Implementation timetable Preparation time/ time of year effective/ duration	One week/spring, summer, autumn/one year	8 weeks/spring/six months (renewable)	12 Weeks/ all seasons/ six months (renewable)	12 weeks/ summer/ six months (renewable)
Permissions required and constraints Including details of liaison carried out with bodies responsible for giving any permits or approvals	Liaison with CCWater and the EA	CCWater, EA	Drought Order, CCWater, EA, Defra	Drought Permit EA/Defra Liaison with Natural England on SSSI

4 MANAGEMENT AND COMMUNICATION STRATEGY

4.1 Drought Management Structure

During drought conditions we will convene our internal Drought Event Management Group to ensure we follow a structured approach to managing the drought and maintain clarity over roles and responsibilities.

We will deploy an agile communication plan to connect with customers, other water companies (incl. NAVs and Retailers), the Environment Agency, the Government and many other stakeholders. We will use and elevate existing communication channels and open new ones, to cascade information about the water shortage we are experiencing. As the drought

progresses, we will use these channels to request customers to observe particular water saving measures, and to inform them of the additional drought measures we will be implementing.

4.2 Communication plan

Communication plays an essential role in managing drought and is a key aspect to any action we undertake. The nature of any particular drought is unique in terms of its extent, duration and severity. This means we will need to deploy a Communication Plan in an agile way, so that we can best respond to the particular drought characteristics being experienced.

The messages used and the method of delivery will be dependent upon the severity of the situation. Nevertheless, the key information we will communicate will include:

- The key reasons for the water shortage;
- The actions taken by Portsmouth Water to date;
- What people can do, and how this helps to save water and protect the environment;
- What may happen in the future should the drought worsen, with regard to water use restrictions; and
- How people can find out more information and advice.

4.3 Regional Drought Collaboration

We are aware that mixed messages from water companies, regulators, NGOs and other stakeholder groups can be counterproductive to the effective management of drought responses. So, we fully recognise the need to work collaboratively to share knowledge and best practice, co-ordinate and align communication to customers and stakeholders, and promote the efficient use of water resources.

Therefore, we work closely with other water companies in our region as part of the WRSE and WRE groups. For example, we participate in the regular WRSE "dry weather" meetings which focus 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 situation. 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.

5 POST DROUGHT ACTIONS

5.1 Identifying the end of a drought

We need to be sure that drought conditions have eased sufficiently to allow us to de-escalate our drought actions. The Environment Agency considers that a drought has ended when:

- The risk to the security of supply and environment from drought, are no greater than they would be during a normal year;
- Normal conditions have resumed for a specified period of time

As the drought status is stepped down to a reduced level, the Drought Management Team will discuss which actions are no longer necessary and these will be stopped. We use our 'Upper Trigger' which is set above the 'Level 1' trigger to notify us when there is full groundwater recovery.

We will also engage with our neighbouring water companies and the Environment Agency in advance of the decision to lift drought restrictions in order to understand the wider water resource and environmental situation and explore possible opportunities for coordinating any messages to reflect the changing circumstances.

5.2 Post-drought review

Once we have declared the end of a drought and conditions have returned to normal, we will carry out a post drought review. In this review we will identify any lessons learnt and any improvements that could be made both to the drought plan and the overall drought management strategy.

We will produce a report detailing the lessons learnt review and its findings, and share it with the water industry, regulators, customers, and other stakeholders. We will integrate any recommendations into our next Drought Plan.

Once the review is completed and signed off, the Drought Event Management Group will cease to meet. Our post drought communications will include the following actions:

- Communicating with customers and all groups that we have engaged with to let them know about the lifting of water use restrictions, and the reasons why we are no longer experiencing a shortage of water.
- Thanking customers and stakeholders for their help and participation in saving water.
- Making the findings of our post drought lessons learned exercise available on our website.

1 INTRODUCTION

1.1 What is a drought?

Droughts are significant periods without rainfall which can lead to a shortage of water for people, the environment, agriculture, and industry. As public water suppliers, we anticipate that periods of drought will occur from time to time, and we must prepare and plan management strategies that we can implement in such times. Droughts can occur for different durations, and at varying severities. It is mainly during prolonged and sustained periods of low rainfall, principally during winter periods, which impact upon groundwater supplies, that our Drought Plan is likely to be required. It is expected that droughts will become more common in the future due to the changes in climate, and we need to be prepared for this so that we can all act together when the time comes, ensuring the best interests of our communities and the environment are always kept in mind.

1.2 Purpose of a drought Plan

We have a statutory requirement as a water company to prepare and maintain a Drought Plan. Under Section 39B and 39C of the Water Industry Act 1991, amended by the Water Act 2003 and the Water Act 2014, each water undertaker should prepare, publish and maintain a Drought Plan. Our plan outlines how we will be able to continue, in a period of drought, "to supply adequate quantities of wholesome water with as little recourse as reasonably possible to drought orders or drought permits".

In our plan we identify triggers that prompt decisions for implementing a range of drought management actions at all stages of a drought (from its onset to its end) and how we will communicate throughout with our customers, partners and other interested groups. We also explain how we will monitor, assess and where possible mitigate any potential environmental impacts of our supply side management actions.

Our plan follows the legal framework for Drought Planning as set out in the following legislation:

- Water Industry Act 1991
- Water Act 2003
- Water Act 2014
- Flood and Water Management Act 2010
- Drought Plan Direction 2016
- Drought Plan Regulations 2005
- Drought Direction 2011
- Water Use (Temporary Bans) Order, 2010
- Drought Permits and Drought Orders, 2011
- Process E6 of the Operational Terms of the Market Codes

The Environment Agency and Defra issued updated guidelines the 'Water Company Drought Plan Guideline' in December 2020, providing guidance on the preparation of a drought plan. We have used this, and the following supplementary guidance documents, to develop our plan:

- Draft Drought permits and drought orders supplementary guidance (October 2020)
- Environmental assessment supplementary guidance (December 2020)

Throughout our history we have always ensured that we have met the statutory obligations to prepare Drought Plans and prior to the Water Industry Act 1991 this had been completed on a more informal basis, but nevertheless drought planning has been a key part of our operational activity for many years.

1.3 Development of the Plan

The Drought Plan outlines the stepped approach we take in order to ensure water supplies are maintained for as long as possible in the event that prolonged dry weather threatens supplies. We prepare a Drought Plan at least every five years, and our current plan, which was published in February 2019, can be found here:

https://www.portsmouthwater.co.uk/wp-content/uploads/2019/02/Final-Drought-Plan-2019.pdf.

1.3.1 Process overview

Figure 1 below shows the steps that water companies need to follow to develop and publish their Drought Plan.

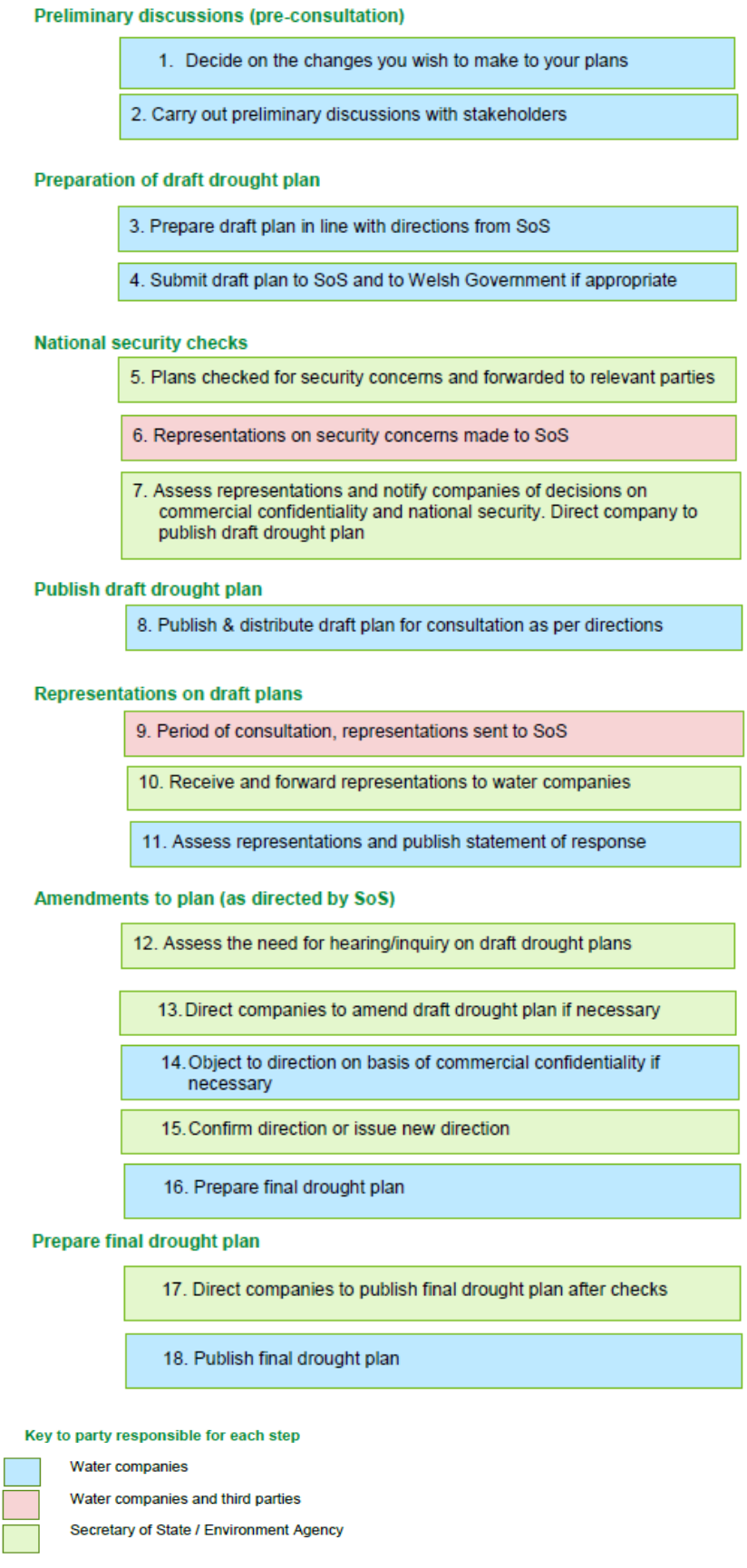

Figure 1 Drought planning process diagram (Appendix C,EA Guidance 2020)

1.3.2 Pre-Consultation

As required by the Secretary of State prior to the preparation of the draft Drought Plan, we undertook a pre-consultation with our relevant stakeholders, to inform the preparation of the Plan. We sent a pre-consultation letter (copy included in Appendix 'B') on the 12th October 2020 to a range of consultees, both statutory and non-statutory, outlining our proposed approach for the Plan and welcoming any feedback. We also held pre-consultation meetings with the Environment Agency throughout the time that we were updating our drought plan- more information on these are included in Appendix 'B'.

Table 1 outlines the organisations who responded to the pre-consultation letter, and further detail on all stakeholders contacted and specific responses can be found in Appendix 'B'.

Table 1 Pre-consultation respondents

Organisation type	Respondent
Regulator/Government	Environment Agency
Regulator/Government	Natural England
Water Companies	Southern Water
Councils/Authorities	Joint Emergency Planning Team for Portsmouth City Council and Southampton City Council
Other	John Hall • West Sussex Growers' Association (WSGA) – Representing the Horticultural Industry in West Sussex • Farming & Rural Issues Group South East (FRIGSE) – Representing Farmers, Growers and Rural businesses across the SE of England • Summerley Estate Management Company Ltd. (SEMCO) – Representing 350 owners of properties on the Summerley Estate, Felpham"
Wholesale/retailers	Castle Water

1.3.3 Consultation details

The draft Drought Plan will be available for public consultation once we have been advised to do so by the Secretary of State. We will publicise the fact that the Plan will be published for feedback via our website, or that a hard copy available on request. There will be no hard copies available at our office due to current COVID-19 restrictions, but we will do everything possible to accommodate anyone interested in reading the draft plan.

An eight-week consultation period will commence, and a Statement of Response to the representation will be produced and included as an Appendix to the final Drought Plan.

1.3.4 Updates since our previous drought plan

We have made several changes and improvements to our drought plan since its last update in 2019. The changes reflect the latest drought planning guidance (December 2020), the feedback from our pre-consultation, and also take account of lessons learned since our last drought plan, both within Portsmouth Water and within the water industry through regional collaboration.

One of the biggest changes suggested by the Environment Agency for this round of plans is for drought plans to be clear and easy to follow so that customers and stakeholders can understand the decisions we make in a drought. To this extent, we have changed the tone and structure of our plan, made it more concise and easy to follow, so that it reads more like a drought manual.

Other changes we made to the Drought Plan include:

1. We aligned our groundwater triggers with the newly clarified Environment Agency classifications to ensure that there is consistency with neighbouring companies and the national picture, to aid better understanding to customers and stakeholders.
2. We have investigated the use of rainfall indices using the Standardised Precipitation Index and have added them to our plan to provide a clearer link through to the 'exceptional shortage of rain' common understanding (and legal definition) of drought.
3. We have also presented clearer links to our North Arundel Drought Permit option, so that it is evident under which circumstances we would seek to use it, the lead-in time required to do so and how this links in to our demand-side implementation timetable.
4. To ensure that we are application ready for this permit in advance, we have completed the environmental monitoring plan, environmental assessments and set out how we plan to minimise and mitigate any potential adverse effects.
5. We have reviewed and updated our demand-side (customer) and supply side (new water) management options and set out worked examples to illustrate how we would manage these options during a drought.
6. We have also considered how we will measure the effects of our actions during a drought event including, reducing leakage, managing customer demand and, where we seek to temporarily change our abstraction allowances, how these might impact upon on the environment.

1.3.5 Lessons learned from 2020

As a result of Covid restrictions and short periods of intensely hot weather, in the summer of 2020 we experienced record levels of peak demand. Whilst not directly comparable to a drought, these periods were testing, and the lessons learned from 2020 have been incorporated in to this plan.

- The event management structure was set up early in anticipation of the 2020 summer event. This meant that each role was clarified and the team worked well to overcome the challenges. This gave us confidence that the proposed Drought Plan management structure is the most appropriate to effectively respond to a drought event.
- When communicating with customers, we found that general messaging was only partially effective, and that local tailored messages were much more effective, particularly through the use of social media platforms such as local Facebook groups. We would use this knowledge gained to ensure that any drought campaigns were done through the most effective channels particularly to local, tailored audiences.
- Whilst no customers went without supply during the summer events, the pressure on our network did show us some pinch points in our system, where supply to customers might be less certain under similar prolonged circumstances. This has allowed us to focus on these areas to ensure that we can maintain supply during these times.
- We learned that local, targeted, interventions on the network were highly effective in maintaining supply. Some local pressure management in the network ensured that water remained in the pipes even at the extremities of the network so that no customers lost supply, although a number experienced a temporary reduction in pressure.

1.4 Portsmouth Water's Resources- Setting the scene

1.4.1 Our Supply

We provide an average of 170 million litres (megalitres) of drinking water per day to around 320,000 domestic properties and the majority of commercial businesses in south east Hampshire and part of West Sussex, covering an area of 868km².

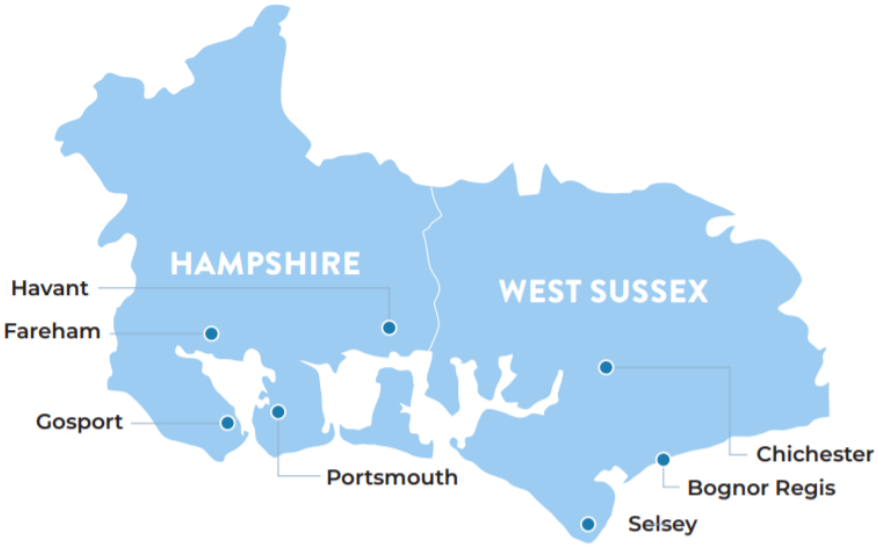

Figure 2 Company Area of Supply

As explained in our WRMP19, for the purpose of water resource management planning we only have a single Water Resource Zone (WRZ), and this corresponds to one Drought Management Area. Our distribution system includes a spine main that runs East to West across our Region and significant strategic treated water storage. This system ensures that all of our customers experience the same level of service.

We abstract, treat and supply an annual average of around 170 Megalitres Per Day (Ml/d) from a combination of boreholes, natural springs, and one abstraction close to the tidal limit on the River Itchen, which is groundwater dependent. Our public water supply sources are therefore all groundwater based and these are shown in Table 2. We have no significant raw water storage and consequently we are reliant on the recharge of groundwater over the winter period.

Table 2 Our water supply sources

Boreholes and wells	**60%**
Natural springs	28%
River Itchen abstraction	12 %

The water is treated in one of 21 treatments works and then distributed to our customers' properties through 3,359km of mains.

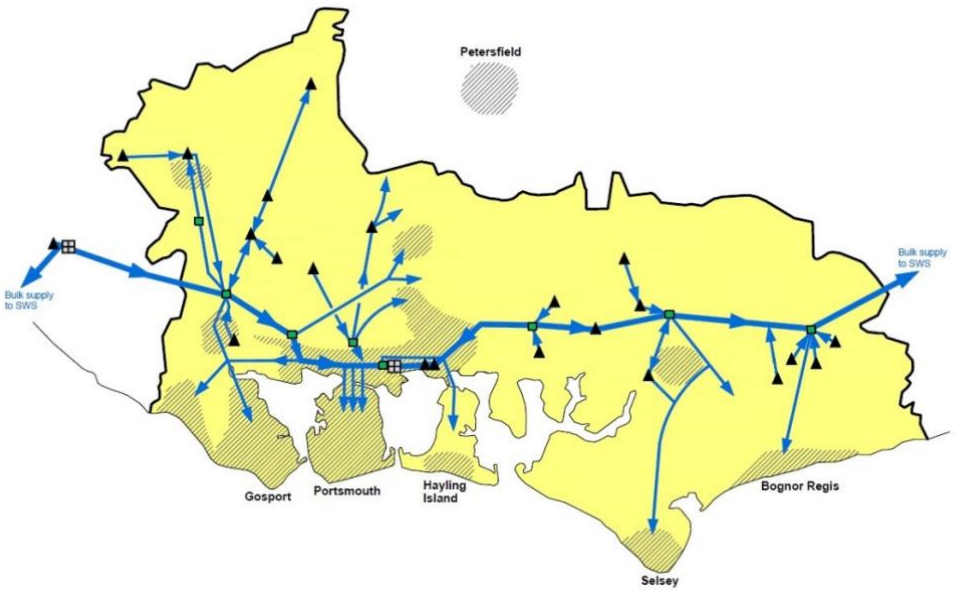

Figure 3 Strategic Resource Zone Map

As we currently don't have any surface water storage reservoirs, our ability to maintain water supply during a drought relies upon balancing peak week demands (normally between May

and August) and the yield we can get from our groundwater sources. We currently have no facility to 'store' and conserve water during the winter periods which would enable supplies to be maintained during the summer peaks.

1.4.2 Designated Sites

Our supply area includes a large expanse of coastline with numerous important habitats that have been designated under European Habitat Directives. We have therefore considered the impacts that our Drought Plan would have on these sites which include Sites of Special Scientific Interest (SSSIs), Special Protection Areas (SPA) and Special Areas of Conservation (SAC), as well as the South Downs National Park. We must have due regard to the purposes of the national park as a statutory undertaker.

The current Habitats Directive designations can be seen in Figure 4 and these include all harbours and the River Itchen.

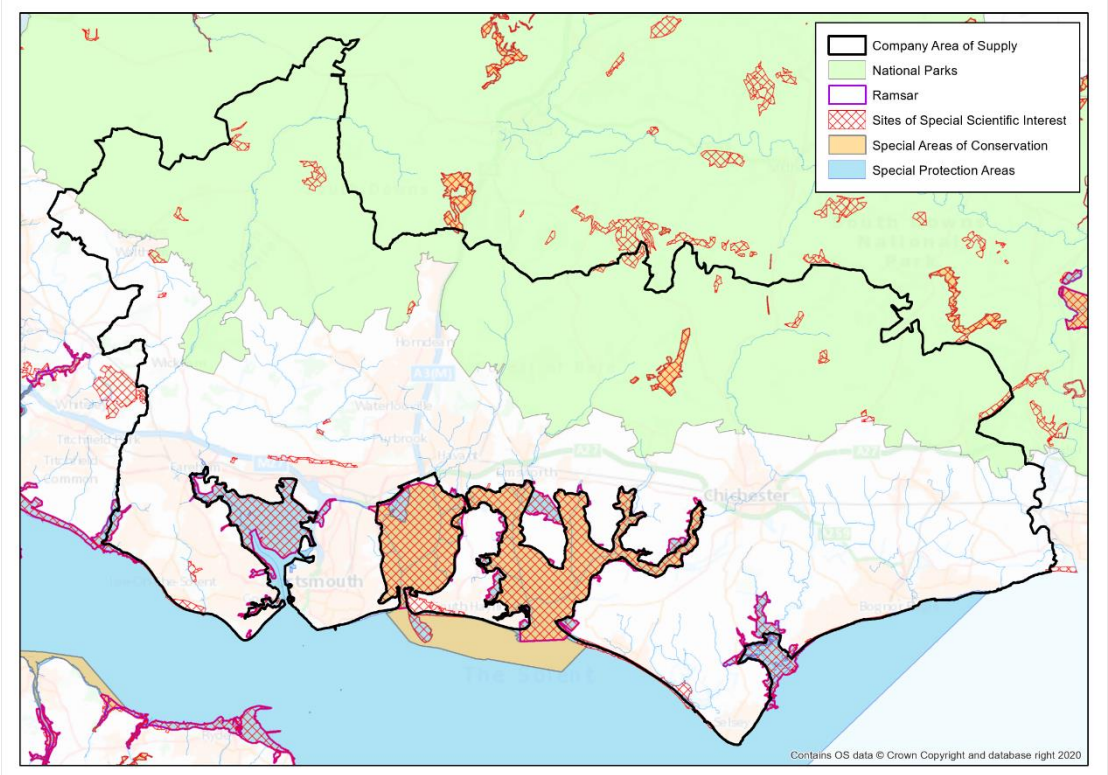

Figure 4 Designated Sites in Area of Supply

In the past, we have carried out environmental impact studies alongside the Environment Agency, which have resulted in conditions being imposed on a number of our abstraction licences. We continue to work with the Environment Agency on a number of sites with the aim to ensure continued environmental protection to key habitats across our area of supply, and that our abstractions don't reduce associated river flows beyond acceptable levels during dry or drought periods.

We have one 'Drought Permit' option, which means that we can apply to the Environment Agency to abstract more water than currently licensed from the drought permit site during times of drought. The impact of this abstraction on the nearby SSSI has been investigated and is detailed further in section 3.2.1

1.4.3 Area of serious water stress

The Environment Agency have recently reassessed which water companies are under serious water stress, defined in the regulations as where 'the current household demand for water is a high proportion of the current effective rainfall which is available to meet that demand. Or, the future household demand for water is likely to be a high proportion of the effective rainfall which is likely to be available to meet that demand'.

Initial results from this assessment have suggested that it is likely we will move from an area of 'moderate' to 'serious' water stress. If this is the final determination, then it will allow us to target water efficiency measures in those areas of greatest need and greatest potential benefit. This would be done in our next Water Resource Management Plan through compulsory metering, if it is shown to be both supported by customers and cost beneficial.

1.4.4 Relationship with our Water Resources Management Plan

Our Water Resources Management Plan (WRMP) ensures we are able to maintain water supply to our customers and investigates the need for investment to maintain this balance over the planning period. Our current WRMP was published in 2019 (WRMP19) and shows the programme of actions we plan to undertake to ensure we can be resilient to a 1 in 200-year drought and to support other water companies in the region. A key part of this plan is the provision of sufficient source yields to meet demand during our peak weeks of demand, particularly in dry summers. Our WRMP19 highlights that there may be occasions where demand may outweigh supply. Such occasions will occur during periods of drought, and the expected frequency is linked to our Level of Service, which is explained further in the section below.

An example of how we support other water companies in the region is through the development of the Havant Thicket Winter Storage Reservoir. This is being built in collaboration with Southern Water and enables us to have enough water in our area to continue to supply Southern with water into their Hampshire Zone. This bulk supply supports reduced abstraction on their chalk rivers, has an overall biodiversity net gain and will offer a new community leisure facility for the area. The need for this reservoir was determined through the WRMP19 process.

All of the drought options in this Plan were included within the WRMP19 process. That means they were assessed against a range of other potential options, to ensure that we implement those which are best value for maintaining the supply demand balance. The options include;

all those related to the reduction in customer demand during a drought, such as Temporary Use Bans and Non-Essential Use bans, as well as our Drought Permit supply option. These are all detailed further in the relevant sections. Our WRMP Table 10 shows the links between our WRMP and Drought Plan.

For our next WRMP (WRMP24), there is a requirement to increase our levels of resilience to more extreme droughts (1 in 500 year event), and the expectation that we should be able to cope with such an event without the need to implement our emergency plan (Level 4 drought restrictions). These updates will be reflected in the next update to our Drought Plan, co-ordinated with the publishing of our WRMP24. It is anticipated that as long-term plans build in higher levels of resilience, the risk of enacting Level 4 restrictions will reduce in the future.

1.4.5 Our Levels of service

We have agreed with our customers the frequency at which demand restrictions might need to be implemented. The agreed Levels of Service (LoS) are consistent between our WRMP19 and Drought Plan and are set out below:

- Temporary Use Bans > 1 in 20 years, representing an annual risk of 5%.
- Non-Essential Use Bans > 1 in 80 years, representing an annual risk of 1.25%.
- Emergency Drought Orders > 1 in 200 years, representing an annual risk of 0.5%.

See section 3.1 for details on these demand restrictions.

1.4.6 Bulk Supplies to Southern Water

We have two bulk supply agreements with Southern Water, both able to provide 15Ml/d each, up to the 1 in 200 year drought event. One of these bulk supplies delivers water west into their Hampshire Zone, and the other east into their Sussex North Zone. The bulk supply agreements guarantee that water will be available to Southern Water up to the most extreme drought scenarios (a 1 in 200 year event). After that trigger, when we would be subject to Emergency Planning, the bulk supplies will be delivered on a best endeavours basis. There is a common understanding of these supplies contained in the bulk supply agreement between both companies. The planning assumption is that the supplies are always available, unless there are operational issues. We have a routine quarterly operational liaison meeting with Southern Water, where in the rare event of such issues emerging, there is open discussion of any temporary revisions to our commitment.

1.4.6.1 Hampshire bulk supply

The Hampshire bulk supply can deliver up to 15 Ml/d to Southern Water from our River Itchen source, situated near the tidal limit of the river. This agreement has been in place since 2019 as a ten-year contract, with a break clause in 2024.

The bulk supply agreement for the transfer allows for some circumstances where the volume of water made available to Southern Water could be reduced in order to secure sufficient supplies for our own customers. This is more likely to be under emergency conditions such as

pollution of a source rather than drought conditions. There will be financial penalties to pay if conditions of the operation agreement are not met.

Should it become apparent that the full supply may not be available, the two companies will meet to ensure joint understanding of the reasons, and the options for maintaining supplies. We will establish and work to a management plan that makes the best overall use of resources with due consideration of environmental impacts of operations and respective costs. Where this joint management approach involves one or the other company incurring costs over and above that which it would incur if progressing individually, the additional cost will be reasonably shared. Such cost estimates and subsequent actual costs must be made available to the company in auditable detail in this circumstance.

There is a planned increase to the bulk supply to Southern Water's Hampshire Zone in 2024, predicated on the development of a scheme to increase deployable output at one of our groundwater sites. If we are able to achieve the assumed outcome of this scheme, then we will be able to supply an additional 9 Ml/d from our River Itchen source. Scheme investigation is underway, and Southern Water are being kept informed of the progress so that any risks to the scheme implementation are communicated in time for alternative options should they be required.

1.4.6.2 Sussex North bulk supply

The Sussex North bulk supply delivers up to 15 Ml/d from the Eastern side of our company area, and onto Southern Water's source on the River Rother. The supply is the subject of a ten-year agreement, signed in 2016 with a break clause in 2021 to discuss volumes, price, and the potential for the formal inclusion of a pain share clause similar to that of the Hampshire bulk supply. Discussions between the companies commenced in February 2021 around these topics, which have not concluded at the time of writing. Whist discussion are ongoing, if we were to enter a drought, we would start a dialogue with Southern Water to agree the approach that would be taken and to discuss the appropriate pain share agreements. The supply of this water would not be jeopardised by these discussions.

Alternatively, the bulk supply can be used to supply water into Southern Water's Sussex West Zone. This capability would only be required if Southern Water experienced outage events in this zone and not under normal system operation. If this transfer is used it means that the 15Ml/d transfer to Sussex North would not be available as this option cannot be implemented simultaneously with the option above.

1.4.6.3 Itchen Drought Order

Upstream of our River Itchen abstraction point, Southern Water have both abstractions and discharges into the River Itchen. This means that their operations can have significant impacts on the flow available in the River Itchen and therefore the volume we can abstract. The Environment Agency have set abstraction licence conditions for both companies relative to the respective river flow and influences upstream of the respective abstraction points. Consequently, Southern Water's abstractions are constrained when river flow reduces to

198Ml/d at the Environment Agency's river flow gauging station at Allbrook and Highbridge, and our abstraction is constrained when river flow falls to 194Ml/d at the Environment Agency's Riverside Park gauging station.

Southern Water's s20 agreement with the Environment Agency, recognises that during low flows, it could be environmentally preferable to abstract water at our River Itchen abstraction point rather than at their abstraction points on either the River Itchen or the River Test. This would be achieved through the implementation of a Drought Order to reduce the Minimum Residual Flow condition (MRF) in our abstraction licence, from 194Ml/d to 150 Ml/d. In preparing the s20 agreement, it was agreed that if a Drought Order is needed at our Lower Itchen source in order to allow the continuation of our bulk supply to Southern Water, then Southern Warer would take responsibility for the application, environmental commitments and costs of that Drought Order.

We are working with Southern Water to review the requirements of the Itchen Drought Order and we have commissioned a project focused on a review of the drought triggers used in the recently published draft drought plan for Southern Water, and the implications on both Southern Water and Portsmouth Water. These relate to the rivers Test and Itchen in Hampshire. A key element of this work is to undertake system simulation modelling to test assumptions around lead times, resultant levels of service, and coherence of drought permit requirements for both companies. We will be working closely with Southern Water and the regulators to ensure that all outcomes are included in subsequent reviews of our Drought Plan.

1.4.6.4 Bulk supply communications

As drought develops, we will engage closely with Southern Water to ensure that we regularly review our water resources and supply demand balance situations. We will share situation reports with increasing frequency as the drought progresses and will agree joint statements to the Press and to customers as required.

If we need to seek restraint or restrict water use by our customers in order to maintain supply to Southern Water, then it is expected that Southern Water would also seek restraint or restrict water use by its customers. It does not necessarily follow that if Southern Water are seeking restraint or restricting water use by its customers, that we have will have to do the same. We will examine these scenarios in more detail during our May workshops and incorporate our learning into our final plan.

1.4.6.5 Bulk supply assessments

Recent modelling during the development of WRMP24 has confirmed that both of these bulk supplies are available to Southern Water up to a 1 in 200 year drought event for the duration of the contracts. Once the contracts have ended, we will be assessing these bulk supplies against a range of other regional options through the WRSE Regional modelling work. This will ensure the best value solution to address the need for water within both companies.

1.4.6.6 Newly Appointed Variations

In addition to the "traditional" bulk supplies to Southern Water, we have in recent years provided bulk water supplies to other licenced water undertakers, referred to as Newly Appointed Variations (NAVs). Typically, they provide water services to new housing developments having purchased the water from ourselves at the boundary of the site.

In the event of the need to introduce restrictions, it is important to ensure communication with the NAV is clear. They will be expected to apply the same restriction on their customers as applied throughout our region. We will ensure we communicate clearly and in a timely manner with all NAVs operating in our region. More information on how we will communicate with NAVs is included in Section 4.

1.5 Regional planning collaboration

The water companies of the south east of England recognise that as an industry we need to work collaboratively to share knowledge and best practice, co-ordinate and align communication to customers and stakeholders, and promote the efficient use of water resources. Therefore, we work closely with other water companies in our region as part of the Water Resources South East (WRSE) and Water Resources East (WRE) groups.

For example, we participate in the regular WRSE "dry weather" meetings which focus 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 situation. 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.

2 DROUGHT INDICATORS, TRIGGERS AND SCENARIOS

We continually monitor the water resource situation across our area as part of our daily operations. This ensures that we get an early indication of when a drought might be developing and allows us sufficient time for action. We use a combination of water resource indicators relating to rainfall and groundwater levels. Additionally, we continually monitor the demand for water, since an additional indicator of dry weather is often a sustained level of high demand. We are using specific triggers to help us determine the drought stages for our supply area and to implement appropriate drought measures (Section 3) once these triggers are breached.

2.1 Resource Monitoring and Drought Indicators

The yield of our groundwater sources is entirely dictated by groundwater levels, which are principally dependent on aquifer recharge from rainfall during the winter period. Because of this, we monitor both rainfall and groundwater levels to enable us to estimate the expected output from our sources during the months ahead. During a drought, we attempt to balance deployable output expected, with the likely demands from our customers. The greatest challenge to maintaining supplies is likely to be during the peak demand period of a dry summer. We therefore also monitor demand data in order to manage our supplies to meet customer demand.

2.1.1 Groundwater Level Monitoring

We use Well 'X' as an observation borehole to monitor our groundwater level situation. This was a former private estate well near Rowlands Castle and has been monitored for over eighty years providing a good record of data. Well 'X' is not affected by abstraction and hence is a very good indication of groundwater resource availability from the South Downs Chalk aquifer.

All of our sources are situated within the same overall chalk aquifer and the well is situated centrally within our supply area, on the Hampshire and West Sussex border. None of our sources are further than 25km from Well 'X', and its location is upstream of the Springs which are our largest single source. Groundwater levels in the well are an excellent indicator of the springs yield as well as being representative of levels at the majority of the other groundwater sources which abstract from the same aquifer.

We use a thirty-year average level profile of this borehole to monitor seasonal variations from average conditions. We continually compare levels with those from previous drought years in order to provide an early indication of a developing drought situation. The eighty-year record covers all of our most significant droughts.

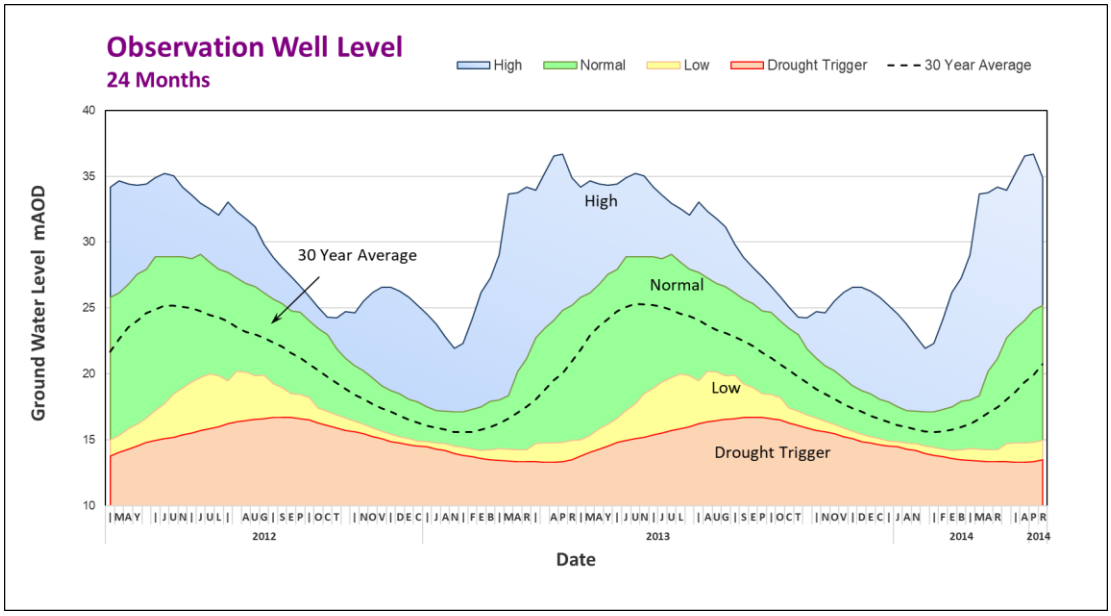

Figure 5 Observation borehole long-term groundwater levels

2.1.2 Rainfall Monitoring

We monitor rainfall as it is an important early indicator of drought severity. We are independently recording daily rainfall at Havant rain gauge and as of this year also receive Environment Agency aerial rainfall data. Our spring source has been in use for public water supplies since 1860 and rainfall has also been recorded there since 1886. Havant is situated conveniently centrally in our area of supply, thus providing a useful indicator of the rainfall for the whole area. It is also just 5km south of the divide between the overlying tertiary layer and the unconfined chalk to the north which supports our principal spring source.

For our water resources, it is not just the quantity of rainfall that is important, but also the time of year that the rain occurs. Winter rainfall especially plays an important role in the recharge of the aquifer and the quantities of water available for abstraction from both our boreholes and spring source.

Figure 6 shows an example of how the percentage of Long-Term Average (LTA) annual rainfall is not a strong drought indicator for our sources. For instance, the year 1975-1976 was the last year we introduced demand restrictions, and rainfall for those years was actually 95% of the LTA in 1975 and 93% of LTA in 1976. However, winter rainfall (October-April) was low for 1975-1976 (the total was 203mm) and this resulted in low groundwater levels in the summer of 1976 when the restrictions were put in place. (See Appendix 'A').

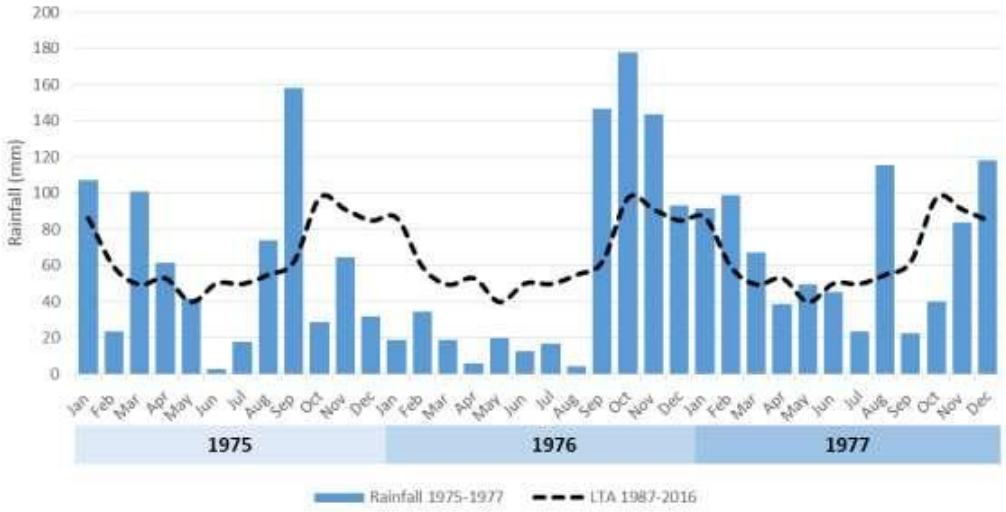

Figure 6 Monthly rainfall for the 1975-1977 drought period

2.1.3 Demand and Abstraction Monitoring

During dry weather conditions, customer demand increases and so does the pressure on our water resources. We therefore monitor demand and abstraction to see if our water resources are being stretched. We record the volume of water abstracted from our borehole sources and the demand from our water treatment works. During normal operation this information is assessed on a weekly basis and during a drought the frequency increases to daily.

We monitor household usage through the use of small area monitors (SAMs). These SAMs are demographically representative of our customers and include both metered and unmetered properties. We therefore get updates on daily household demand and can use this data to forecast future demand based on different weather scenarios. We also continuously monitor the largest non-household users. This includes customers that would increase usage during warm weather such as agriculture, golf courses and recreation. We have historic data of non-household usage and are able to forecast future demand based on different weather scenarios.

2.2 Drought Triggers

We use drought triggers to identify when we need to take actions to manage a possible drought, through all stages of drought development. It is important to us therefore, that triggers are of practical benefit to those managing the supply demand balance on a daily basis.

The Environment Agency guidance suggests that triggers should be built into 'control curves' which can be used to influence drought management actions. These have been developed principally to manage the use of water from surface water storage reservoirs. As we do not currently have any significant surface water storage, we do not use any reservoir control curves. We do, however, use groundwater drought triggers in the form of 'control curves' which enable us to identify the time when the deployable output from our sources may be

insufficient to meet customer demands. For this drought plan update we have also explored using rainfall triggers based on the Standardised Precipitation Index (SPI) to understand whether they provide us with additional notice and would therefore be beneficial in the identification and management of drought. We have also done this to provide a clearer link with the 'exceptional shortage of rain' common understanding of drought.

For this drought plan update we aligned our triggers with the newly clarified Environment Agency classifications to ensure that there is consistency with neighbouring companies and the national picture. Increasing levels of drought severity have been defined in line with the updated guidance, to ensure that the drought actions are proportionate to the level of drought risk being experienced:

- Level 0- Normal
- Level 1- Developing
- Level 2- Drought
- Level 3- Severe Drought
- Level 4- Emergency Plan

Table 3 Drought stages and levels of interventions as defined in our drought plan

Drought Plan Stage	**Normal**	**Developing**	**Drought**	**Severe Drought Phase 1**	**Severe Drought Phase 2**	**Emergency Plan**
Our WRMP19 drought severity reference	No Drought	Developing Drought	Dry Year to Extended Drought	Extended Drought to Serious Drought	Serious Drought to Severe Drought	Emergency Plan
Level of restrictions	Level 0	Level 1	Level 2	Level 3a	Level 3b	Level 4
Approximate drought severity return period	n/a	First year of a drought	<1-in-20 to 1-in-80	1-in-80 to 1-in-125	1-in-125 to 1-in-200	>1-in-200
Drought Plan demand side actions	n/a	Media campaign and water efficiency messaging. Voluntary reductions in usage. Enhanced leakage control & pressure management.	Temporary Use Bans (TUBs) for domestic customers.	Non-essential Use Bans (NEUBs)	Extreme actions – "More before 4" implemented after our Drought Permit (more severe drought than the 1-in-125)	Introduction of the Emergency Plan
Drought Plan supply side actions	n/a	n/a	Prepare for Drought		Apply for and implement North	Introduction of the

			permit applications		Arundel Drought Permit (DP) Extreme actions – "More before 4" implemented after our Drought Permit (more severe drought than the 1-in-125)	Emergency Plan

2.2.1 Groundwater triggers

Historical experience has shown us that sufficient resources are available within the aquifer across our area when groundwater levels at the Well 'X' monitoring borehole are above 13.3m AOD. Water levels have only fallen below 13.3m AOD on three occasions:

- 12.70m AOD Dec 1973
- 12.95m AOD Dec 1990
- 13.15m AOD Nov 1989.

Although groundwater levels can fall to levels close to 13.3m AOD they have only continued to decline beyond this level during multi-season droughts. On all these occasions the careful management of demand has ensured that our customers received an adequate supply of water.

Records show that the lowest yearly groundwater level can be anticipated to occur during December or early January (see Figure 5). The lowest groundwater level ever recorded was 12.70m AOD in the winter of 1973. In the 12 months preceding this, below average winter rainfall resulted in minimal recharge from an already low groundwater level of 13.3m AOD in November 1972. Groundwater levels rose to 16.7m AOD in February 1973 before declining to an all-time low in December 1973.

We developed a groundwater trigger profile, based on our historic groundwater level record. The profile is derived from the minimum weekly average groundwater levels, excluding the 5% most extreme events. This represents a 1 in 20 return period which is the level of service for just avoiding any demand restrictions. The benefit of the trigger profile is that in any week of the year we can compare the current groundwater levels and this provides us with an early warning that drought actions may need to be considered.

Not surprisingly, the minimum trigger point is 13.3m AOD in early December, with a maximum trigger point of 16.7m AOD in mid-May. This is known as a 'Level 1' trigger and represents the change from normal operations to drought management actions. Further triggers, to initiate demand restrictions such as Temporary Bans, known as a 'Level 2' triggers have been set as one metre below the initial trigger. The trigger to initiate Drought Orders such as Non-essential Use Bans and drought permits is called 'Level 3' and this has been set two meters below the initial

trigger. The final trigger is the limit for Drought Plans and represents the introduction of the Emergency Plan- 'Level 4'.

A drought does not necessarily end when it starts to rain again. Depending on how severe a drought is, it can take time for rain to recharge the aquifers and increase groundwater levels back to normal. We therefore use an 'Upper Trigger', which is set 1.6m above the 'Level 1' trigger, to represent the end of the drought when there is full groundwater recovery. Figure 7 below shows the annual profile of our groundwater triggers.

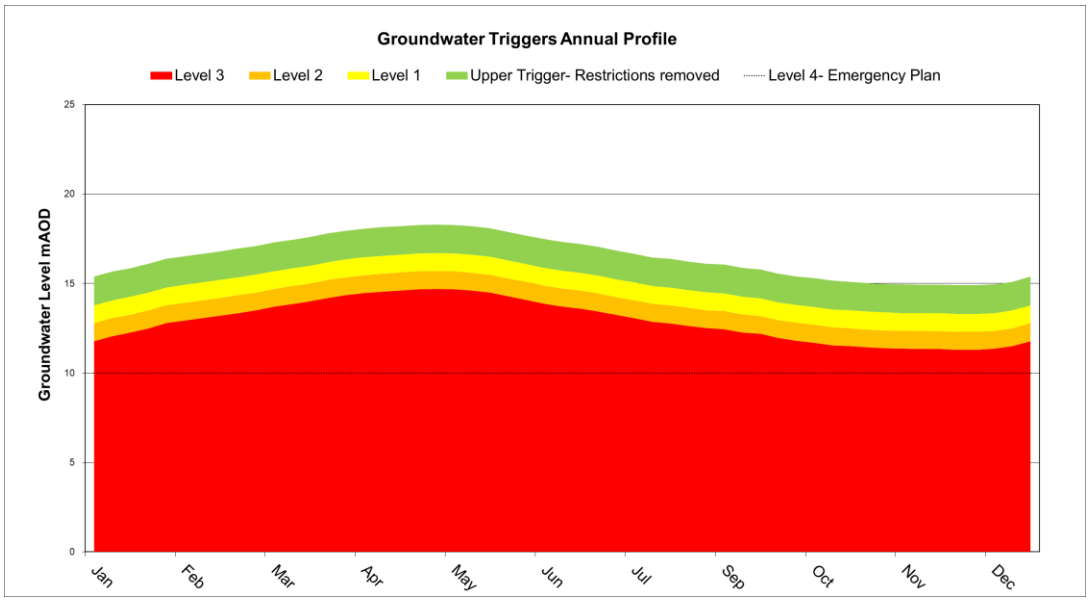

Figure 7 Groundwater triggers annual profile

Through the process of planning for WRMP24, we are going to be updating our groundwater triggers, basing them in future on a full stochastic sequence of groundwater levels. These triggers and the testing information around these, will be included in our next drought plan update.

2.2.2 Standardised Precipitation Index (SPI) indices

SPI is a widely used index based on precipitation which characterises a meteorological drought, by quantifying the precipitation deficit for a range of timescales. On short timescales, the SPI is closely related to soil moisture, while at longer timescales, the SPI can be related to groundwater and reservoir storage.

For this drought plan update, we have explored the use of SPI indices to help us understand the different stages of drought in terms or rainfall deficit, and how well that links with the response of our groundwater resources. We explored the use of SPI linked to three different timescales, 6-month, 12-month and 24-month.

The SPI indices and how they would link to levels of restrictions are presented below:

Level of restriction	SPI Indices	SPI Description	Drought Plan Stage Description
Level 1	SPI < -1	Moderately Dry	Developing
Level 2	SPI < -1.5	Severely Dry	Drought
Level 3	SPI < -2	Extremely dry	Severe Drought

For this plan we have not added these levels as formal drought triggers, and therefore we will not be enacting our drought actions solely on when they are crossed. Instead, they are intended to provide additional early warning, prior to crossing our formal groundwater triggers. Additionally, they provide a useful link to the 'exceptional shortage of rain' requirement necessary for the application for drought order/permits. More information on the SPI Indices can be found in Appendix 'D'.

2.2.3 Environmental triggers

We have not adopted any specific environmental triggers as the primary function of our Drought Plan is to make provision for the actions to ensure security of supply for our customers. Environmental triggers would indicate periods where the environment is stressed because of dry weather or drought but our supply system is not. During such periods when the Environment Agency declare an environmental drought, we will liaise with the Environment Agency and produce dedicated communication to reflect these impacts on the environment and promote water efficiency (see section 4.3.4). Under such circumstances, we would consider requests from other water users such as private water suppliers or other sectors such as agriculture, for example where there are needs for livestock during a drought and we will make best endeavours to provide supplies in these circumstances. However, we are only able to do this where it does not adversely affect the security of supply for our own customers, and we will give priority to supply to our own customers.

2.3 Demonstrating an exceptional shortage of rain

As part of the drought permit or order application process we will need to provide evidence to demonstrate that we have been experiencing an 'exceptional shortage of rain' in our statement of need. Since each drought situation is unique, it is not appropriate to set a prescriptive approach to assessing this. Based on the information we have available relevant to our water resource zone, we expect to use the following types of analysis:

- Identification and presentation of the continuous and cumulative rainfall deficit from the start. This would be done as a percentage of LTA, and could be monthly, winter period LTA or a different period as appropriate.
- Calculation and presentation of ranking of rainfall deficits as compared to other droughts in the historic record.
- Analysis of Standard Precipitation Index (SPI). SPI represents the statistical deviation of rainfall totals over a defined period. We will determine which SPI periods are most

representative of the current situation at the time of the application

We will also use the Environment Agency's final version of 'Hydrological guidance for the assessment of an Exceptional Shortage of Rain (ESoR)' once finalised or at least at project start-up to ensure consistency with the latest requirements.

2.4 Drought Vulnerability assessment

For our previous drought plan (Final Drought Plan 2019), we have undertaken a drought vulnerability assessment to demonstrate the resilience or vulnerability of our single WRZ to drought. This was based on the approach outlined in the Environment Agency's *Understanding the performance of water supply systems during mild to extreme droughts* (December 2015).

A total of 320 different series of synthetic drought profiles of groundwater level have been created within an existing lumped parameter model for Well 'X' (our key observation borehole within our area) using stochastically generated climate data for the Portsmouth area. The synthetic groundwater levels and model statistics were run through the drought scenario testing WRZ model, along with Deployable Output (DO) profiles, demand profiles, allowances for headroom, outage and climate change impacts, and predicted impacts of drought permits and demand restrictions. The output of the analysis demonstrated the unfulfilled demand (%) for each drought profile. The drought scenario testing for this was undertaken using a set of conservative and best case DO values i.e. with or without a simultaneous groundwater and surface water drought.

The work demonstrated that our WRZ (with the drought plan in place) is largely resilient to historic droughts as well as plausible droughts worse than those in the historic record (including beyond a 1 in 200 year condition). The outputs of this analysis are included as Appendix 'G' to this plan. We will be updating this assessment for our next Drought Plan to maintain consistency with our next WRMP.

2.5 Testing our triggers

Additional scenario testing has been used to test our groundwater triggers and demonstrate their validity and how they would be used in a drought situation. The Environment Agency Guideline suggests that a Drought Plan should be able to cope with a range of plausible droughts as set out in the Water Resources Management Plan (WRMP). These should include:

- Short duration one season droughts (6-12 months)
- Medium duration multi-season droughts (1-2 years)
- Long term droughts (2-3 years)

This draft Drought Plan is based on the same WRMP19 modelling and testing as our 2019 Drought Plan with a range from a 'Dry Year' to a 'Severe Drought. The Scenarios are detailed in Appendix A of the WRMP and are summarised as follows:

- Dry Year 1 in 20 (5% risk)
- Scenario 'A' Historic Drought 1 in 40 (2.5% risk)
- Scenario 'B' Extended Drought 1 in 80 (1.25% risk)
- Scenario 'C' Serious Drought 1 in 125(0.8% risk)
- Scenario 'D' Severe Drought 1 in 200(0.5% risk)

In terms of Long-Term Average (LTA) rainfall, each drought is different but the scenarios can be related to an overall shortage of rainfall:

- Scenario 'A' 70% LTA Rainfall
- Scenario 'B' 60 % LTA Rainfall
- Scenario 'C' 50% LTA Rainfall
- Scenario 'D' Less than 50% LTA

These droughts cover the plausible range that the Government has suggested with the Reference Level of Service for a Severe Drought at 1 in 200.

The guidance also requires us to assess the impacts of high demands, heatwaves and outage. The impacts of high demand and heatwaves are addressed through the measures to require customers to reduce their demand and these would all be in place under the severe drought scenarios included in the assessments described above. We assess the impact of outage through our internal resilience programmes rather than through the drought preparedness plans.

Appendix 'C' provides a description of how we would typically respond to the drought patterns listed above if they were repeated under our current supply system capability and customer demand patterns. The effectiveness of the drought actions for each scenario, determined from the results of testing the triggers are detailed below:

Drought Scenario	**Effectiveness of drought response under different drought durations and scenarios**
Scenario A: Historic drought (1 in 40; 2.5% risk)	Some years require no further actions; calls for restraint and additional leakage control are sufficient to meet supply/demand balance, indicating adequate system resilience for 1 in 40 droughts. The historic drought triggers Level 1 in April of the second year, requiring Temporary Bans. During year 2, summer demand increases and summer deployable output decreases, however drought actions are sufficient for some headroom to be maintained, though a drought permit is considered if groundwater levels continue declining to ensure preparedness if next level is triggered. Groundwater levels

	recover to normal in the winter/spring of year 3 indicating effective drought response.
Scenario B: Extended drought (1 in 80; 1.25% risk)	The analysis indicates that where a dry summer follows a dry winter, there would be less time to prepare temporary bans and drought permits than in Scenario A, but the lack of winter recharge makes the need for restrictions more obvious, thus drought interventions can be implemented in a timely manner. Following the dry winter, notification of the need for a Temporary Ban would be made by the end of December with the aim of introducing restrictions by the end of January, with restrictions expected to reduce demand by 5%. As groundwater levels continue to decline in the spring, an application would be made for a Drought Order, but it is unlikely that the Drought Order would be available before August under any scenario. However, 'Temporary Bans' are introduced in time to influence the spring and summer garden watering season, and 'Non Essential Use Bans' following a shortage of rainfall restrain non household demand in the summer. Groundwater levels subsequently recover to normal in the winter/spring of year 3.
Scenario C: Serious drought (1 in 125; 0.8% risk)	Due to lower rainfall in the first Autumn and no recharge over the whole of the next year, the 'Non-Essential Use Ban' would need to be in place from January for the peak demand period in August. Breach of trigger 1 in August ensures that drought actions are in place sufficiently early. The application process for a Drought Permit would start in May with implementation expected in August when groundwater levels were already low, and will produce an additional 8.5 Ml/d of supply for a short time during the summer. Preparation to extend the drought permit ensures drought actions are sufficient if groundwater levels continued to decline.
Scenario D: Severe drought (1 in 200; 0.5% risk)	Groundwater recession extended into a third year with very low rainfall requires 'Temporary Bans' to be repeated, and a 'Non Essential Use Ban' imposed, and the 'Drought Permit' to reinforce supplies. The analysis demonstrates that indication of the possible occurrence of severe droughts is sufficiently early to prepare and deploy necessary drought actions. Close work with the Environment Agency and other stakeholders to prepare for a third dry summer by the spring of the third year in a timely manner, including extension of the existing 'Temporary Bans' and the removal of some concessions and the introduction of the 'Non-Essential Use Ban'. Portsmouth Water assumes that the response to a 'Non- essential Use Ban' would be a further 3% reduction in demand. Latterly, record low groundwater levels and yield, requires application for a Drought Permit for North Arundel, which would produce an additional 8.5 Ml/d of supply for the whole of year three. As groundwater levels approach the Emergency Plan level (Level 4), we will start to explore the need and prepare for extreme 'More Before 4' drought actions with the aim to delay the implementation of the Emergency Plan (Level 4). We will also consider the need to extend the drought permit and prepare the application.

As mentioned previously, this draft Drought Plan is consistent with our published WRMP19. The next round of drought scenario modelling will be carried out for WRMP24, and so our subsequent Drought Plan will reflect these updates.

3 DROUGHT MANAGEMENT ACTIONS

We believe that our water sources are sufficiently resilient in periods of low rainfall such that we only anticipate the implementation of our Drought Plan for multi-season droughts. Having such a long advance period of prolonged dry weather put us in a good position to recognise when a drought is developing and gives us time to implement drought management actions.

When we need to implement drought management actions, we have different options available to us. The options for managing a drought can be divided into two types. Those which focus on reducing the need for water are called demand-side options. Those which seek to increase the amount of water available are called supply-side options.

Below we set out the drought options we could implement in times of acute water scarcity.

3.1 Demand-side actions

After having promoted water efficiency measures to our customers, and asked them to use water wisely, the key options suppress overall demand for water during a drought include the following:

- We can appeal to customers to use water more sparingly
- We can enhance our efforts to reduce water wasted by leaks
- We can reduce the pressure of water in the distribution network
- We can impose temporary water use restriction on certain activities
- We can apply to the regulator to impose further restrictions, via a Drought Order

Each of these options is detailed in the following sections.

3.1.1 Appealing to customers to use water sparingly

If a period of low rainfall continues such that we think we may need to start restricting certain uses of water, we will first make direct appeals to customers to voluntarily restrain their consumption. We will start to make these appeals once the first drought trigger in our Drought Plan has been crossed – see section 2.2. We will reach out to customers in a number of ways (see Table 6) including the local press, TV and social media.

Through demographic household usage analysis, we are able to understand which customers are likely to be high users and can use this information to do targeted campaigns if required.

3.1.2 Reducing leakage

Portsmouth Water understands the importance of maintaining low leakage levels. If we ask customers to curb their demand, then we think it is very important that we act to reduce any leakage that may be happening. We don't expect customers to voluntarily restrain their use of water, if we are not also active in minimising any wasted water.

In addition to the common reasons why pipes develop leaks, such as deterioration of materials and physical damage, periods of hot dry weather can also cause leaks. This is because the weather conditions cause soils to dry out and crack, triggering ground movement and potentially dislodging buried pipes. Additional leakage can be anticipated, and thus without additional detection and repair effort, leakage could be expected to rise in drought years.

As part of a commitment to reduce leakage by 50% from 2017-18 levels (32.4 Ml/d) by 2050, we have an ongoing programme of finding and fixing leaks. This programme is constantly evolving through advances in innovative technologies and efficiency improvements, and has led to Portsmouth Water reporting its lowest ever leakage figure in 2019/20 (23.6 Ml/d) .

During periods of hot, dry weather and drought, leakage detection and repair will be scaled up. The measures can be categorised into the four periods of a leak, known as Prevention, Awareness, Locate and Mend (PALM), which are aimed to reduce the life (run-time) of each leak. An estimation of the leakage reduction possible from each measure is available in our Leakage Strategy. The Leakage Strategy was developed as part of preparations for AMP7 and beyond and is constantly being reviewed as new technologies become available. The leakage reduction possible would heavily depend on the leakage level at the time of the drought and the extent in which measures are scaled up.

The measures that can be scaled up include:

- Prevention
    - Purchasing and deployment of additional pressure and flow logging equipment to better monitor the network and mitigate against leak occurring.
    - Reducing non-leakage operations on the network.
    - Enhanced pressure management (see section 3.1.3)
- Awareness
    - Communication campaigns to further encourage customers to report any unfound leaks.
    - Purchasing and deployment of additional leakage noise logging equipment to provide earlier awareness of leaks.
    - Increased frequency of DMA flow monitoring by Leakage Analysts.
- Location
    - Increased detection team resource to find more leaks.
    - Use of Smart Network Technicians, Network Technicians and Meter Readers to provide additional internal resource to detect more leaks.
    - Use of external contractors to provide additional external resource to detect more leaks.
- Mend

- Prioritisation of fixing leaks over other repair activities.
- Increased repair team resource to fix more leaks.
- Use of our Mains Renewal team to provide additional internal resource to fix more leaks.
- Use of external contractors to provide additional external resource to fix more leaks.

Leakage is currently calculated weekly, reported fortnightly to the internal operations group and presented to the board monthly. In order to track the effectiveness of further leakage reduction, leakage reporting will also be scaled up to daily calculations and weekly reporting to the operations group.

After a drought, a full analysis of the effect of scaled up measures would take place. This analysis would inform both the future Leakage Strategy as well as the Drought Plan.

3.1.3 Water pressure management

Pressure management is an extremely cost-effective way to reduce leakage. A 'calm' network, where the pressures are as consistent as possible throughout the day, increases the life of pipes and reduces the number of leaks and bursts that occur. Currently around 70% of our distribution network is under pressure control, with projects to increase this during AMP7.

Over the past few years, we have significantly increased the number of pressure sensors that are on our network, which allows us greater visibility to network changes that occur. This enables faster leak awareness and localisation.

Further, the pressure management controls allow us to vary the water pressure across the distribution network at different times of the day and week. We can use this ability, where appropriate and safe to do so, to reduce pressure in periods of drought. This will reduce the demand for water and water lost through leakage, and help us conserve what water resources we have available.

We have an established protocol we follow when considering a change in pressure on our network. This protocol includes an assessment on the possible impact of a change on vulnerable customers and essential users (such as hospitals and schools). We would continue to follow this protocol when considering pressure changes in response to a drought.

All areas on the network are constantly monitored for pressure using loggers, which allows for quick assessments of the demand reduction possible from enhanced pressure management. Demand on the network is also monitored with 15 minutes readings from flow loggers, meaning that actual demand reduction can be quickly calculated. After a drought, a

full analysis of the effect of pressure management would take place. This analysis would inform both the Leakage Strategy and the Drought Plan.

3.1.4 Restrictions: temporary bans on the water use

Based on the experience of other water companies, the potential combined prolonged reduction in water demand, after calls for voluntary restraint and additional active leakage control, is expected to be very low, at only 2%. This means that we will need to consider and implement some mandatory restrictions on customer's use of water should the drought deepen.

The first stage of mandatory restrictions is called a "Temporary Use Ban", otherwise known as TUBs, as set out in Section 36 of the Flood and Water Management Act 2010, and the Water Use (Temporary Bans) Order 2010. They are often called "Hosepipe Bans" in the media. Customer research for our Business Plan 2019 showed that customers accepted the need for TUBs, and were prepared to have them imposed on a frequency that approximates to 1 in 20 years on average. This has been adopted as our Level of Service. In a drought, we will look to implement a TUB before we consider other actions, such as applying to take more water from the environment (see section 3.2.1). In this way we can try and minimise the environmental impact of the drought situation.

We will fully comply with the regulations produced by the Environment Agency, and will follow the Water Industry's 'Code of Practice and Guidance on Water Use Restrictions', to ensure that we apply the TUB in a way that is consistent, transparent and proportionate.

3.1.4.1 When the Ban will be implemented and what is affected

We will seek to implement a TUB once the second drought trigger in our Drought Plan has been crossed – see section 2.2

We will clearly communicate the implementation of the Ban and what is restricted, using the communication channels listed in Table 6. We would ensure that prior to application we would conduct as a minimum a two-week public consultation with customers and stakeholders. We will ensure that representations are given appropriate consideration, particularly where stakeholders raise issues that have not been previously considered.

The following uses will then be restricted:

- Watering a garden using a hosepipe
- Cleaning a private motor-vehicle using a hosepipe
- Watering plants on domestic or other non-commercial premises using a hosepipe
- Cleaning a private leisure boat using a hosepipe

- Filling or maintaining a domestic swimming or paddling pool
- Drawing water, using a hosepipe, for domestic recreational use
- Filling or maintaining a domestic pond using a hosepipe
- Filling or maintaining an ornamental fountain
- Cleaning walls, or windows, of domestic premises using a hosepipe
- Cleaning paths or patios using a hosepipe
- Cleaning other artificial outdoor surfaces using a hosepipe

Please note that the TUB restrictions do not always prevent people from using water for the above purposes, but specifically restricts the use of a hosepipe. This is because hosepipes can use a lot of water very quickly. Using a watering can or a bucket is a much more efficient use of water.

3.1.4.2 Effect of a Temporary Use Ban

While other water companies have needed to implement these bans, the last time we implemented such a ban was during the drought of 1976. After we imposed the ban on the use of sprinklers and hosepipes, there was a 15% drop in water demand, which is considerable.

It is not easy or possible to precisely attribute the specific impact from a particular intervention when a range of actions have been taken. We believe the significant reduction of 15% was also a result of the context of the overwhelming national situation, with publicity sustained over a long period, plus actions such as putting bricks in toilet cisterns to reduce the volume of water used by a flush.

As a result, we use a lower value of 5% when estimating the average potential decrease in demand due to a TUB, which will occur over the summer period. This lower value is also because, nowadays, appliances are more water efficient, our customers use less water and a third have had water meters fitted. This level of reduction is consistent with the recent experience of other water companies. While this reduction in water demand is small, the justification of a ban on certain uses of water is also being able to conserve our water resources in a fair way. It is estimated that the maximum decrease in demand from TUBs, could be around 9% during the peak summer period.

We recognise that if customers are restricted in watering their gardens, using a hosepipe may have a consequential impact on horticultural businesses and trades, as customers may be reluctant to purchase new plants or commission work. Given that we are confident that there will be a long lead in time before we need to implement such bans, we believe that businesses can modify purchasing decisions and develop drought mitigation measures. Given the potential effects of climate change in increasing the number of droughts and their severity, it

would be prudent for the horticultural industry to develop drought contingency plans so it can be resilient to a changing future.

3.1.4.3 Representations and concessions

The legislation for TUBs allows water companies to specify exceptions or concessions to particular groups so they can remain unaffected by the Ban. These exceptions aim to minimise the impact on vulnerable customers and the economy.

There are two types of exceptions to these restrictions which can be applied by water companies:

- Statutory Exceptions: activities/water uses which are exempt from the legislation; and
- Discretionary Exceptions: activities/water uses which are not covered by a statutory exception, but water companies can grant the use of a hosepipe under certain circumstances.

Discretionary Exceptions can be further split into two categories:

- 'Universal': these exceptions have been agreed by all companies who signed up to the Drought Code of Practice (a policy which aims to ensure a common approach to drought management by UK Water companies). Such exceptions do not require customers to write or make representation to the water company to obtain permission; and
- 'Other concessions': these are exceptions which individual water companies can choose to offer customers, depending on the particular circumstances. These exceptions *do* require customers to write or make representation to the water company to obtain permission.

Appendix 'E' sets out the exceptions and concessions for Portsmouth Water. Where customers feel that they should be granted a concession that is not listed, they are welcome to contact us with their representation. We will consider all representations to the Ban in a fair way, i.e. complaints, requests to be exempted from the Ban, and other appeals. We will record all representations and respond appropriately.

3.1.4.4 Policing the Ban

During drought situations, there is less water for people and the environment. We would call upon customers to safeguard our precious water resources and ensure their use and enjoyment of water is in keeping with the restrictions and does not impact unfairly on others. Our aim in imposing restrictions is to ensure a fair and equitable distribution of potable water for all, and protect the environment in the early stages of drought. It is difficult to police these restrictions, and we hope that customers will use water wisely. Where we are aware of anyone

flouting the Ban, we will respond with information on the current water resources situation to ensure the individual(s) are aware of the temporary restrictions in place.

Where continued infringements and contraventions are found, we will respond in a manner commensurate with the need to safeguard the availability of water available for distribution. In particular cases, offenders may face prosecution: flagrant and repeated abuse of the Ban could attract a penalty fine of up to £1000 (level 3 of the standard scale of fines as outlined in section 32 of the Criminal Justice Act 1982), as set out in the Water Management Act 2010.

3.1.5 Further restrictions: bans on the non-essential use of water

Should the drought continue to deepen, or the water demand reductions from TUBs are less than expected, we will need to extend the ban to what are considered "non-essential" uses of water. Non-essential Use bans, commonly referred to as NEUBs, are a set of measures granted to water companies to impose further restrictions on the use of water as long as certain legislative tests are met.

The underpinning legislation for these restrictions is the Drought Direction 2016. Mindful of the potential economic impact on businesses which use water, our Level of Service for NEUBs is 1 in 80 years, i.e. we do not anticipate needing to impose such restrictions on a frequency that is less than 1 in 80 years on average.

As with TUBs, we will fully comply with Environment Agency regulations and will follow the Water Industry's 'Code of Practice and Guidance on Water Use Restrictions' for NEUBs. We will clearly communicate the implementation of the Ban and what is restricted, using the communication channels listed in Table 6.

3.1.5.1 When the Ban will be implemented and what is affected

In order to be able to impose these further restrictions after we have imposed TUBs, we need to make an application to the Secretary of State via a "Drought Order".

We would ensure that prior to application we would conduct as a minimum a two-week public consultation with customers and stakeholders. We would be particularly keen to hear from our NAV and retailer partners - and their customers, at this time. Should any substantial objection be received as part of the consultation, it would be likely that a formal inquiry into the application would be necessary.

A decision is made by the Secretary of State, who must be satisfied that: *"By reason of an exceptional shortage of rain, a serious deficiency of supplies of water in any area exists or is threatened".* If permitted, we will implement a NEUB once the third drought trigger in our Drought Plan has been crossed – see section 2.2. This is after we have implemented TUBs, as per the legislation.

The Drought Direction 2016 allows Water Companies to restrict the use of water for the following purposes:

- Watering outdoor plants on commercial premises using a hosepipe;
- Filling or maintaining a non-domestic swimming or paddling pool;
- Filling or maintaining a pond;
- Operating a mechanical vehicle washer;
- Cleaning any vehicle, boat, aircraft or railway rolling stock using a hosepipe;
- Cleaning non-domestic premises using a hosepipe;
- Cleaning a window of a non-domestic building using a hosepipe;
- Cleaning industrial plant using a hosepipe;
- Suppressing dust using a hosepipe; and
- Operating cisterns in an unoccupied building.

3.1.5.2 Effect of a Non-Essential Use Ban

We have never yet needed to impose these restrictions so have no direct experience of their effectiveness. Based on the experience of other water companies, we estimate that such a ban would reduce average demand by a further 3% on top of the demand savings from the TUBs. This would take the total savings to between 5-10% of demand. The effect will be over the duration of the drought, unlike TUBs which are mostly effective during summer. It is estimated that the maximum decrease in demand from implementing both TUBs and NEUBs, could be around 14% during the peak period of demand during the summer.

3.1.5.3 Representations and concessions

The legislation for NEUBs allows water companies to specify exceptions or concessions to particular groups so they can remain unaffected by the Ban. Appendix 'E' set out the exceptions and concessions for Portsmouth Water, including the circumstances where we believe concessions are appropriate or otherwise. As for NEUBs, there are Statutory and Discretionary exceptions to these restrictions which can be applied by water companies, these are also included in Appendix 'E'. Where customers feel that they should be granted a concession that is not listed, they will be welcome to contact us with their representation. We will consider all representations to the Ban in a fair way, i.e. complaints, requests to be exempted from the Ban, and other appeals. We will publicise the mechanism for making an appeal widely in both our pre-application consultation and on our website. We will record all representations and respond appropriately.

3.1.5.4 Policing the Ban

As with TUBs, it is also difficult to police the NEUB restrictions, and we hope that customers will use water wisely. Where we are aware of anyone flouting the Ban we will respond with

information on the current water resources situation to ensure the individual(s) and organisation is aware of the temporary restrictions in place.

Flagrant and repeated abuse of the Ban could attract a penalty fine of up to £1000 (level 3 of the standard scale of fines as outlined in section 32 of the Criminal Justice Act 1982), as set out in the Water Management Act 2010.

3.1.6 Regional consistency in estimating demand savings

There are a range of approaches currently used by companies in the South East to estimate demand savings from the implementation of TUBs and NEUBs. A club project has recently been commissioned to review and align these approaches, using lessons learnt, case studies and other evidence from both the UK and abroad. The results of this project will be available to use in our next round of water resource management planning in 2024, and the subsequent revision of the Drought Plan.

3.1.7 The basis for the variability of responses to water use restrictions from water companies in South East England.

As indicated above, there may be situations when neighbouring areas are experiencing water shortages more so than the area covered by Portsmouth Water. This variation may mean some water companies across the South East region may start to implement water use restrictions, but not others.

In the South East region water companies source their supplies of raw water in a number of ways:

1) River abstraction;
2) Reservoirs filled by river abstraction or impoundment of river water;
3) Groundwater abstraction from boreholes and springs.

The percentage balance of these varies from company to company, and even within company areas and this causes variability in drought resilience and response.

The impact of drought is felt differently in different areas and over different timescales. An 'agricultural drought' affecting crop growth, for example, can occur after a few weeks of dry and sunny weather through the growing season as a result of causing unseasonably dry soil. In contrast, a 'water resources drought' affecting the availability of water for potable supplies, takes much longer to develop, after several months of below average rainfall, particularly winter rainfall which is critical for replenishing most water resources. The low groundwater levels, reservoir levels, and river flows that result from this type of water resource dry period reduce the water available and poses a risk to a water company's ability to supply its customers.

To manage this risk, water use restrictions are an important measure that water companies can use to reduce demand during drought. They not only enable companies to maintain essential supplies but also help to conserve water resources in periods of water shortages and reduce the environmental impacts of abstraction.

Water companies will only impose water use restrictions upon their customers if they are absolutely necessary, and in accordance with their Levels of Service for water supply. Water companies fully appreciate the confusion that can be caused when one company introduces restrictions but a neighbouring company does not. One of the reasons for this is the spatial extent of the drought: it may be very localised and not extend beyond the area served by an individual water company. Clearly from a customer point of view, if water use restrictions need to be imposed then a simple and consistent approach should be adopted across the South East.

At the regional level, one water company may need to impose water use restrictions earlier in a drought than its neighbours, while another water company is able to withhold the imposition of restrictions until much later or not at all. The reasons why companies may have to react differently in terms of restrictions and their timing are explained below:

- *Differing levels of drought severity across the region:*

Whilst droughts across the South East will generally be caused by a regional trend of several months of below average rainfall, sub-regional differences in rainfall amount may cause differing levels of water shortage across the region. In other words, the need to impose restrictions for one company may not equally apply to another.

- *Differing vulnerabilities at Water Resource Zone level:*

Due to the way the water supply system has developed over time, many water company supply areas are sub-divided into Water Resources Zones (WRZs). These are defined as the largest possible zone in which all resources, including external transfers, can be shared and hence the zone in which customers experience the same risk of supply failure from a resource shortfall. WRZs can be divided into those dependent upon:

  - River abstraction only;
  - Groundwater abstraction only;
  - Reservoirs filled by abstracting local river water or by impounding river water;
  - Various combinations of the above.

This mix of WRZ types means that even if there were not a significant difference in drought severity across the region, WRZs will tend to react differently to the same drought, with certain zones experiencing higher levels of risk to potable supplies than others. That means in similar drought conditions, rivers, groundwater sources and reservoirs across the region

can respond differently in terms of risk to supply. For example, a WRZ dependent on combined river abstraction and reservoir storage for supply may have a different level of risk to one based on groundwater abstraction. This difference in WRZ vulnerability has an impact both at the company level and regional level. A water company may need to introduce water use restrictions in its more vulnerable WRZs but not need to extend the ban to the remaining zones in its area of supply.

The introduction of the new powers in the form of the Temporary Use Ban in 2011 provided an opportunity for the water companies in the South East to review their Drought Plans with a view to finding a clearer, more consistent and more unified approach to introducing water use restrictions across the region than in the past.

The water companies in the South East have had formal meetings to discuss the development of their plans and ensure that they are implementing the powers as consistently as possible. Alongside all the other companies, we are committed to working collaboratively during periods of water shortages. We have worked together to align the drought levels in their plans and to align as closely as possible the restrictions and exemptions that would be imposed when a TUB and a NEUB are implemented. However, due to the local differences highlighted above, the timing of drought plans, and actions will vary across the region.

3.2 Supply-side actions in a drought

Our supply area includes a significant number of protected sites and we have considered the potential impacts on these when identifying and selecting supply-side drought management options.

The requirement for undertaking Habitat Regulation Assessment (HRA) is provided within the Habitats Regulations. We cannot implement our Drought Plan without ascertaining that it will not adversely affect the integrity of a European site. Therefore, we have undertaken a screening exercise to comply with the Habitats Directive and to inform the selection of drought management options. This demonstrated that the North Arundel drought permit is least likely to cause environmental impacts; this is mentioned in section 3.2.1.4 and the screening table found in Appendix 'F'.

Our WRMP19 has demonstrated that even in the most severe drought scenarios, we only require a single drought permit to maintain supplies to our customers. The North Arundel drought permit was chosen as it has the least likely impact upon the environment (as described above) and is the only confirmed drought permit proposed within our drought plan. All of the demand management measures must be in place before the Drought Permit will be approved. For details on the other supply side actions that we considered, see Appendix 'F'.

3.2.1 North Arundel Drought Permit

A Drought Permit for the North Arundel Source would increase the output from its current 2.5 Ml/d license up to 11 Ml/d. When the second borehole at North Arundel was developed in 1990, the site was test pumped and sustained a long-term yield of 11 Ml/d. The source was licensed at this figure in 1991, although it was subsequently reduced to 2.5 Ml/d due to its assumed impact on Swanbourne Lake, Arundel.

3.2.1.1 Yield Analysis

Our investigations, which have included discussions with Southern Water, have not found any records of the original yield testing at the North Arundel Source. However, historic abstraction data confirm that the source has been pumped at over 10Ml/d for extended periods in the past. Most significantly, records show that the source was operated at an average abstraction of 9.9Ml/d for 85 days over the period July to September 1992.

Monitoring records at Well 'X' indicate that the 1992 drought was one of the most severe in the historic record, with minimum groundwater levels very similar to the 1973 groundwater drought. The weekly minimum pumped water levels obtained during the 2005 drought event have also been used to generate a yield drawdown curve for lower levels of abstraction as part of the source DO assessment. This indicates that the yield/drawdown curve is very flat, dropping by around a metre for the first 2.5Ml/d of yield. The difference in rest water levels is also relatively insensitive to drought severity, with a reduction of around 1-2m between the worst recorded operational event (2005) and the worst historic event (1973). The drop between the worst historic event and the 1 in 200 event should be of a similar magnitude. Given that the pumped water levels at 2.5Ml/d only reach -10mAOD at 2.5Ml/d abstraction under the worst historic event, compared with a DAPWL (pump cutoff) of -25mAOD, it is considered highly likely that the source could achieve the yield quoted in the Drought Permit, unless there is a notable increase in the rate of drawdown at higher abstraction rates.

It would only be possible to investigate this by carrying out a pump test, which would need to be carried out under reasonably low groundwater conditions at a rate of at least 7.5Ml/d to 10Ml/d (i.e. 3-4 times the licenced allowance) before this risk could be evaluated. We would need a drought worse than the 1996/97 or 2003 events to undertake a meaningful test which makes it difficult to plan. However, it is considered that the risk is acceptable based on the assessment above.

3.2.1.2 Implementation timeline analysis

A detailed analysis was carried out of the implementation timeline for the enabling works at North Arundel for the Drought Permit. This used the stochastically generated groundwater level data sets used in the Regional planning (Water Resources in the South East) and examined how long there is, on average between antecedent trigger thresholds and the Permit being useable for the design drought condition.

This showed that a trigger level set at a 1 in 25 year return period would give 4 to 6 months notice before the North Arundel temporary treatment works would be commissioned and working for a 1 in 200 year event, which is when it is required under the water resources management plan.

Using a trigger threshold of 1 in 20 years, in line with the commencement of the 'drought' status as defined above, to start the permit application process will therefore allow the Permit to be in place one month before the physical works needs to be completed, which will allow pumping at the higher rates during commissioning and testing of the temporary treatment plant. The timeline can be summarised as follows:

- 1 in 20 year threshold breached: Permit application starts and initial procurement of treatment plant commences
- 1 month later: on-site works start.
- 2 months later: Permit application submitted
- 4-5 months later: Permit application granted (drought reaching circa 1 in 125 return period at this stage).
- 5-6 months later: North Arundel scheme fully tested and operational (prior to the 1 in 200 year threshold being breached)

3.2.1.3 Engineering solution

Following the reduction of the North Arundel output down to 2.5 Ml/d, all of the associated infrastructure was removed. We have therefore undertaken an assessment of the best value engineering solution to increase deployable output during a 1 in 200 year drought condition, whilst ensuring compliance with all regulations and company policies and standards.

Existing treatment at the site is solely chlorine disinfection. The process evaluation of the existing assets confirmed that at the increased flow of 11 Ml/d, the site would not achieve an effective contact time (eCT). Therefore, the preferred treatment option that we would need to install in order to use the source during drought includes Ultraviolet (UV) treatment of water prior to the contact main and also includes cartridge filters prior to disinfection to get the required contact time and water quality compliance. This treatment option would be a containerised UV system at the site, which could provide a template design and build programme for other sites where UV is considered as a treatment step.

3.2.1.4 Environmental Assessment Summary

We have a responsibility to monitor, assess and where possible mitigate the impact of our supply-side actions in a drought. For this Drought Plan, we have prepared a detailed Environmental Assessment Report (EAR) for the North Arundel drought permit. The EAR identifies the environmental baseline and also the likely impacts of the drought permit on environmental features. A summary is provided below and a copy of the full EAR is available upon request.

The North Arundel abstraction is from the Chichester Chalk aquifer block, which contributes flow to numerous water courses in the wider study area. A review of the available baseline information and scenario testing within the Environment Agency's regional groundwater model has identified that Swanbourne Lake, Mill Stream, and the Wildfowl and Wetlands Trust Reserve (forming part of the Arundel Park Site of Special Scientific Interest (SSSI)), and also the Park Bottom tributary, are the primary hydrological receptors of the effects of the drought permit. These sites are located immediately west of the tidal River Arun.

The North Arundel permit is only expected to be implemented within a drought that is more severe than the historic 1973 drought; it would be expected to be implemented not more frequently than once every 125 years on average. Swanbourne Lake is an artificial feature that relies on groundwater flows to maintain its level and it is expected to largely dry out in a severe drought as it has done in lesser historic droughts. However, the drought permit might cause the lake to be drier for longer, resulting in minor environmental impacts. The drought permit may also reduce flows to the Mill Stream and the Wildfowl and Wetlands Trust Reserve, which are adjacent to Swanbourne Lake and on lower ground nearer to the tidal River Arun. The likely environmental impacts on the Mill Stream and the Wildfowl and Wetlands Trust Reserve are currently uncertain and further investigation is required.

The regional groundwater modelling also indicates that river flows in the Park Bottom tributary might also be reduced by implementation of the North Arundel drought permit; moderate likely environmental impacts have been identified, although there is low confidence owing to a lack of baseline data.

With respect to HRA, PW commissioned to undertake the data collection and interpretation required to support an HRA of its WRMP19 to determine whether any aspects of the plan, (alone or in-combination) could have significant or significant adverse effects on the integrity of any European sites. This included the drought plan options and actions we are expecting to implement during a drought event. The conclusion of the HRA of the revised WRMP was that the plan will have no adverse effects, alone or in combination, on any European sites taking into account established scheme-level mitigation and avoidance measures that will clearly be available, achievable and likely to be effective. The below text box summarises the assessment with respect to the North Arundel Drought Permit. We will be updating our HRA as part of the development of our next water resources management plan (WRMP24) and the findings from that will be included in our next drought plan.

North Arundel Drought Permit- Summary of Assessment

The nearest European sites are Duncton – Bignor Escarpment SAC (~5km, not water resource sensitive), and Arun Valley SAC, Arun Valley SPA and Arun Valley Ramsar (~8.3km, on the far side of the River Arun). There are no water resource sensitive European sites within 5km of the borehole (and so direct effects on groundwater dependent terrestrial ecosystems due to any additional drawdown would not be expected) and the borehole is not within the catchment of any European sites (i.e. any effects on surface waters due to increased abstraction will not affect any European sites). The groundwater drawdown associated with borehole operation will not affect the Arun Valley sites (principally alluvial grazing marsh and relict raised bog). As a result, operational effects would not be expected. No construction works are proposed, although any construction required would not affect any European sites. As a result, no effects would be expected as a result of this scheme.

The EAR also confirmed there are no European sites within the zone of influence of the permit and therefore a separate HRA for the Drought Plan is not required. With respect to the Water Framework Directive (WFD) the Swanbourne Lake, Mill Stream and Wildfowl and Wetlands Trust Reserve are not WFD water bodies. However, these sites are part of the Arundel Park SSSI and are relevant to the groundwater dependent terrestrial ecosystem (GWDTE) test for the Chichester Chalk WFD groundwater body. The EAR has identified a medium risk of temporary deterioration in quantitative status owing to the GWDTEs test. All of the impacts are considered to be short-term, temporary and reversible.

The risk of temporary deterioration in WFD status will be discussed with the Environment Agency in the event that the North Arundel drought permit needs to be implemented in a future drought. The risks to WFD compliance will also be further assessed at this time to take account of any new evidence from new baseline data.

In addition to the above impacts, we have also identified the potential for cumulative impacts with Southern Water's own North Arundel drought permit site, assuming they may be implemented at the same time. The likely combined impact of the permits is predicted to be similar to the 'alone' impact of our permit, although some of the impacts are uncertain and require further investigation.

3.2.1.5 Baseline and in-drought monitoring and mitigation

Fortunately, there has been no requirement for us to implement supply-side drought orders or permits within historic droughts. However, this limits our environmental assessment, as there is a lack of observed baseline data to predict the impact of the North Arundel permit. Our EAR has been prepared using the available data and best conceptual understanding at the

time of writing. The available drought plan guidance (Environment Agency, 2020) identifies that we should set out:

- monitoring to develop appropriate baseline environment datasets.
- monitoring that will be put in place to understand the actual environmental impacts of implementing drought permits or orders.

We have already completed a joint study with Southern Water using the Environment Agency's regional groundwater model to predict likely hydrological (and therefore environmental) impacts. The results of the modelling are now being used to inform updates to the baseline monitoring requirements (including groundwater, surface water, water quality and ecological monitoring).

There are ongoing discussions with Southern Water, the Environment Agency and other stakeholders regarding the monitoring and mitigation plan for the impacted sites; a copy of our current Environmental Monitoring Plan (EMP) is available upon request.

. We are responsible for monitoring, assessing, and if possible, mitigating the impact of our North Arundel permit. However, it is possible that some activities will be delivered by others via a partnership approach.

Potential mitigation involves the potential augmentation of flows in the Park Bottom tributary and on the WWT Reserve and also working with other licensed abstractors in the study area to ensure they continue to have a supply of water if impacted by our drought permit.

3.2.1.6 Compensation arrangements

Water companies normally have a duty to provide a constant supply of water that is sufficient for domestic purposes. However, if there is (or if there is a danger of) a serious supply shortage because of exceptionally low rainfall, then a drought order may be sanctioned by the Secretary of State for Environment, Food and Rural Affairs. A drought order can change a water company's water supply obligations including quantity, pressure and the means of supply.

There is a statutory duty for Water Companies to compensate owners of other sources of water when drought orders are in force, whilst Condition Q of our Regulatory Licence now requires us to compensate our own customers if, in the event of a drought, we need to restrict customers use. We encourage commercial users who are dependent on mains water supplies for their business operations to consider taking steps to protect themselves from the effects of water use restrictions which are imposed under drought measures. It may be that a number of businesses need to consider pooling resources and if possible accessing alternative supplies from, say, an area outside that affected by drought.

Where we impose an emergency drought order and need to interrupt or cut off a person's supply as a result of the order which means there is no water for cooking, washing, drinking or flushing the toilet, Condition Q would apply. This states that household customers are entitled to £10 for each day where the supply is interrupted or cut off. The total amount shall not exceed the average amount of water charges payable by household customers in the charging year preceding on average circa £100. Business customers are entitled to £50 for each day where the supply is interrupted or cut off. The total shall not exceed the average amount of water charges payable by that customers in the charging year preceding or if that customer was not liable to pay those charges, £500.

3.2.2 Worlds End potential drought permit

As part of the AMP7 water resource management development programme we are investigating the development of satellite borehole sources at Worlds End to support source capability during drought conditions. Whilst outputs would fall within existing licenced quantities, it is possible that the use of the satellite boreholes to allow abstraction above recent historic rates could be managed through the use of a Drought Permit, rather than a change of the existing abstraction licence.

Investigations and discussions with the Environment Agency are ongoing and at this stage it is not possible to determine whether the development will proceed and, if it does whether it would be licenced or depend on a Drought Permit application process. The requisite Environmental Assessment Reports are being developed as part of this process and will be available to support any application if necessary, however it is not possible or appropriate to include details within the Drought Plan at this stage.

3.3 Summary of our Drought Management Actions

Table 4 includes a summary of our demand and supply side management actions for our L1-3 levels of restrictions. We will implement our demand saving actions first, and have prioritised the use of supply actions that are the least damaging options to the environment (Appendix 'F'). This means we will take actions to reduce our customers' demand, leakage and outage before applying for drought permits and orders to take more water from the environment.

Table 4 Summary of drought management actions for L1-3

Option Name	Appeals for Restraint and Enhanced	Temporary Ban	Non-Essential Use Ban	North Arundel Drought Permit
Trigger (or preceding actions)	Groundwater Level 1	Groundwater Level 2 (Following consultation on Temporary Ban)	Groundwater Level 3 (Follows Temporary Ban)	Groundwater Level 3 (Follows Temporary Ban) Serious Shortage of Rainfall (Relate to SPI indices levels)
Drought Plan Stage Description	Developing	Drought	Severe Drought	Severe Drought
Location Area affected or whole supply zone	Whole Company Area	Whole Company Area	Whole Company Area	North Arundel
Implementation timetable Preparation time/ time of year effective/ duration	One week/spring, summer, autumn/one year	8 weeks/spring/six months (renewable)	12 Weeks/ all seasons/ six months (renewable)	12 weeks/ summer/ six months (renewable)
Permissions required and constraints Including details of liaison carried out with bodies responsible for giving any permits or approvals	Liaison with CCWater and the EA	CCWater, EA	Drought Order, CCWater, EA, Defra	Drought Permit EA/Defra Liaison with Natural England on SSSI
Risks associated with option	Depends on Customer behaviour. Co-operation with other Water Companies required. Negative press	Consultation and appeals process untried. Large number of responses. Legal challenges	Objections from commercial water users. Calls for compensation.	Source currently running at 2.5 Ml/d Water Quality

3.4 Extreme Drought actions

We are working as part of the WRSE drought group, to develop a set of actions, known as 'More Before 4' that would be implemented during extreme drought, with the aim to delay the implementation of the Emergency Plan (Level 4).

This includes considering regional connections and collaborative and coordinated actions between neighbouring companies. The WRSE group are investigating options that will benefit the region as a whole and have reviewed extreme drought operational logistics. The following options are currently being considered:

- National campaigns and 'Day Zero' messaging to raise awareness and guide customers to reduce consumption, by first targeting 80 litres per person per day and then progressing to 50 litres per person per day.

- Potable Water Tankering. Sea Tankering options are being investigated to be imported into local ports on the South Coast.
- The use of temporary containerised desalination plants at strategic locations along the coast

These options are being investigated further by the WRSE at a regional scale for the regional plan.

Further to the regional options considered, we have carried out an internal exercise, considering additional actions we could consider implementing during an extreme drought event, such as recommissioning unused sources, internal transfers, and additional Drought Permits and Orders. The list of options considered is included in Appendix 'F'. In keeping with the guidelines, we have considered possible actions to be:

- practical to implement during an extreme drought
- likely to be temporary
- technically feasible
- generally not result in permanent increases to deployable output i.e. usually distinct from WRMP options

We have identified three actions that we could consider in more detail as drought escalates that are potential options for implementation during extreme drought to delay the need for Level 4 severe drought restrictions. We will consider these options as the drought progresses and discuss them with the Environment Agency to help identify barriers and environmental assessment requirements. In the future, there is a requirement to increase our levels of resilience to more extreme droughts (1 in 500 year event), and the expectation that we should be able to cope with such an event without the need to implement our emergency plan (Level 4 drought restrictions). In the meantime, these could be implemented in extreme drought but would warrant further investigations.

Option A- Recommissioning of Source U

Type of action	Supply enhancement
Summary of action	This is currently used for augmenting the River Ems in dry conditions. It would be possible to recommission the works in an Extreme Drought and direct the water into the supply network.
Likely benefit	2.2Ml/d
Barriers	Water Quality This option would require a package UV treatment plant and new chlorinators to ensure water quality compliance. DWI requirements DWI would require water quality testing prior to the source being recommissioned.

Environmental Impacts	If this option is being used, it would not be possible to augment River Ems simultaneously. This might result in damaging environmental impacts on the river ecology and biodiversity.
Timescales	3 to 6 months

Option B- Recommissioning unused private boreholes

Type of action	Supply enhancement.
Summary of action	There are a number of unused private boreholes within our area which might have spare licence capacity to augment public water supply sources in an extreme drought. We have obtained a list of these sites from the Environment Agency and, in the event of a developing extreme drought, will could make contact with site owners to prepare plans to make use of any spare capacity for public water supplies. The WRMP did not consider these to be feasible options.
Likely benefit	TBC
Barriers	DWI requirements Any source must have DWI approval before being used to supply customers.
Environmental Impacts	These options were not included in the SEA or the HRA assessments so these would have to be undertaken to understand potential environmental impacts.
Timescales	3 to 6 months

Option C- Increasing pump capacity and lowering pump levels at sources Q and R

Type of action	Supply enhancement
Summary of action	Operational pump capacity decreases at Source Q and Source R as groundwater levels lower in a drought. The action involves installing higher capacity pumps at a lower depth to overcome this effect. The group licence constraints and conditions would need to be temporarily removed via a drought permit to allow an uplift in abstraction.
Likely benefit	Up to 8 Ml/d in an extreme drought with a drought permit in place. It is likely the action would represent a second phase of the existing North Arundel drought permit option.
Barriers	Water Quality The supply enhancement would improve yields in an extreme drought to match those in a dry to normal year. Therefore no

	additional treatment processes are required. However, there is a risk that turbidity, nitrate or other water quality issues could materialise when pumping under low groundwater level conditions.
Environmental Impacts	The action is likely to have environmental impacts at nearby sites. There is currently no Environmental Assessment Report (EAR) for this supply enhancement option. This would need to be developed, including an assessment of impact on new authorisations in the local area.
Timescales	3 to 6 months

4 MANAGEMENT AND COMMUNICATION STRATEGY

4.1 The Drought Event Management Group

When our monitoring of prevailing conditions suggests it is necessary, we will formally convene our internal Drought Event Management Group to ensure we follow a structured approach to managing the drought and clarity over roles and responsibilities.

We will deploy an agile and proactive communication plan to connect with customers, other water companies, water retailers, the Environment Agency, the Government and many other stakeholders. We will use and elevate existing communication channels and open new ones, to cascade information about the water shortage we are experiencing. As the drought progresses, we will use these channels to request customers to observe water saving measures, and to inform them of the additional drought measures we will be implementing.

4.1.1 Convening the Drought Event Management Group

Groundwater levels are currently monitored daily at our observation borehole which gives an indication of the GW levels across our area. This information is reviewed at our weekly operations meetings. Should we identify that the groundwater trend indicates a potential forthcoming drought we will keep a watching brief on the water resources situation, ready to convene the Drought Event Management Group when necessary.

We will convene the Drought Event Management Group as soon as it looks likely that the first groundwater level drought trigger will be breached, or if a neighbour within the WRSE group is in drought, even if our drought triggers have not been reached. The purpose of this will be to collaborate with any regional drought actions and communications where needed, to ensure a joined-up approach. This is detailed further in section 4.4.

4.1.2 Group structure

The Drought Event Management Group is comprised of key members of staff that cover the different roles covered by the company. It is led by the Head of Water Resources, who has overall responsibility for the implementation of the Drought Plan. Figure 8 shows the management structure of the Group; the relatively small size of Portsmouth Water means that the management structure is clear and easy to understand.

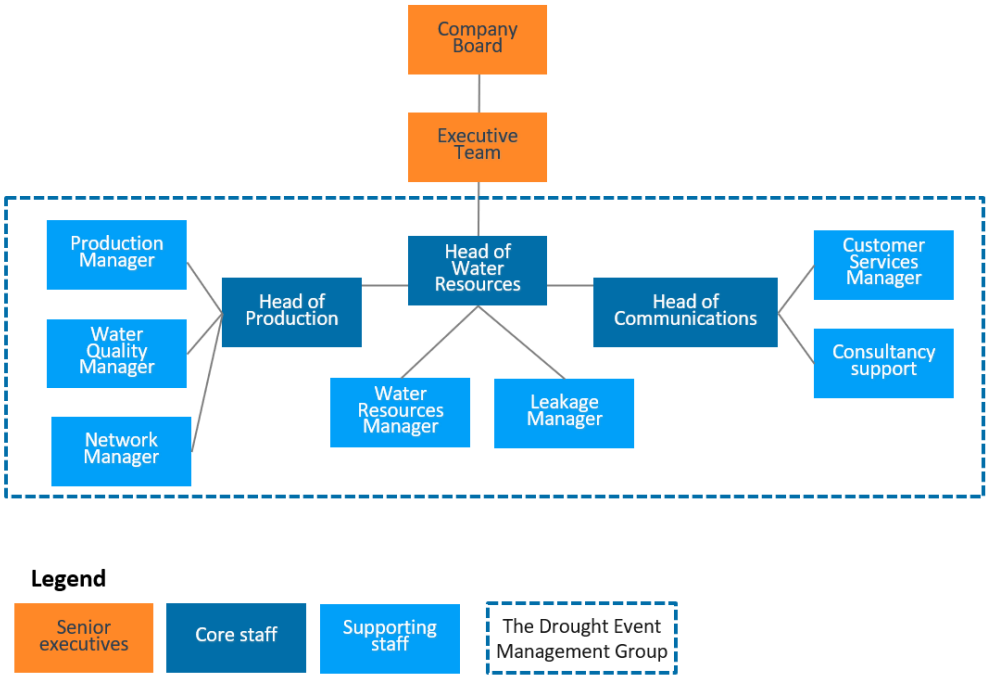

Figure 8 The Drought Event Management Group Structure

4.1.3 Group meetings and reporting

The Drought Event Management Group will meet at a frequency that matches the severity and escalation of the drought. For example, it may be held monthly initially, rising to weekly or more frequent if the drought escalates.

As a member of the Executive Team, the Head of Water Resources will provide weekly reports on the situation and actions to the rest of the Executive Team, and provide monthly updates to the Company Board.

Members of the Group will actively participate in other groups convened to manage the drought, such as the Environment Agency's Regional Drought Co-ordination Group; and any others which are relevant.

4.1.4 Winding down the Group

When groundwater levels rise above the 'Upper Trigger', this indicates that the drought has ended, and so the focus of the Drought Event Management Group will change from actively managing the drought, to conducting a review of the experience.

We will conduct a lessons learned exercise to understand whether our actions had the desired effects, whether our communications reached their target audiences, any unexpected occurrences, what went well and what could be improved.

We will produce a report detailing the review and its findings, and share it with the water industry, regulators, customers, and other stakeholders. We will integrate any recommendations into our next Drought Plan.

Once the review is completed and signed off, the Drought Event Management Group will cease to meet.

4.2 Roles and responsibilities

Table 5 sets out the roles and responsibilities of the Drought Event Management Group. Other staff and contractors will provide additional assistance where necessary.

Table 5 Membership and responsibility of the Drought Event Management Group

Role	Key responsibilities
Head of Water Resources	• Chair of the Drought Event Management Group • Liaison with regulators, particularly the Environment Agency, through the Dry Weather Group. • Reports to Executive Team and Company Board • Overall delivery of the Drought Plan • Weekly review of the water resource position
Water Resources Manager	• Water resource monitoring • Communication of trigger level breaches • Reporting when demand management and restrictions should be implemented • Application for water use restriction measures, Drought Permits / orders • Liaison with regulators and regional drought groups • Produce the lessons learnt report
Leakage Manager	• Implementation of network demand management measures
Head of Production	• Technical issues including Water Quality, Supply, and Capital Works and Distribution Network • Liaison with regulators
Water Quality Manager	• Water quality monitoring and standards • Liaison with DWI
Production Manager	• GW level data collection • Operation of sources, service reservoirs, treatment works • managing source outputs
Network Manager	• Water main distribution network including leak repair • Reporting operational data

Role	Key responsibilities
Communications Manager	• Delivery of the communication plan • Key messaging • Point of contact for media • Point of contact for NAVs • Stakeholder engagement, including Customer Panel
Customer Services Manager	• Customer service interactions • Company call-centre briefing and communications

4.3 Communication Plan

Proactive communication plays an essential role in managing drought and is a key aspect to any action we undertake.

The nature of any particular drought is unique in terms of its extent, duration and severity. This means we will need to deploy a Communication Plan in an agile way, so that we can best respond to the particular drought characteristics being experienced. Therefore, we have given much consideration to different communication approaches and channels, so that we can swiftly produce a plan that is best suited to the particular characteristics of the drought being experienced.

An excellent example of collaborative working across the region on drought matters, is provided by the jointly funded research work on customer engagement in which the company Accent has been commissioned by the WRSE. The objective of the project is to explore customer awareness and comprehension of drought, and develop communication approaches that will advise and prompt behavioural change. The project focuses on talking to customers to gain insights into their understanding, experience and views on water shortages, and restrictions on water use. Customers will also be asked for their views on existing drought communication messages and methods to find out what works, what could be improved, and what may encourage behavioural change to save water.

By involving all companies in the WRSE region, the project will be able to gain the views of a much large sample of customers than if it were just done for one company. In this way it will be much more representative of the many different types of customers, including vulnerable, and hard to reach customers in the south east of England. This larger reach will also ensure a deeper level of comprehension, allowing for robust analyses.

When available we will use the findings of this work to create a specifically tailored communication plan to be used with our Drought Plan. Its purpose will be to manage the demand for water by informing customers about the water shortage and appealing for

restraint in their use of water, using the recommended and up to date communication methods.

Throughout the drought, we will monitor the effectiveness of our communications and assess the impact of each action we take before applying further measures. We will also ensure that any areas for improvement are implemented immediately where possible and included in the post drought review, so we continually improve our management of drought episodes.

4.3.1 Implementation

The Communications Manager has the responsibility for implementing communications with customers. This will happen when it looks likely our first drought trigger will be breached.

As stated above, we will be working closely with other water companies in the WRSE which may need to start communicating about water shortages in their area before we need to. In order to ensure a joined-up approach, we will also activate parts of our communication plan when any other company in the WRSE region needs to start raising awareness.

The reason why other neighbouring water companies in the wider south east region may start to experience water shortages is, in part due to where the water comes from. This is because the majority of our water sources come from groundwater, which takes longer to show the impacts of periods of low rainfall. This contrasts with neighbouring water companies that may rely more on reservoirs and surface water such as rivers, which reduce much more quickly in periods of reduced rainfall.

Therefore, we will work collaboratively with other organisations, from regulators to neighbouring companies and regional groups, to ensure a joined up and coordinated approach to the management of the drought. In particular, we will work closely with Southern Water, due to our existing water transfer agreements, to share information and understand their need for water during the drought.

Moreover, we will look to formally notify all our NAVs and retailers operating in our area of any change in our drought status levels and will be providing them with all the communications we send our customers. This would be done both to keep them and their customers informed, since we would be urging them to proactively relay that information to their customers through their own communication channels. Working with Retailers in particular there is an opportunity to influence large commercial users of water alongside our household customers.

We will liaise with Hampshire County Council as the local highway authority to ensure that in an extreme drought, they are satisfied that any emergency restrictions such as standpipes do not restrict the safe operation of the public highway, should the drought reach those levels.

4.3.2 Key messages and delivery methods

The messages used and the method of delivery will be dependent upon the severity of the situation, as stated above. Nevertheless, the key information we will communicate will include:

- The key reasons for the water shortage;
- The actions taken by the Company to date;
- What people can do, and how this helps to save water and protect the environment;
- What may happen in the future should the drought worsen, with regard to water use restrictions; and
- How people can find out more information and advice.

We will ensure customer facing staff in our call centre and others, are well briefed and able to respond to enquiries about the water shortage and restrictions. We will consider extending the opening hours of our Customer Service centre for the initial period following the publication of the water use restrictions in order to ensure we are able to best respond to enquiries.

Table 6 shows the large range of communication methods and channels we will use to reach as many people and different groups as possible. We will review and update this where necessary, with the findings from the regional research on drought communications.

Our communications strategy has been informed by key reports on communicating during droughts, including the following which were produced after the 2011-2012 drought:

- Consumer Council for Water's (2013) "Understanding drought and resilience";
- Waterwise's (2013) "Water Efficiency and Drought Communications";
- UKWIR's (2013) "Managing through drought: code of practice and guidance for water companies on water use restrictions"; and
- Accent (2021) Regional Drought Communications Research Project

Table 6 The communication methods and channels to be used for drought messaging

Communication channel	Communication activity / reach (depending on the drought severity)
Our website	Information in the form of text, pictures, articles, and videos to inform staff and customers on the water shortage, and what customers can do.
Our social media accounts (Twitter, Facebook, Linked-In, snapchat), and relevant others	Information in the form of text, pictures, articles, and videos to inform staff and customers on the water shortage, and what customers can do
Local Press (for example the Portsmouth News)	Articles on the water shortage and what people can do to help, or any water use restrictions. Official notices about water use restrictions. Paid advertisements.
Local Radio and TV Stations	In-person interviews and appeals for people to use water wisely. Briefings on the water scarcity situation. Paid advertisements to be played regularly.
Stakeholder Briefing Sheets	Regular updates to the Environment Agency, Natural England, Local Authorities, Consumer Council for Water, Members of Parliament, Trade Associations, Local Resilience Forums, NAVs and Retailers
Posters in public buildings (e.g. doctors, surgeries, libraries), electronic displays and billboards, messages on the side of fleet vehicles	Key messages about the drought and helpful actions to take for people out and about.
Information with bills	Inclusion of information about the water shortage in the magazine that accompanies customer bills, and what actions they can take
Internal briefing notes	Information about the drought for Customer Services and Production staff to keep them informed of the developing situation so they can better undertake their duties
E-mail postscripts	Key messages about the drought and helpful actions to take for customers and contractors

4.3.3 Phased approach and audience groups

Our communications with customers will follow a phased approach linked to our drought trigger levels (section 2.2). This ensures we step up our communication with our customers and stakeholders in tandem with the increasing severity of a drought episode. Table 7 shows our drought management and communication activities for each drought trigger level.

Table 8 sets out the different groups or audiences that we will try and reach during droughts to alert them to the need to reduce their demand for water. The individual or groups may be affected by water shortages either directly or would benefit from information and advice to pass onto others. Each group will need a tailored approach to ensure that they receive useful information.

While we may not be a supplier of water to certain individuals or groups listed, such as farmers or businesses, it is recognised that communication with these groups is useful and can generate wider benefits.

It is important to note that we believe that none of the drought scenarios considered in this Plan would affect the provision of water for firefighting supplies. Only an unprecedented occurrence such as a major pollution event during a severe drought would pose such a risk, and in this case Portsmouth Water would communicate with the Fire Brigade as per the Emergency Plan.

Table 7 Our drought management and communication activities for each drought trigger level, management action and communication activities

Level	Drought management action	Drought communication activity
0	None	• We will deploy our usual customer-orientated water efficiency messages, which include options for customers to have free water saving devices to be fitted; tips for saving water, access to discounted rain butts etc; and having a water meter installed. • We will include updates on the water resources situation at regular meetings with the Enviroment Agency.
1	Close monitoring of water resources Enhanced leakage control	• As above plus additional activity as follows. • We will appeal to customers to ask for their help to use water wisely. We will explain that we are experiencing a water shortage and why this is happening in terms of reduced rainfall and the impact on our water supplies.

Level	Drought management action	Drought communication activity
		It will include the area affected and what actions we are doing to save water. • We will ask customers to report leaks promptly. • We will send bespoke messages to customers in areas of the network which may experience shortage or low pressure first, such as Bognor. • We will engage with regulators, WRSE and regional or national drought groups over the water resource position, and collaborative actions (including external comms). • We will reach out early with light touch messaging with wider stakeholders (see Table 8) on the developing water shortage, explaining the situation and possible future water use restrictions. • We will provide updates to the Environment Agency on the Water Resource position in meetings and explain actions we are taking.
2	Imposition of restrictions: Temporary Use Bans (TUBs) for domestic customers	• We will step-up communications to all customers, building on what has already been expressed, updating them on the water resource situation and what we need to do now to further save water in the form of certain restrictions. • We will explain what other actions we are doing to save water (enhanced leakage find and fix, using new or different water sources, protecting the environment). • We will explain how customers will be affected by the impositions of temporary use bans, and how this will help us all save water; where customers can find more information, and what further actions they can do to save water. • We will ensure targeted messaging to customers in areas of the network which may experience particular issues. • We will make direct contact with vulnerable customers to personally advise them of the situation to ensure they are fully informed, and any concerns are addressed • We will directly liaise with neighbouring companies over water transfer arrangements. • We will continue our engagement with regulators, WRSE and regional or national drought groups. • We will have a presence at areas where people gather (e.g. retail areas) and events to promote awareness and

Level	Drought management action	Drought communication activity
		water saving initiatives • We will continue to provide updates on drought development in regular meetings with the Environment Agency (and via email) and discuss upcoming drought permit application where appropriate.
3	Application and imposition of restrictions: • Non-essential Use Bans (NEUBs) • Application of Drought Permits (DPs) • 'More Before 4'	• As above plus additional communication to customers and stakeholders on the imposition of further restrictions and using hosepipe. • We will reprise our direct contact with vulnerable customers to personally advise them of the situation to ensure they are fully informed, and any concerns are addressed. • We will send targeted messages to customers which may be significantly affected by the non-enhanced use bans to ensure they understand the new water restriction. • We will advise customers in advance should we need to implement water flow pressure reductions. • We will continue to liaise with neighbouring companies over any changes to water transfer arrangements, and the application of Drought Orders or Permits. • We will communicate with environmental groups and other licence holders about the application for a Drought Order / Permit, explaining the reasons why we are doing this, the powers it gives us, and the subsequent implications. • We will continue our frequent engagement with regulators, the WRSE group, and other regional or national drought groups. • We will continue frequent meetings with Environment Agency to update on drought development. This is likely to involve discussions about drought permit applications prepared.
Post drought		• We will communicate with customers and all groups that we have engaged with to let them know about the lifting of water use restrictions, and the reasons why we are no longer experiencing a shortage of water. • We will thank customers and stakeholders for their help and participation in saving water. • We will make the findings of our post drought lessons learned exercise available on our website.

Table 8 The different audience groups to be reached for each drought trigger level.

Group	Individuals and organisations that may be affected by droughts and water use restrictions (not exhaustive)	Level 0	Level 1	Level 2	Level 3	Level 4
Employees	Employees and contractors	Y	Y	Y	Y	Y
Customers	Domestic customers	Y	Y	Y	Y	Y
	Commercial customers		Y	Y	Y	Y
	Private customers		Y	Y	Y	Y
	Citizens Advice Bureau			Y	Y	Y
	Housing Associations			Y	Y	Y
	Retailers			Y	Y	Y
	Special needs customers	Y	Y	Y	Y	Y
Regulators	Environment Agency	Y	Y	Y	Y	Y
	Ofwat		Y	Y	Y	Y
	Defra		Y	Y	Y	Y
	Drinking Water Inspectorate		Y	Y	Y	Y
	Natural England		Y	Y	Y	Y
Water industry groups	Consumer Council for Water			Y	Y	Y
	Waterwise			Y	Y	Y
	Customer Challenge Group		Y	Y	Y	Y
Water companies	Southern Water	Y	Y	Y	Y	Y
	WRSE	Y	Y	Y	Y	Y
	All				Y	Y
Environmental, landscape, heritage, and other relevant interest groups	Local wildlife groups and campaign groups				Y	Y
	Conservation volunteer groups				Y	Y
	Local Friends of the Earth				Y	Y
	South East Rivers Trust				Y	Y
	WWF				Y	Y
	RSPB				Y	Y
	CPRE					Y
	English Heritage					Y
Sports and leisure groups	Angling Trust				Y	Y
	Canal & Rivers Trust		Y	Y	Y	Y
	River Trust		Y	Y	Y	Y
	Angling clubs			Y	Y	Y
	Canoe clubs			Y	Y	Y
	Sailing clubs			Y	Y	Y
	Local fishing groups				Y	Y
	Ramblers Association and other walking groups				Y	Y

Group	Individuals and organisations that may be affected by droughts and water use restrictions (not exhaustive)	Level 0	Level 1	Level 2	Level 3	Level 4
	Professional sports clubs				Y	Y
Authorities and service providers	MPs		Y	Y	Y	Y
	Local Authorities		Y	Y	Y	Y
	Town Councils		Y	Y	Y	Y
	Parish councils		Y	Y	Y	Y
	Local Resilience Forums		Y	Y	Y	Y
	Health Authorities				Y	Y
	Police Service			Y	Y	Y
	Fire Service			Y	Y	Y
	Coastguard and RNLI					Y
Representative bodies	Residents' associations			Y	Y	Y
	Confederation of British Industry				Y	Y
	National Farmers Union				Y	Y
	Chambers of Trade and Commerce				Y	Y
	Countryside Landowners and Business Association				Y	Y
	Horticultural Trades Association				Y	Y
	Window Cleaners Trade Associations				Y	Y
	Federation of Small Businesses				Y	Y
	Grounds Management Association			Y	Y	Y
	Age UK			Y	Y	Y
Local community focused institutions and organisations	Hospitals				Y	Y
	Schools				Y	Y
	Residential Care Homes				Y	Y
	Faith groups				Y	Y
	Youth clubs				Y	Y
	Age-based groups			Y	Y	Y

4.3.4 Additional communications that may be required

4.3.4.1 Communications for Environmental Drought

In situations under which there is adverse impact on the environment due to drought, but the drought has not developed to be severe enough to be a threat to public water supply, there may be benefit from reductions in customer demand. In such circumstances we may work with the Environment Agency and other stakeholders to communicate with our customers to request that they take steps to increase water efficiency and reduce their water consumption. We would use similar means of communication as in situations where reduced consumption is required to reduce the impacts on water supply, but the messaging would be different with the focus being on the potential to benefit the environment.

4.3.4.2 Communications for High Demand or Outage

There may be a requirement to communicate with our customers to request that they take steps to reduce demand in circumstances where there is not a drought or a threat of drought. This could arise due to a period of high demand that puts stress on the water treatment or water distribution infrastructure, or it could be due to a period of outage at a water treatment works or a failure of a strategic main. Under such circumstances it would not be appropriate to implement drought measures to restrict demand such as implementation of a TUB as the situation would not have arisen due to an exceptional shortage of rain. Therefore, the implementation of a tailored communications campaign is the best means of trying to achieve a reduction in customer demand in such circumstances and a short lived and targeted campaign using the most appropriate means of communications would be used in these circumstances. It is likely that the use of social media and methods such as text messaging could be used during a campaign of this type. This approach would also be used in a situation where unforeseen circumstances may occur such as in 2020 as a result of Covid19 which led to high demand in parts of our supply area which when coupled with very hot weather, led to stress on our operational network. In these circumstances it is necessary to mobilise a communications campaign quickly, this process is known as 'agile comms', which was proven to be successful in 2020.

4.3.5 Effectiveness of our communications

We have in place quick and efficient monitoring of daily demand, which is used to assess usage during peak summer periods and has been used throughout the Covid pandemic. Continuous monitoring of representative sample sets of households and non-household customers allow for robust analysis of changes in usage. This is currently used to forecast future demand. This same dataset would be used to monitor the effect of our communication campaigns during a period of drought. We would look to collaborate with other water companies and organisations, such as the Environment Agency, to share data, behaviours and lessons learned.

4.4 Regional Drought Collaboration

Portsmouth Water recognises that as a member of the water industry, we need to work collaboratively to share knowledge and best practice, co-ordinate and align communication to customers and stakeholders, and promote the efficient use of water resources.

Therefore, we work closely with other water companies in our region as part of the WRSE group. For example, we participate in the regular WRSE "dry weather" meetings which focus 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 situation. 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. As mentioned above, the WRSE has commissioned research covering the region, on customer awareness of drought matters and optimal communication approaches.

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.

5 POST DROUGHT ACTIONS

5.1 Identifying the end of a drought

It is vital for us to recognise when a drought event has ended, and we can safely de-escalate our drought actions. A drought does not necessarily end when it starts to rain again. The Environment Agency considers that a drought has ended when:

- The risk to the security of supply and environment from drought, are no greater than they would be during a normal year;
- Normal conditions have resumed for a specified period of time

Normal conditions in this case does not only refer to rainfall, i.e. when rainfall levels have returned to normal, but rather, that water resources have recovered back to normal conditions. Depending on how severe a drought is, it can take time for the rain to recharge the aquifers and increase groundwater levels back to normal.

During this period, our Drought Management Team will continuously monitor and report on the overall position of our water resources. Any decision declaring a drought has ended, will be based on the information presented throughout this period of monitoring. As the drought status is stepped down to a reduced level, the Drought Management Team will discuss which actions are no longer necessary and these will be stopped. We use our 'Upper Trigger' which is set above the 'Level 1' trigger to notify us when there is full groundwater recovery.

Whilst making decisions to lift certain restrictions, we will be liaising with several regulators and stakeholders, who could be affected by our decisions. These will include but aren't limited to the following:

- Environment Agency
- Natural England
- Neighbouring Water Resource Companies
- Household Customers
- NAVS
- Retailers

We will also engage with our neighbouring water companies and the Environment Agency in advance of the decision to lift drought restrictions in order to understand the wider water resource and environmental situation and explore possible opportunities for coordinating any messages to reflect the changing circumstances.

5.2 The post-drought review

Once we have declared the end of a drought and conditions have returned to normal, we will carry out a post drought review. In this review we will identify any lessons learnt and any improvements that could be made both to the drought plan and the overall drought

management strategy. During the drought, we would be monitoring the impact of our actions to manage demand and enhance our supply. Once the drought has ended, we will carry out the following reviews:

- A review of our response with respect to triggers and actions to understand if our triggers gave us sufficient notice to implement our demand management actions. We will also review the actual lead in times for action implementation.
- A full analysis of the effect of scaled up measures for leakage reduction and pressure management, the effect of demand restrictions as well as any environmental effects following the implementation of our drought permit. This analysis would inform both the Leakage Strategy and our subsequent Drought Plan.
- A review of our communication actions at the different stages of drought, to understand whether our actions had the desired effects, whether our communications reached their target audiences, any unexpected occurrences, aspects which worked well and aspects that might need further improvement.

We will produce a report detailing the lessons learnt review and its findings, and share it with the water industry, regulators, customers, and other stakeholders. We will integrate any recommendations into our next Drought Plan.

Once the review is completed and signed off, the Drought Event Management Group will cease to meet. Our post drought communications will include the following actions:

- Communicating with customers and all groups that we have engaged with to let them know about the lifting of water use restrictions, and the reasons why we are no longer experiencing a shortage of water.
- Thanking customers and stakeholders for their help and participation in saving water.
- Making the findings of our post drought lessons learned exercise available on our website.

6 FUTURE REVISIONS AND IMPROVEMENTS

We are continually improving our understanding of our water resources and water supply system, the environmental effects of our actions and the impact on our customers. Moreover, our industry is continually developing new methodologies and guidelines around water resource and drought management. As such, we are committed to keep improving our drought management processes and planning methodologies and reflect this in our future plans. Some of the areas we aim to develop further subsequent revision of our Drought Plan are set out below.

Consistency with our WRMP24	**For our next WRMP (WRMP24), there is a requirement to increase our levels of resilience to more extreme droughts (1 in 500 year event) without the need to implement our emergency plan. These updates will be reflected in our next Drought Plan**
Drought Plan triggers	For our WRMP24 we have developed a PyWR system model that will be used to assess our conjunctive Deployable Output. Using this model, and based on updated stochastically generated inputs, we have been working to update our groundwater trigger levels for selected return periods. These will be updated in our next Drought Plan. Further to this, we will look to carry out assessments on additional triggers based on rainfall and surface water. We will explore the use of areal rainfall data to develop SPI triggers that would be used alongside our updated groundwater triggers.
Regional Drought Group Findings	We are involved in several streams of work that are on-going, as part of the WRSE drought group. These include, but not limited to the following: • Demand savings from the implementation of TUBs and NEUBs. • Regional drought communications • 'More before 4' extreme drought actions The results for these projects will be available to use in our next round of water resource management planning, and will update the subsequent revision of the Drought Plan.