WATER RESOURCES MANAGEMENT PLAN

ANNUAL REVIEW 2023

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TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

1 EXECUTIVE SUMMARY

The Water Act 2003 places a duty on all water companies to prepare a Water Resource Management Plan (WRMP). As part of the WRMP process, it is a statutory requirement to review progress against the Plan and report it to the Secretary of State in an Annual Review.

We published our Final WRMP in November 2019 (WRMP19). This was recently updated to reflect both our current company position, and advances in industry-wide approaches to improve our data forecasts. Our revised WRMP19 (rWRMP19) was published in December 2022. This Annual Review 2023 will set out our performance in 2022-23 in comparison to our forecast positions for this year in our rWRMP19.

The combination of a low groundwater starting point and a dry spring and summer resulted in groundwater levels dropping below our Level 1 Drought Trigger on the 17th of August. This prompted the implementation of our Drought Plan. Since the developing drought event in 2022, we have produced a draft document which details the actions we took, the effectiveness of our actions, lessons learnt, and how we will use our learning going forwards. A copy of this draft document is provided in Appendix B. There have been no changes to our previously agreed Levels of Service or supply side drought permit options.

The key headlines within this Annual Review are:

- Our average customer demand met our target PCC in the rWRMP19 of 153 l/h/d. This is a significant improvement in our annual average PCC performance compared to 2021-22, when average household PCC was 6 l/h/d higher than target. We are continuing to implement our PCC recovery plan and prepare for the roll out of our smart metering programme in AMP8.

- Driven by extreme weather in the summer and winter months, we saw two periods of leakage breakouts which has caused our outturn annual average leakage to be 32.19 Ml/d, which is 7.5 Ml/d higher than the rWRMP19 target. We have since increased efforts focussing on detection and repair which has significantly improved performance and reduced leakage down to a monthly average of 26.65 Ml/d by the end of April 2023. We are still on track to meet our rWRMP19 target by the end of AMP7.

- Treatment works losses and operational use losses have increased in 2022-23 by around 8 Ml/d compared to rWRMP19 forecasts. This is due to an enhanced reservoir cleaning regime and water running to waste at sites to prevent neighbouring properties from flooding. This did not decrease resilience during the dry weather as these activities were not undertaken during dry weather conditions.

- Despite the challenges of the very dry summer in 2022, in reality we maintained a surplus in our supply demand balances of +2.77 Ml/d and +10.93 Ml/d for the annual average and critical period scenarios respectively, so the supply of water to our customers was not at risk. However, it is recognised that if Southern Water had taken the required the full 30Ml/d of bulk supplies every day of the year, then we would have been in deficit in both scenarios.

- Taking into account these factors, our rWRMP19 shows that we are no longer meeting our target headroom for a 1 in 200-year drought scenario i.e., our risk and uncertainty allowance for the supply demand balance is fully used. It means there is a slightly higher risk we'd need to introduce emergency restrictions in a severe drought in the event of an event restricting the production of treated water (DO).

Our Revised draft WRMP24 will be submitted in the coming months. The plan is our most ambitious and collaborative plan yet. Through this plan, we will become more resilient to increasingly severe drought events, at the same time as reducing our reliance and impact upon the local chalk-based environment that characterises our supply area. We are acutely aware of the need to mitigate against any risks to our security of supply and will continue to work closely with all relevant stakeholder to ensure that the implementation of our WRMP24 will provide a robust and achievable way forwards as we progress towards AMP8.

2 GENERAL

2.1 Introduction

The Water Act 2003 places a duty on all water companies to prepare a Water Resource Management Plan (WRMP). As part of the WRMP process, it is a statutory requirement to review progress against the Plan and report it to the Secretary of State in an Annual Review.

We published our Final WRMP in November 2019 (WRMP19)[1]. This was recently updated to reflect both our current company position, and advances in industry-wide approaches to improve our data forecasts. Our revised WRMP19 (rWRMP19) was published in December 2022[2] and provides the justifications, methodologies and differences between our WRMP19 and rWRMP19.

This Annual Review 2023 will set out our performance in 2022-23 in comparison to our forecast positions for this year in our rWRMP19.

Our draft WRMP24 (dWRMP24) was published for consultation in October 2022 which we are currently revising for submission to Defra later this year. The next Annual Review (2024) will compare our outturn values with this new plan, rather than the rWRMP19.

Updated guidance published in April 2023[3] sets out the content of the Annual Review and the submission procedure. In accordance with this guidance, this review will:

- Highlight any changes that have been made since the development of rWRMP19,
- Report on the actions that the Environment Agency and Defra asked us to work on after the publication of our rWRMP19
- Report on the implementation of the Drought Plan, our ongoing programmes of works, and any changes required as a result of our lessons learnt,
- Report on progress against our forecast data for 2022-23 in our rWRMP19
- Report on the overall summary of the supply-demand situation; and
- Provide a forward look for our WRMP programme.

Furthermore, following the submission of our previous Annual Review 2022[4] we received feedback from the Environment Agency stating their expectations for the Annual Review 2023. As a result, this report will specifically provide:

- Commentary to ensure our customers understand their in-year security of supply risk and level of service (sections 2.4 and 7.1)
- What steps are being taken to ensure there is a supply demand balance surplus under a 1 in 200-year level of drought resilience (sections 7.1 and 8)
- The steps we have implemented over the last year to reduce PCC and leakage and increase metering to the planned levels set out in our rWRMP19 (sections 5.2.1 and 5.3)
- An update on our smart meter trial and how this will support/enhance the delivery of our AMP7 targets (section 5.2.1.2)
- An update on the progress with our supply side schemes (section 4.5)

[1] https://www.portsmouthwater.co.uk/wp-content/uploads/2019/11/Final-Water-Resources-Management-Plan-2019.pdf
[2] https://www.portsmouthwater.co.uk/wp-content/uploads/2023/01/Portsmouth-Water_rWRMP19_Dec_2022.pdf
[3] Water resources management plan annual review and annual data return, Guidance for water companies in England and Wales. Developed by the Environment Agency and Natural Resource Wales (April 2023)
[4] https://www.portsmouthwater.co.uk/wp-content/uploads/2023/ 01/Portsmouth-Water-WRMP-Annual-Review-June-2022_updated-Dec-2022.pdf

Our annual return data is used to confirm our Supply Demand Balance Index (SDBI), an Environmental Performance Assessment measure, previously called Security of Supply Index (SOSI). Our annual review and annual returns data will also be used in future to monitor our progress in delivering the National Framework measures for England, such as reductions in per capita consumption, leakage and increases in water supply.

2.2 Supply Area

Portsmouth Water is a long established, community focussed water company, with a strong history of industry leading customer service.

Throughout the last plan period, we have had a changing role in the supply of water to the Southeast. We already support our neighbouring water company, Southern Water, with bulk supplies of wholesome water so that they can reduce their abstractions on world renowned chalk rivers. Additionally, we are developing Havant Thicket Winter storage reservoir in collaboration with Southern Water, which is due for completion early 2029, to enable a further bulk supply into their Hampshire zone to help further reduce abstraction from these rivers. Our WRMP24 will explore the further uses of the reservoir to maximise its potential as a major water donor to support the further reduction of abstractions across the region.

We are committed to supporting our customers in using less water, and we work hard to reduce leaks in our own network. The summer of 2022 proved challenging as we experienced a developing drought, but we are proud that we maintained supply to our customers without the use of mandatory restrictions and continued to protect the environment throughout the course of the year.

Figure 1: Portsmouth Water supply area

The company operates as one water resource zone (Figure 1). There have been no changes to the company area or WRZ configurations since rWRMP19. However, some customers on new housing estates are supplied by New Appointments and Variation companies (NAVs), who provide their own water service to their customers.

2.3 Water Resource Position

We abstract the majority of our water from groundwater sources and therefore groundwater levels are the best indicator of the water available from the chalk aquifer. We monitor groundwater levels on a daily basis, comparing them to the 30-year long term average (LTA) and extrapolating the likelihood of crossing our Drought Trigger threshold. The groundwater situation in our indicator well at Idsworth for 2022/23 is shown in Figure 2.

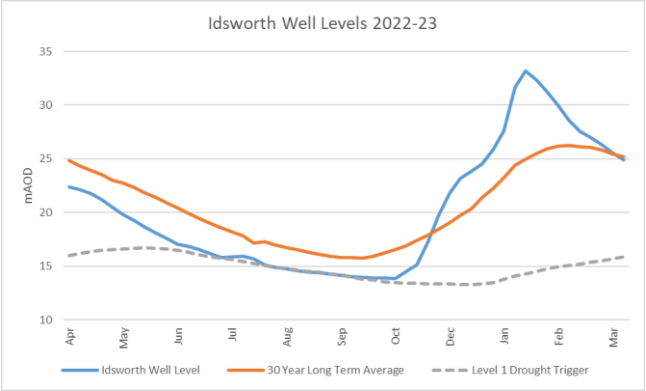

Figure 2: Groundwater Levels against LTA and Drought Trigger levels

As the graph shows, we started the year with below average groundwater levels as a result of the preceding relatively dry winter which didn't fully recharge the aquifers in time for the start of the 2022-23.

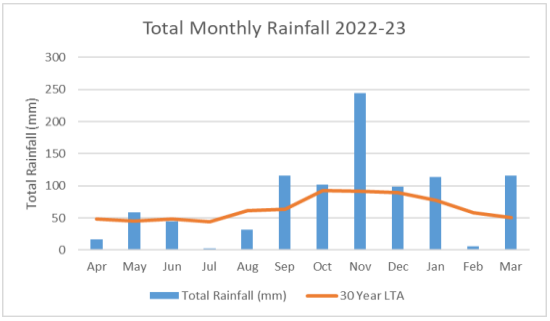

Figure 3: Total Monthly Rainfall

With the exception of May, rainfall stayed below average over the summer. This was combined with periods of high temperatures with the UK as a whole experiencing its fourth warmest summer on record. Total monthly rainfall at Havant is shown in Figure 3.

The combination of a low groundwater starting point and a dry spring and summer resulted in groundwater levels dropping below our Level 1 Drought Trigger on the 17th of August. This prompted the implementation of our Drought Plan, which is described further in section 2.4.

After an unseasonably wet Autumn and plenty of rainfall in the early winter months, our groundwater levels rose well above average levels, and even after an exceptionally dry February, we started 2023-24 with average groundwater levels.

2.4 Levels of Service and Drought Planning

When dry weather conditions persist and cause groundwater levels to pass predefined trigger levels, we implement our Drought Plan. Continued dry weather would result in the drought plan requiring us to implement a steady escalation of restrictions on household and commercial users of water, designed to reduce their demand for water. After initial appeals for voluntary restraint, enforced restrictions range from Temporary Use Bans (TUBS) such as bans on the use of hosepipes to Non-Essential Use Bans (NEUBs) that may start to impact business in the local area. If the drought deepens further, we would apply for a Drought Permit which would allow us to take additional water from our North Arundel source.

As a last resort, we may also ask for emergency drought orders to allow the use of standpipes and rota cuts to further reduce the demand for water. These actions are part of the Emergency Plan and not the Drought Plan.

We have agreed with customers the frequency at which demand restrictions might need to be implemented. The agreed Levels of Service (LoS) are:

- TUBs to be implemented no more frequently that in a 1 in 20-year drought event
- NEUBs to be implemented no more frequently that in a 1 in 80-year drought event

- Emergency Drought Orders to be implemented no more frequently than in a 1in 200-year drought event

As we did in the summer of 2022, in advance of the possible implementation of TuBs we would engage with our customers to make them aware of the implications of the dry weather episode on the water resource situation for the company and ask them to reduce their water consumption voluntarily. In approaching customers, we use the full range of media types to efficiently reach as many sections of our customer base as possible.

Our new 2022 drought plan was published in April 2022, which complies with the latest drought planning guidance from regulators (Defra and Environment Agency, December 2020). The structure and tone of the plan has changed to meet the evolving requirements, including the need for plans to be clearer and easier for customers and other stakeholders to follow. Since the developing drought event in 2022, we are producing a review document which details the actions we took, the effectiveness of our actions, lessons learnt, and how we will use our learning going forwards. A draft copy of this document is provided in Appendix B. Please note that the final version is intended to be published alongside our Revised Draft WRMP24 (RdWRMP24) and is therefore subject to change with any new information provided between now and that publishing date.

There have been no changes to our previously agreed LoS or supply side drought permit options. However, we have on-going programmes of work that were agreed with the Environment Agency and Natural England as part our permission to publish our Drought Plan. An update to those are provided in the following sections.

2.4.1 Ongoing drought plan programme of works

We have an ongoing programme of work that was agreed with the Environment Agency and Natural England as part of our permission to publish the current Drought Plan. This section provides an update on those projects.

2.4.1.1 Drought Plan addendum on Southern Water revised trigger levels

The final draft report for the 'Drought Trigger review for the Test and Itchen'[5] was completed in February 2022. A further joint assessment and validation report[6] was produced at the request of the Environment Agency which concluded that the changes to the SWS drought trigger levels would not pose a risk to our current 1 in 20-year LoS for TuBs. The EA have subsequently provided comments which are to be addressed in further work which will be carried out jointly with Southern Water using our combined Pywr model for Hampshire. Once this work is finalised it will form an addendum to our Drought Plan.

2.4.1.2 Environmental Assessments

We included the consideration of the North Arundel drought permit within the Strategic Environmental Assessment (SEA) for our WRMP19. This identified uncertain potentially negative impacts on biodiversity, water quality and quantity due to the likely exacerbation of the effects of drought on the local water system. We submitted an updated SEA[7] alongside our dWRMP24 which concluded that there was a medium impact risk of Water Framework Directive deterioration.

The assessment suggested that in the event of a drought event where both Southern Water and Portsmouth Water emergency drought groundwater options were operational, an in-combination effect would occur. This could lead to temporary reduction in groundwater levels, itself leading to potential changes in the water balance and surface water dependant status element. The environmental assessments are on-going as we work towards our RdWRMP24, which will be provided in the coming months. Once the rdWRMP24 environmental assessments are finalised we will use these to update the appendix for the Drought Plan.

[5] Drought Trigger review for Test and Itchen, Final Draft Report, Atkins 24th February 2022.
[6] Drought Plan 2022 River Test and River Itchen Drought Triggers, Southern Water Technical Note
[7] Portsmouth-WRMP24-SEA-NTS-v1.1.pdf (portsmouthwater.co.uk)

3 WATER RESOURCE PLANNING

In this section we discuss the feedback we received from our WRMP Annual Review 2020, which reported on our 2019-20 performance, and the resulting work.

3.1 4.1 Background

Our WRMP19 sets out how we plan to maintain our supply demand balance up to a 1 in 200-year drought scenario between 2020 and 2045. Our Annual Review 2020 highlighted that in 2019-20, we had not reached certain WRMP19 targets (PCC), but that we over performed significantly on other WRMP19 targets (leakage). In addition to this, our proposed AMP7 supply schemes had been undergoing environmental assessments and further analysis which meant that we needed to adjust the implementation schedule of these schemes.

Feedback from Defra, Ofwat and the Environment Agency on the annual review 2020 was centred around concerns that the revised delivery schedule of schemes and the relatively high PCC could present a risk to our potential bulk supply commitment of an additional 9 Ml/d to Southern Water in 2024 and that our supply of water to customers may not be fully resilient up to a 1 in 200 drought event.

Our recommended action from Defra, Ofwat and the Environment Agency was to:

"keep track of the water available for bulk supplies to the region as a whole, and focus on demand management activities to minimise the risks to these proposed transfers."

Furthermore, the Environment Agency specifically stated that:

"The company should review the water available for the bulk supplies to Southern Water as given the multiple issues identified there is a risk to bulk transfer and potentially to security of supply that Portsmouth Water need to recognise, investigate and address. The company need to report progress through quarterly meetings and AR2021."

In consultation with the Environment Agency, we decided that producing a set of revised planning tables was the most appropriate way to identify whether a risk was present. By creating revised planning tables, we could fully understand if there is a security of supply risk to our own customers, and to the bulk supplies to Southern Water in each drought scenario, and if so, identify potential mitigation measures to put in place until WRMP24 is implemented in 2025.

Our rWRMP19 tables draw upon our most recent data, knowledge, and methodologies, developed through workstreams associated with our emerging dWRMP24. We believe this is the most appropriate information to use to give us an accurate view of our current position. Our rWRMP19 includes:

- Updated demand forecast, using outturn data and WRMP24 methodologies.
- Revised demand modelling to include a range of drought scenarios for calculation of baseline demand and demand option benefits.
- Re-calculation of target headroom figures to reflect uncertainty in new demand forecasts.
- Updated outage assessment, using WRMP24 methodologies.
- Updated leakage forecast, using outturn data and WRMP24 methodologies.
- Updated demand management options using current AMP7 strategies and WRMP24 forecasts.
- Updated deployable output and supply option schedule and benefits following further scheme analysis, including via our new Pywr system simulation model.
- Use of our Pywr model to define the benefits from Temporary Use Bans (TUBS) and Non-Essential Use Bans (NEUBS) during the relevant drought scenarios.

Using industry best practice techniques, this work has refined our view of the original WRMP19 'options' that were selected by us to maintain the supply-demand balance. We have captured this refinement in Table 1.

Option code	Preferred Final Plan Option name	AMP7 (2020/21-2024/25)	AMP8 (2025/26-2029/30)	Revised WRMP 2019 adjustment
CO46	Household water efficiency programme (partnering approach, home visit)	2020–21		New basket of demand side options and benefits to reflect latest WRSE Group related work streams. Including; • Revised water efficiency programme • Virtual home visits • Change of Occupier metering • Further fixed network noise loggers to reduce leakage • The targeted provision of water saving devices
CO46b	Waterwise programme	2020–21		
CO26	Subsidy to customers that purchase water efficient appliances (washing machines and dishwashers, showers and WCs)	2020–21		
CO34	Water saving devices – Retrofitting existing toilets	2020–21		
CO06a	Metering on change of occupancy – existing meter pits	2020–21		
DO04a	Fixed network of permanent noise loggers connected to telemetry – Tranche 1	2020–21		
CO40	Water saving devices – spray taps	2020–21		
CO84	Voids metering	2020–21		
CO78	Voluntary restraint and leakage action	2020–21		
CO79	Mandatory restraint	2020–21		New view on the effectiveness of mandatory restraint from Pywr modelling
CO80	Imposition of Drought Direction Restrictions (mandatory commercial restraint)	2020–21		
RO68	Source S – Drought Permit	2020–21		Completed analysis and environmental reports. Revised yield benefit following Pywr modelling.
RO21a	Source O – Maximising DO	2020–21		Delivery now expected to be 2024-25 with a revised yield benefit following a feasibility review and Pywr modelling.
RO23a	Source H – Maximising DO	2020–21		Delivered and in place for 2022-23.
RO24a	Source C– Maximising DO	2020–21		Delivery now expected to be 2024-25 with a revised yield benefit following feasibility review and Pywr modelling.
RO22a	Source J – Maximising DO	2024–25		Updated assumptions regarding yield benefit and operation following a feasibility review and Pywr modelling. No change to implementation date.
DO04b	Fixed network of permanent noise loggers connected to telemetry – Tranche 2		2025–26	New basket of demand side options and benefits to reflect latest WRSE Group related work streams. This includes universal metering from 2025-26.
CO06	Metering on Change of Occupancy – all properties		2025–26	
RO13	Havant Thicket Winter Storage Reservoir		2029–30	Revised DO based on updated designs and further Pywr modelling

Table 1:Preferred Final and Revised WRMP19 Options

It is recognised that because of this work there have been updates to our rWRMP19 relative to our Final WRMP19, and the reasons for these updates are outlined within this Annual Review report where appropriate. Following Annual Review guidance, such changes to components of the water balance and/or supply-demand balance because of better understanding are not routinely considered a 'material' change of the WRMP.

The initial development of our rWRMP19 took place as a separate piece of work to the 2021 annual report and was separately shared with stakeholders and regulators at the end of June 2021. The rWRMP19 report and accompanying tables were updated again during December 2022 and are available here: https://www.portsmouthwater.co.uk/news/publications/water-resources-planning/.

Throughout the rWRMP19 project, we have been working closely with the Environment Agency to ensure that our approach is acceptable and answers the regulators original concerns. The values in our December 2022 rWRMP19 tables now represent our most up to date position and supersede the values in our original WRMP19. Therefore, we have compared our outturn data to our rWRMP19 values.

3.2 WRMP24

We submitted our dWRMP24 in October 2022 and have since been developing our RdWRMP24 in response to the public consultation and last-minute changes to planning guidance.

When we published our rWRMP19 we used the most up-to-date data. This data was also used in our dWRMP24. Subsequent further work and implementing the additional planning guidance has meant adjustments have been made to this data for use in our RdWRMP24. Given that we will be publishing our RdWRMP24 later this year, it is not considered necessary to update our rWRMP19. Therefore, next year's Annual Review 2024 will be the first Annual Review to compare our outturn performance against our proposed RdWRMP24 targets. This approach has been agreed by the Environment Agency.

4 SUPPLY

In this section we review the elements of our balance that collectively account for our supply capability, indicated by our Water Available For Use (WAFU). WAFU is calculated using the formula: DO – Outage – Treatment works losses – Bulk Supply Exports = Total WAFU. A summary is provided in Table 2. We identify the outturn performance we have achieved from our sites against the 1 in 200-year scenario of our rWRMP19 as per the guidance for each of the components (e.g theoretical maximum of 30 Ml/d for the bulk supplies).

Dry Year Supply 2022-23 assumptions (WRMP tables reference)	Annual Average (Ml/d)		Critical Period (Ml/d)	
	rWRMP19	Outturn	rWRMP19	Outturn
Deployable Output (7FP)	213.52	213.12	264.30	262.4
Outage (10FP)	6.70	3.29	6.40	4.11
Bulk Supply Exports (6FP)	30	30	30	30
Treatment works losses (9FP)	2.40	10.15	2.40	4.60
Total Water Available for use (WAFU) (13FP)	**174.42**	**169.67 (-2.7%)**	**225.50**	**223.69 (-0.8 %)**

Table 2: Total WAFU using theoretical maximum for Bulk Supplies

As shown, our outturn WAFU is 4.75Ml/d less than our rWRMP19 WAFU during Annual Average, and 1.81Ml/d less for Critical Period.

Table 3 shows the real-world situation WAFU which uses the actual outturn bulk supply values for each of the scenarios rather than the theoretical maximum.

Dry Year Supply 2022-23 assumptions (WRMP tables reference)	Annual Average (Ml/d)		Critical Period (Ml/d)	
	rWRMP19	Outturn	rWRMP19	Outturn
Deployable Output (7FP)	213.52	213.12	264.30	262.4
Outage (10FP)	6.70	3.29	6.40	4.11
Bulk Supply Exports (6FP)	30	12.22	30	14.71
Treatment works losses (9FP)	2.40	10.15	2.40	4.60
Total Water Available for use (WAFU) (13FP)	**174.42**	**187.46 (+7.5%)**	**225.50**	**238.98 (+5.98%)**

Table 3:Total WAFU using outturn values for Bulk Supplies

As shown, in the real-world situation, our outturn WAFU is 13.04Ml/d more than our rWRMP19 WAFU during Annual Average, and 13.48Ml/d more for Critical Period.

The following sections provide detail on the various contributing components of our supply capabilities displayed in the table above and explain our outturn values.

4.1 Deployable Output

To calculate our outturn Deployable Output (DO), we adjusted the rWRMP19 DO on a site-by-site basis. As a result of this exercise, for operational availability reasons we have had to remove the DO from two sites from the DO calculation for 2022-23:

- Site D has been through an extensive maintenance programme and new equipment is installed on site. However, to protect drinking water safety standards we still need to obtain water quality samples to

access the raw water to confirm the correct classification. The source will be returned to service, but in the meantime, it has been taken off the DO as per the guidance. Site D DO in the rWRMP19 is 0.8Ml/d and 1.5Ml/d for Annual Average and Critical Period respectively.

- Site E has experienced long term outages due to water quality issues since 2017, so has been removed for the outturn DO for 2022-23. Site E DO in the rWRMP19 is 0.4Ml/d for both Annual Average and Critical Period.

Table 4 below shows the total DO reductions from these two sites and how that results in our outturn DO for 2022-23.

Outage allowance scenario	rWRMP19 (Ml/d)	Total DO reductions (Ml/d)	Outturn DO (Ml/d)	% change of DO
DYAA	213.52	0.4	**213.12**	-0.2%
DYCP	264.3	1.9	**262.4**	-0.7%

Table 4: Outturn Deployable Output for 2022-23

4.1.1 Deployable Output in WRMP24

The baseline DO values for our rWRMP19 and dWRMP24 are the same and were derived using our standalone Pywr water resources model. For the RdWRMP24 we have recalculated deployable outputs and climate change impacts using our new Pywr model for Hampshire, which was developed with Southern Water and contains an improved representation of the river Itchen.

For our Annual Review 2023-24 we are expecting to report our outturn DO against the rdWRM24 DO instead of the rWRMP19 DO.

4.2 Outage

In the WRMP guidance, outturn Outage falls into three categories:

- Less than 3 months and which has not been undertaken for maintenance or other planned reasons,
- Less than 6 months and should have an action plan to recover the losses,
- Longer than 6 months but the mitigation plan has been agreed by regulators.

Adjustment in the DO values of two sites were required for our outturn outage values in 2022-23:

- Site H was brought back online in 2022-23 following a long-term outage resulting from water quality concerns. However, the site was offline for 96 days of the reporting year and so 26% (96/365) of the sites total DO has been included as outage. This equates to the site outturn outage of 1.89Ml/d for the Annual Average scenario and 2.31Ml/d for the Critical Period scenario.

- Site I has been offline for the full reporting year due to a positive cryptosporidium detection. The site is awaiting the installation of UV treatment before being returned to service in AMP8. The plan has been agreed by the DWI and so is included as outage (rather than DO reduction) in accordance with the guidance. Site I outturn outage is therefore 1.4Ml/d for the Annual Average scenario and 1.8Ml/d for the Critical Period scenario.

Table 5 shows the outturn outage compared to that in the rWRMP19. Our Annual Average performance was better than forecast in Annual Average whereas we experienced more outage in a Critical Period scenario.

Outage allowance scenario	rWRMP19	Outturn Outage
	Value in Ml/d	Value in Ml/d
DY Annual Aaverage	6.7	3.29
DY Critical Period	6.4	4.11

Table 5: Outturn Outage for 2022-23

4.2.1 Managing outage

We understand the need to manage outage carefully as it is a key component of our supply demand balance. Following the experiences of the developing drought in 2022, we are in the process of employing additional staff in the production team which will improve response times for fixing any issues at our sites. The team are also investigating the possibilities of improving resilience at certain sites through the installation additional pumps to provide further back up in the case of equipment failure.

A major threat to outage at our treatment works is from oil spills. Our 2020-25 Business Plan therefore included £2.4m to address the risk and improve resilience at peak demand.

As part of this investment, we participate in three Catchment Partnerships which include initiatives to reduce domestic oil pollution for example through the offer of subsidised surveys of old oil tanks and/or subsidised replacement of oil tanks with plastic double bunded tanks. We also installed VOC monitors at all sites at risk from pollution, to be able to better monitor the pollution plume and make an informed decision on when the site can be started up again. This is likely to reduce the outage durations of any future pollution events related to oil spills. We have had no outages in 2022-23 due to oil pollution incidents.

Case study:

Last June, we reported on an exciting local trial to prevent pollution from domestic heating oil in Hampshire and West Sussex. Run as a partnership between the EA, Portsmouth Water and OFTEC (trade organisation for UK oil heating industry), they used messaging based on customer behaviours to urge households to check and replace failing domestic heating oil tanks. The full toolkit[8] is now available for water industry professionals to produce locally. Since February 2023 we have also increased awareness of the campaign through nudge mailshots, technician advocacy and parish council coverage. This has doubled the customer response rate and resulted in a 150% increase in inspection conversion, and 120% increase in tank replacement conversion. The DWI's 'Drinking Water 2020: Chief inspectors report for drinking water in England'[9](page 116) commended Portsmouth Water, Defra and the EA for our campaign.

4.3 Bulk Supplies

We currently operate two bulk supplies to Southern Water. One is feeding east into their Sussex Zone, with a capacity of 15Ml/d. This supply is made on a 'best endeavours' basis, but with a constant 'sweetening flow' of 1 Ml/d required at all times. Our second bulk supply to Southern Water is from our Source A, sending water west into their Hampshire Zones. It is also up to 15 Ml/d with water volumes guaranteed through a reservation basis, managed between our respective company production teams.

In our WRMP19 we undertook to investigate the possibility of increasing the capability of one of our sites to support an increase in the volume of the western bulk supply, originally planning to supply Southern Water with an additional 9Ml/d of treated from 2024 onwards. Following the completion of a comprehensive investigation we have reluctantly concluded that there is insufficient opportunity to develop the site as we

[8] Local domestic heating oil campaign - Oil Care Company
[9] The Chief Inspector's report for drinking water in England (dwi.gov.uk)

intended and therefore to increase the water available. We have therefore notified Southern Water that we will be unable to deliver the extra bulk supply. Details on this investigation are provided in section 4.5.1.1.

4.3.1 Outturn bulk supplies

Figure 4 shows the total amount of potable water exported to Southern Water this year, compared to the previous two years. This year's annual average is 12.22 Ml/d. Despite levels reaching a maximum of 23.7Ml/d in September, the critical period amount corresponds with the DI peak week in July. The critical period bulk supply amount is therefore 14.71 Ml/d.

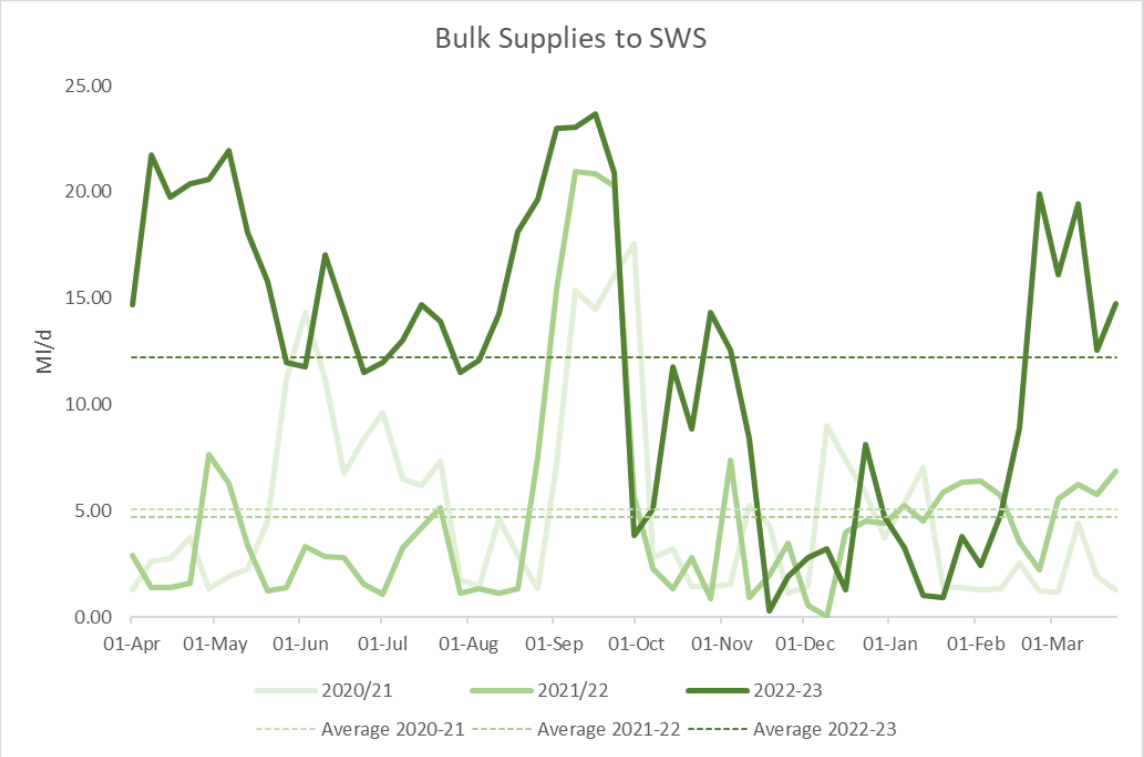

Figure 4: Outturn Bulk Supplies to Southern Water 2022-23

The average yearly volume has increased significantly in comparison to the previous two years due to the increased support required by Southern Water to maintain supplies during a year of developing drought. The peak in early 2023 was due to a period when Southern Water's Southern Hampshire zone was under pressure following a significant outage at one of their sites. We therefore increased our bulk supplies to provide as much resilience as possible to communities across Southampton, Eastleigh and Winchester.

4.4 Treatment works losses and operational use

The values for 'Treatment works losses and operational use' indicate the volume of losses between the point of abstraction and the point at which water enters the supply network. These are otherwise known as process losses and can include water used for augmentation, run-to-waste, and the cleaning of treatment works and reservoirs. In the rWRMP19 and WRMP24 we calculated the allowance for these losses to be 2.4 Ml/d.

To calculate our outturn losses, we subtract the bulk supplies and distribution input values from the total raw water abstracted.

4.4.1 Annual Average Process Losses

Table 6 below shows the numbers used to derive our outturn annual average value for 2022-23.

Losses	Annual average Ml/d
Raw water abstracted	202.01
Bulk Supplies	12.22
Distribution Input	179.64
Treatment works losses and operational use	**10.15**

Table 6: Outturn treatment works losses and operational use (Annual Average calculation)

This value can be attributed to several factors including:

Augmentation scheme.

- The dry summer required us to run our augmentation scheme on the River Ems from Site U between the 18th of July and 22nd of November 2022 (127 days) at 2.2Ml/d, which equates to 0.77Ml/d over an annual average. Water used for augmentation is abstracted from the environment but never enters supply and therefore is accounted for as a process loss.

Treatment works losses.

- This refers to the losses at the works based on what is required to treat both surface and groundwater before supply. In general, complex treatment at surface water works requires a higher water usage whereas groundwater treatment losses are often treated as negligible. A combined value for these losses is 2.4 Ml/d as per the rWRMP19

Running sites to waste.

- For various operational reasons we sometimes need to abstract water from a site but are unable to put that water into supply. That water is returned to the environment and the site is said to be “running to waste”. In 2022-23 this happened primarily at Sites Q and T when turbidity levels in the raw water meant we were unable to treat that water safely. We chose to run those sites to waste at times to prevent neighbouring properties from flooding from naturally high groundwater levels. Had we not run the sites in this way we believe several local properties would have been at risk from groundwater flooding.

Reservoir cleaning regime.

- To ensure the supply of wholesome water to our customers, we run a cleaning programme for our service reservoirs which is where treated water is held in our network. The cleaning regime requires a flushing operation before returning a reservoir to supply, where the reservoir is filled and emptied with potable water, before being brought back online. Nine reservoirs were cleaned in 2022-23, which a collective volume of 123.69 Ml in total, which is a good estimate of the total volume of water used.

Collectively, these activities explain the difference between annual average projected and actual levels of treatment and operational losses.

4.4.2 Critical Period Process Losses

Using the same calculation for process losses for the critical period values as we did for annual average, we obtain a negative value for the process losses: Raw water abstracted (224.26) – Bulk Supplies (14.71) – DI (222.24) = Losses (-12.69 Ml/d)

This indicates that we used more water than we abstracted when averaged across the critical period week[10]. As the system is designed to do, supply was maintained using our service reservoir storage reserves. The method of calculation used for the annual average 'losses' value does not work for critical period as it is calculated over too small a time period and is heavily influenced by the use of service reservoir storage.

Our service reservoir cleaning programme actively avoids work in the summer high demand season, and during the critical period in July we did not have any sites running to waste. Therefore, the critical period process losses include only the augmentation scheme (2.2Ml/d) and treatment works losses (2.4Ml/d) which provide a total critical period process losses value of 4.6 Ml/d.

Table 7 below shows the components for each of the losses for both annual average and critical period.

Losses	Annual Average (Ml/d)	Critical period (Ml/d)
Augmentation scheme	0.77	2.2
Treatment works losses	2.4	2.4
Other process losses	6.98	0
Treatment works losses and operational use	**10.15**	**4.6**

Table 7: Outturn Treatment Works Losses and Operational Use Components (Annual Average and Critical Period)

Going forwards, we plan to update our process for obtaining the outturn process loss values by taking a bottom-up approach. This will involve an increased level of data collection to accurately quantify the losses according to specific category.

4.5 rWRMP19 Supply-Side Options Update

In this section we discuss the progress made in delivering the enhanced DO schemes identified in the rWRMP19. Table 8 below shows which schemes are included and their benefit in a 1 in 200-year drought scenario. Note that the table excludes the Source H scheme, which was completed at the start of 2022-23.

Supply Side Scheme	Assumed DO Benefit (Annual Average Ml/d	Assumed DO Benefit (Critical Period) Ml/d	Implementation date
AMP7 Groundwater schemes total benefit (maximising DO at Sources O, C & J)	13.3	10.5	2024–25
Drought Permit at Source S	3.6	4.5	2020-21
TUBS/NEUBS	16.6	21.5	N/A
Havant Thicket Winter Storage Reservoir	21.1	21.3	2029-30

Table 8: Supply-Side Options Benefit and Implementation Dates

The AMP7 groundwater schemes and the Havant Thicket Winter Storage Reservoir do not provide DO benefit until after this reporting year and so they do not impact on our outturn SDB for this reporting year. However, the benefits of the drought permit at Source S and TUBS/NEUBs are incorporated within our outturn SDB.

The following sections outline progress with schemes.

[10] Our critical period (peak week) refers to the week with the maximum DI, which in 2022-23 was between the 18th-24th July.

4.5.1 Maximising DO at Sources O, C, H and J

4.5.1.1 Source J

This scheme intended to provide resilience to supplies to facilitate a new 9 Ml/d bulk transfer to Southern Water from Source A in 2024-25. The scheme had originally been intended as a straightforward increase in abstraction capability designed to allow Source J to increase output by 12.5 Ml/d, closer to its licensed limit of 22.73Ml/d under drought conditions.

We completed an initial desk study in May 2020, followed by further desk studies, groundwater modelling and a site visit between January and March 2021. Through this programme of work, we were able to demonstrate that there is no long-term average risk to the Chalk aquifer, as the increased abstraction would only occur in severe drought.

Six sites were targeted for investigation, although we could only achieve landowner consent for investigation at three sites. We completed the drilling and testing of three pilot boreholes (one at each site) during 2022. The testing indicated that the yield of the boreholes was considerably less than the existing holes and insufficient both in quantity and quality to contribute to a bulk supply.

In March 2023 we concluded our investigation and formally wrote to Southern Water to inform them of the results. We have now removed the Source J enhancement and 9 Ml/d bulk supply from the joint modelling being undertaken by Portsmouth Water, Southern Water and other WRSE companies to derive our RdWRMP24.

4.5.1.2 Source O

When groundwater levels drop below the adit level at Source O, turbidity issues have been experienced. This scheme aimed to mitigate that impact and therefore provide an additional resource in severe to extreme drought.

In November 2020 we commenced our 'Deployable Output Recovery Scheme' project (AECOM, 2021). The objective of this was to determine the maximum 1 in 200-year deployable output from our Sources O, H and C, utilising the current assets and treatment processes ensuring regulatory and process compliance. The project was completed by AECOM in March 2021 giving us a clearer understanding of what each of the schemes would achieve in a 1 in 200-year drought event.

During 2022, concerns have been raised because of land-use related water quality risks at this site (turbidity and cryptosporidium in particular). We have also identified this site as being higher priority for Water Industry National Environment Programme (WINEP) investigation and options appraisal because of the new Environment Agency 'environmental destination' and 'licence capping' policies, and therefore the site is at higher risk of future sustainability reductions (i.e. reductions in the licensed amount that we can abstract).

For the above reasons we are now pursuing an alternative scheme at Source L, which forms part of a wider planned WTW upgrade project. We believe this site is at lower risk of sustainability reductions and has reduced water quality concerns. The scheme seeks to improve the output of the source under lower groundwater level conditions; it is currently constrained by operational pump capacity.

Initial Pywr modelling in 2022 indicated that the scheme would provide at least as much Deployable Output benefit as the Source O scheme. We have re-confirmed this in early 2023 using the new Hampshire Pywr model (developed with Southern Water), which includes an improved representation of the river Itchen. The benefit in Ml/d has been included within the data set supporting our RdWRMP24. We are currently reviewing the detailed design and costs for the Source L WTW upgrade project and expect to deliver the scheme in 2024-25.

4.5.1.3 Source C

Air and turbidity issues are experienced when running the larger borehole pumps at Source C; this scheme was to mitigate that impact and therefore provide greater peak outputs in a drought event.

As with Source O, Source C was part of the 'Deployable Output Recovery Scheme' project (AECOM, 2021) and the benefits in Ml/d have been modelled in Pywr. The benefit has been included within the data set supporting our RdWRMP24.

Progress on this scheme was hampered by the 2022 dry weather and high demands, as we needed to maintain reliable source outputs. Undertaking works to improve the output of the Source might have compromised this reliability.

In spring 2023 we undertook high velocity flushing of boreholes 1 and 3 to clear turbidity which was completed in June. We had to drain one of our service reservoirs to facilitate this testing. We have ordered variable speed drives for the existing pumps which should be operational by October 2023. We may change the pumps in due course to further optimise the efficiency and output.

4.5.1.4 Source H

Turbidity issues had been experienced when running Source H at higher flows. This scheme was to mitigate that impact and therefore provide additional deployable output across a range of drought scenarios. As with Source O, the Source H was part of the 'Deployable Output Recovery Scheme' project (AECOM, 2021).

In the 2021 Annual Review Source H was a long-term outage site (water quality concerns) with a plan to bring the site back online. The improvements were made to this source (UV was installed) and abstraction re-commenced in 2022-23 i.e. the scheme has been completed. The benefits are included in the baseline Deployable Output for our supply area, as modelled in Pywr, and incorporated within our rWRMP19, dWRMP24 and RdWRMP24 data sets.

It is noted there were still some residual outage issues at Source H during 2022-23. Significant time has been invested in improving the reliability of Source H, but this was hampered by damage to a larger diameter water main linked to Source H; the damage was caused by increased overburden within a field used for agricultural use.

4.5.1.5 Drought Permit at Source S

Source S is our drought permit source, which was estimated to provide 8.5 Ml/d benefit to the DYAA and DYCP scenarios in droughts equivalent to, or worse than, a 1 in 125-year event. The nature of the option remains unchanged from our Final WRMP19. However, we have undertaken further work to demonstrate:

- that the source has operated at rates close to those required in the past.
- there is sufficient time to mobilise temporary treatment infrastructure as a drought develops.
- the environmental impact of the drought permit and the necessary monitoring and mitigation.

Furthermore, we have used our Pywr model to check for constraints within our supply network. The results indicate that Source S permit may only provide a benefit of up to 4.5 Ml/d under the DYAA and DYCP scenario in droughts equivalent to, or worse than, a 1 in 125-year event.

This is because we cannot fully transfer water from the Source S permit to the parts of our Water Resource Zone where this water is most needed. The identification of this restriction will lead to new network options being developed for WRMP29. We have used the Pywr modelled benefits within our rWRMP19 tables and the final supply demand balance.

We are working closely with Southern Water on the environmental monitoring to maximise opportunities for joint efficiencies with a source they operate nearby. We have also provided the reports and progress updates to the Environment Agency through our regular meetings.

Further information is available within our final 2022 Drought Plan published here: https://www.portsmouthwater.co.uk/news/publications/water-resources-planning/

Since the rWRMP19, it has been proposed that Source S forms part of a joint WINEP scheme with Southern Water to restore Arundel Park SSSI to 'favourable' condition. Natural England have noted that there is currently insufficient evidence to exclude a hydrogeological link between the SSSI and the chalk groundwater abstractions and whether they are having an impact on the designated features. The investigation is expected to be delivered in AMP8 and may affect our assumptions for the next drought plan and water resource management plan (WRMP29).

4.5.1.6 TUBs/NEUBs

Our Drought Plan describes how we use Temporary Use Bans (TUBs) and Non-Essential Use Bans (NEUBs) to lower the demand for water and conserve supplies as a drought develops. We used the regional Pywr simulation model to identify the supply benefit of TUBs and NEUBs. Our rWRMP19 includes this benefit as a supply side option in line with our levels of service and regulator guidance.

Following the events of last year, a project was undertaken by UKWIR 'Review of 2022 Drought Demand Management Measures'. The report attempted to evaluate the impact that demand saving measures had across the water industry and to standardise data provided by water companies to generate a company level metric for drought demand management measures, specifically TUBs. However, given that we did not introduce TuBs and we also have a lower meter penetration rate than other water companies which could influence the benefits seen, the findings are not directly comparable, and we deem our option benefits within the rWRMP19 appropriate.

4.5.1.7 Havant Thicket Winter Storage Reservoir

Havant Thicket Winter Storage Reservoir is a significant construction project being undertaken as a collaboration between Portsmouth Water and Southern Water. It will provide resilient water supplies to the region, supporting reduced abstraction on chalk rivers. The project has an overall biodiversity net gain and will offer a new community leisure facility for the area.

Under the current, approved plans for Havant Thicket Reservoir, under drought or emergency conditions, water from the reservoir will be piped to Portsmouth Water's Treatment Works, be treated to drinking water standards and used to supply some of our customers in Hampshire. This would free up water to the west of our supply area which we would share with Southern Water, without impacting Portsmouth Water security of supply.

Construction of the reservoir has commenced, and the implementation date of this option (2029-30) has not changed. We are therefore due to achieve the target date for DO realisation as per the rWRMP19.

Figure 5: Illustration of Havant Thicket Winter Storage Reservoir

4.5.1.8 Water Resource Management Plan 2024

Since rWRMP19 and dWRMP24 we have undertaken further modelling using our new joint Hampshire Pywr model (with Southern Water) to re-calculate the baseline DO, climate change impacts and WRMP option benefits. This new data has been used to inform our RdWRMP24, which is due to be submitted at the end of August 2023. We expect that next year's annual review (WRMP AR24) will be compared against the new data set instead of that within our rWRMP19 and dWRMP24.

Following on from the AMP7 scheme progress described above and the latest Pywr modelling, we are:

- Removing the Source J benefit and associated bulk supply from the RdWRMP24; and
- Introducing a benefit from the new Source L scheme, which replaces the AMP7 Source O scheme.
- Revising the benefits of Havant Thicket, Source S drought permit, TUBS, NEUBs and AMP7 Source C scheme.

Through our WRMP24 work, we have also identified the need for additional options for new sources of water to protect chalk stream habitats. We have already started work on our unconstrained options list for WRMP29 and are in the very early stages of looking into options including the relocation of abstraction points downstream, desalination, water recycling, opportunities for aquifer recharge and possible new reservoir sites. Before these options are considered in WRMP29, the preferred option is a water recycling scheme involving the Havant Thicket reservoir. Under this recycling scheme, more water would be available in the reservoir, and Southern Water would be able to transfer water directly to its Water Supply Works in Hampshire, rather than abstracting more from the River Test and River Itchen. Our Statement of Response (SoR) and RdWRMP24 will provide an appendix giving further details on this water recycling option.

4.6 Other potential impacts on supply

In this section we set out how any other company programmes may impact our supply in the future, including Drinking Water Inspectorate (DWI) Notices and Water Industry National Environment Programme (WINEP) schemes.

4.6.1 Drinking Water Inspectorate Notices

The company currently have 10 live Drinking Water Inspectorate (DWI)s Notices, with a further two complete and awaiting closure following submission of the final reports. These Notices have been served on the company's management and training practices, catchment and abstraction risk assessment procedures, and on treatment works for parameters including cryptosporidium, metals, and risks to disinfection. A team of specialists has been established to deliver the programme of works developed to meet the requirements of the Notices. This programme includes upgrading treatment works, increasing water quality monitoring, reviewing incoming risks to water quality and the controls available, updating documentation and procedures, and increasing structured training across the business.

A small number of notices require planned shutdown of treatment works to undertake remedial works. These planned shutdowns will be planned to take place outside peak demand periods and will therefore have limited impact on resilience to supply from a WRMP perspective. However, if any parameters are detected above permissible limits at any site across Portsmouth Water's supply system, this could lead to a temporary impact on available deployable output. We will proactively monitor these activities so that we reduce any losses to a minimum whilst ensuring the safety of supply.

4.6.2 WINEP Schemes

Portsmouth Water's area of supply includes numerous protected rivers, harbours and coastlines, highlighted in Figure 6.

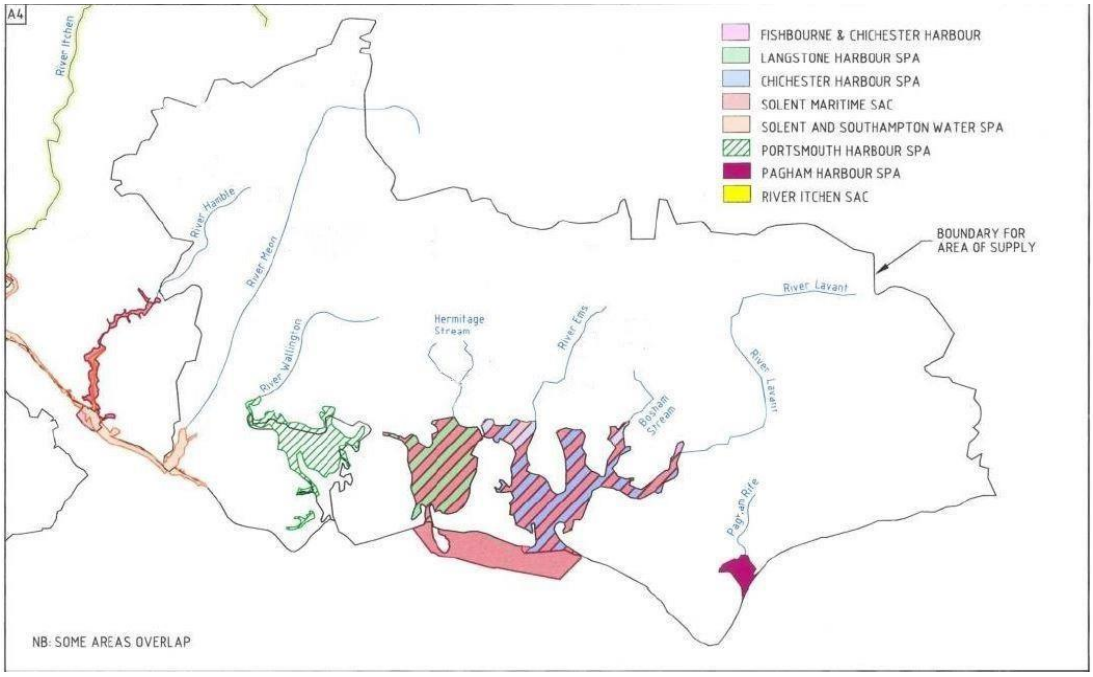

Figure 6: Protected areas within Portsmouth Water's area of supply

We have compiled will all previous sustainability reductions and have voluntarily reduced a number of abstraction licences in the past. In this section we set out which activities were included in our WINEP for AMP7 and our progress against our delivery targets.

In 2018, the Environment Agency set out which activities were to be included in our WINEP3 which included three water resource schemes to be undertaken during AMP7. We have outlined them in the following sections.

4.6.2.1 Scheme 1; Source F WFD No Deterioration

This WINEP investigation is to investigate and undertake options appraisal for preventing deterioration of ecological status from flow pressures in the two waterbodies identified by the EA as being impacted by abstraction from our Source F. In June 2020 we appointed a consultant, Wood, to undertake this WFD No Deterioration investigation on our behalf. An initial project was completed which included a summary of previous investigations, a review of impacts of abstraction in the Meon catchment, a review of ecological data, and an assessment of the predicted future abstraction growth from the site.

However, during 2021-22, the focus on the Source F WINEP study shifted to a review of the Meon catchment as a whole, and then to a holistic (but preliminary) review of licences across the whole Portsmouth Water supply area. This allowed us to estimate the uncertainty associated with the environmental ambition and emerging licence capping scenarios promoted by the Environment Agency. These estimates were used within the WRSE regional planning processes and strongly influenced our dWRMP24.

In February 2023, AECOM produced our Phase 1 report for the Meon Valley Investigations[11]. An extended holistic analysis of the potential for growth has been completed where existing and planned bulk supplies to Southern Water are considered. Increased demand would be mitigated by demand management interventions and leakage reduction in AMP7 and AMP8, but we would also need to increase abstraction from the River Itchen at Source A as this is the only source that can provide the bulk supply due to network constraints. An uplift in the rate of groundwater abstraction (including at Source F) would not be required and therefore the growth factor for Source F in AMP7 and AMP8 would be less than one.

[11] Meon Valley Investigations, Phase 1 report, AECOM, 28 February 2023

Despite this conclusion, we committed to report on the combined levels of abstraction at Sources F and H within our future annual reviews to identify how this compares with the recent actual 2010 to 2015 annual average abstraction.

It was proposed that the AMP7 Source F investigation is closed so that a holistic assessment of abstraction impacts and best value options can be undertaken in AMP8. This has been agreed by the Environment Agency. In the meantime, the augmentation condition added to the Source F licence in 2015 provides low flow mitigation and the on-going Wessex Rivers Trust / Southern Water compensation works on the river Meon (for the River Itchen SAC) will provide greater ecological resilience to the downstream catchment.

4.6.2.1.1 Source F No Deterioration Analysis

Table 9 below shows the 2022-23 abstraction rates for Sources F and H combined and compares it against the recent actual abstraction rate (2010-2015) as stated in the AECOM (Feb 2023) report.

Source F Abstraction	7.88 Ml/d
Source H Abstraction	4.46 Ml/d
Combined Abstraction 2022-23	**12.34 Ml/d**
Recent Actual (2010-2015)	11.06 Ml/d

Table 9: Source F No Deterioration Analysis

In the reporting year we abstracted an annual average of 1.28 Ml/d more than the recent actual. The graph below shows how the combined abstraction of Sources F and H have changed throughout AMP7.

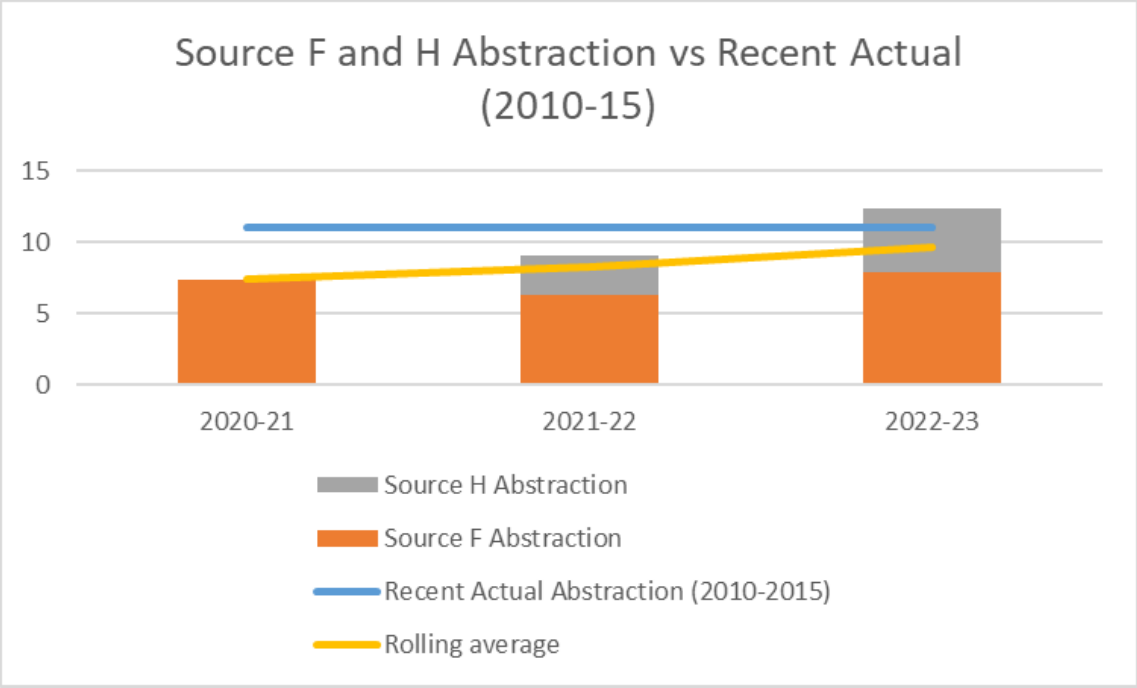

Figure 7: Sources F and H abstraction (2022-23) against Recent Actual (2010-15)

Although we have abstracted over the recent actual in 2022-23, the rolling average over AMP7 is still below that value. This reporting year saw a very high level of source utilisation due to the levels of demand over the summer which would not be considered 'normal'. It is therefore not anticipated that these abstraction levels would continue. We will nevertheless continue to monitor the abstraction from these sources and ensure that the combined abstraction does not increase above the recent actual rate of 11.06 Ml/d.

4.6.2.2 Schemes 2 & 3; River Itchen CSMG & River Itchen Salmon Action Plan

Our 2022 Annual Review provides detail on the conclusion of the 'River Itchen CSMG flow target and Salmon Five Point Approach WINEP investigations' from April 2022. The WINEP scheme has now progressed into AMP8 for a joint options appraisal with Southern Water and South East Water.

5 DEMAND

Distribution input (DI) is the amount of water we put into our network each day and is our headline measure of demand. In this section we detail our rWRMP19 forecast against the outturn demand for water in 2022-23. We consider the components of DI as shown in Table 10, including household demand, water efficiency, non-household demand, PCC and leakage. We have compared outturn results against the rWMRP19 dry year (1 in 20 year) forecasts. This approach is aligned with the EA guidance for the Annual Review, which requires comparison against dry year values.

For most outturn years the 'Macro Components' of demand; unmeasured demand and measured demand, do not add up precisely to the measured DI. The Annual Review process requires us to reconcile any imbalance using the Maximum Likelihood Estimation (MLE) methodology. All outturn data provided in this review are the post MLE values and are provided in the data tables in Appendix A using the latest data return guidelines[12].

Dry Year Demand 2022-23 assumptions (WRMP tables reference)	Annual Average (Ml/d)		Critical Period (Ml/d)	
	rWRMP19	Outturn	rWRMP19	Outturn
Household & Non-Household Consumption (23-26FP)	146.07	144.52	187.38	187.12
Total Leakage (40FP)	24.69	32.19	24.69	32.19
Water taken unbilled (32FP)	2.5	2.38	2.5	2.38
Distribution system operational use (33FP)	0.5	0.54	0.5	0.54
Distribution Input	**173.76**	**179.64 (+3.38%)**	**215.07**	**222.24 (+3.33%)**

Table 10: Outturn Distribution Input for 2022-23

Our outturn DI values are higher than our rWRMP19 values by 5.88Ml/d (3.38%) and 7.17 Ml/d (3.33%) in annual average and critical period respectively. The outturn consumption is comparable (or less than) the forecasts, as are the water taken unbilled and the distribution system operational use. The primary driver for our increased demand is our 2022-23 leakage performance.

5.1 Distribution Input

During 2022-23 we effectively managed our production capability to ensure that we maintained supply to our customers despite the challenges throughout the summer heatwaves. Figure 8 shows our 7-day average weekly recorded Distribution Input (DI) for 2022-23 against our long-term average DI. The LTA provided is the weekly average since 2007.

[12] Technical guidance for completion of WRMP annual review data return, Environment Agency, April 2023

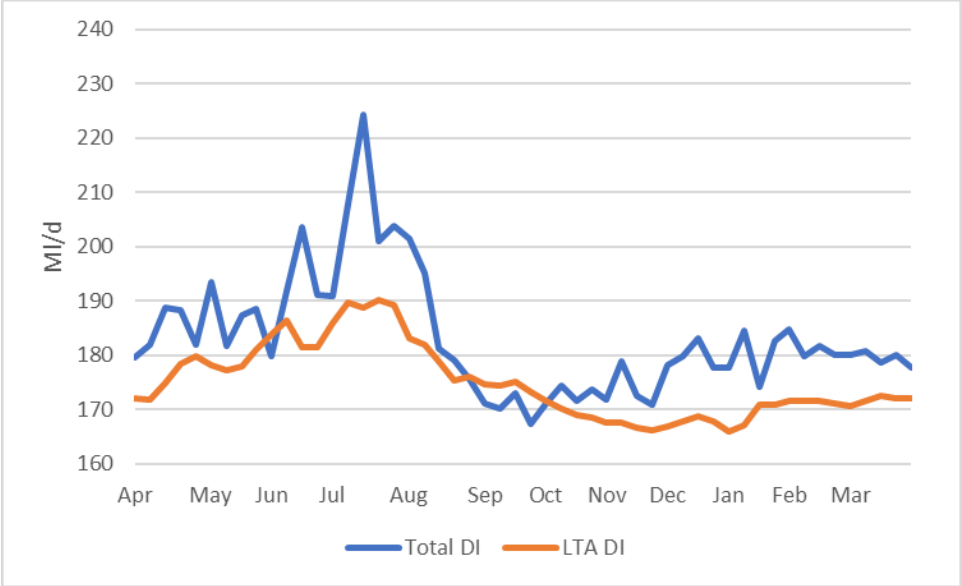

Figure 8: Total DI recorded for 2022-23 against LTA DI

As shown in Figure 8, at the start of the reporting year we experienced above average demand primarily because of dry conditions, particularly during April. The first of three heatwaves was experienced in June where average weekly DI initially increased to above 200 Ml/d. The second, and most intense heatwave was faced in July where demand drastically increased to a weekly average peak of 224.26 Ml/d.
The following sections explain our outturn performance for DI and provide information on how they will be reflected in the forecasts of the upcoming WRMP24.

5.2 Household & Non-Household Consumption

In this section we cover our consumption performance, how it compares to our rWRMP19 dry year forecast for 2022-23 and how we are forecasting consumption in our WRMP24 going forwards. Details on household consumption are provided separately to non-household consumption so that we can initially explore our key metric of Per Capita Consumption (PCC). Table 11 shows the consumption split between the two categories.

Dry Year Demand 2022-23 assumptions (WRMP tables reference)	Annual Average (Ml/d)		Critical Period (Ml/d)	
	rWRMP19	Outturn	rWRMP19	Outturn
Household Consumption (25:26FP)	115.34	112.27	156.65	154.87
Non-Household Consumption (23:24FP)	30.74	32.25	30.74	32.25
Total consumption	**146.07**	**144.52**	**187.38**	**187.12**

Table 11: Total outturn household and non-household consumption

Our non-household consumption was 1.51 Ml/d higher than forecast in both scenarios, whereas our household consumption was lower than forecast by 3.1 Ml/d in annual average, and 1.78 Ml/d in critical period.

5.2.1 Household Consumption

Our main measure of household consumption is calculated as per capita consumption (PCC) in litres per head per day (l/h/d). Table 12 below provides a breakdown of how we performed for both measured and unmeasured PCC, with the average household PCC being the primary reporting metric.

Per capita consumption (l/h/d)	Annual Average (l/h/d)		Critical Period	
	rWRMP19	Outturn	rWRMP19	Outturn
Measured Household	137	147	177	191
Unmeasured Household	162	155	226	219
Average Household	153	153 (=)	208	210 (+0.96%)

Table 12: Outturn household PCC for 2022-23

We are pleased to say that our average customer demand met our target PCC in rWRMP19. This is a significant improvement in our annual average PCC performance compared to previous years, illustrated in the graph below. Our average PCC for the critical period was slightly higher than our target rWRMP19 and saw an 8 l/h/d increase compared to last year's critical period. This is explained by the developing drought scenario during the summer 2022.

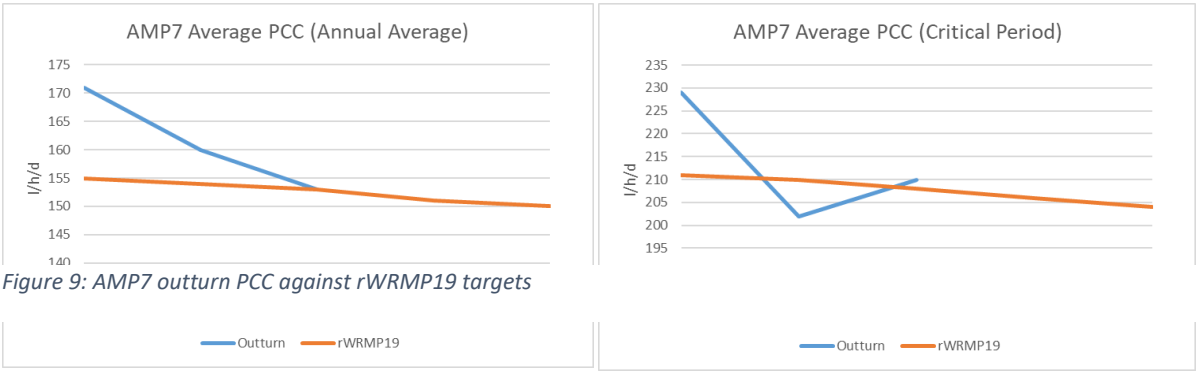

Figure 9: AMP7 outturn PCC against rWRMP19 targets

The drivers for the reduction in average PCC are explored in the following sections.

5.2.1.1 Enhanced communications campaign

As previously mentioned, we enacted our Drought Plan in 2022 which involved the implementation of demand side drought actions including a significant enhanced communications campaign. This, together with national media coverage of the water situation and other communications from water companies in our Region, had a significant impact on customers consumption. More details are found in Appendix B.

5.2.1.2 Water efficiency and metering

In addition to the enhanced communication campaign during the summer of 2022, we have continued our metering programme and have been implementing a wide range of water efficiency measures which have been influencing PCC down.

Within our rWRMP19, our demand management options relating to household PCC in AMP7 and beyond are:

- Household water efficiency programme
- Optants (metering)
- Change of occupancy (metering)
- Universal metering (after 2024-25)

In terms of household water efficiency, our PCC recovery strategy has accelerated since April 2021, one element of which was continued promotion of the Get Water Fit platform. When customers sign up to this platform they receive advice on saving water, can order water efficiency gadgets and take part in challenges. Participating in challenges earns them virtual gold coins that can be exchanged for charity donations.

We have started to introduce new gadgets onto the platform, focusing on leakage detection and prevention. These gadgets include items such as leakyloo strips and pipe lagging for the winter as well as a selection of subsidised water butts. All our broadcast messages on our social media feeds promote the platform as well as the need to conserve water. As a result of this customer engagement, we have seen over 9,000 registrations to the site so far.

Another new initiative we have introduced was giving away 1,000 household leakage alarms known as LeakBot to customers. Early results show around 24% of properties had a leak. After the leakbot notified customers of these leaks, the majority were fixed, saving on average 41 litres per household per day. As well as saving water, this initiative is giving us really important local data that is helping us plan our future smart metering programme.

We have also introduced a new water efficiency report and platform, which is being provided to our existing metered customers. A home water use report is sent via email giving the customer a view of their average water consumption and how they compare to similar homes in their area. The platform provides additional water saving support and advice using nudges and social norms to promote behavioural changes. Again, as well as helping customers connect with their water use, it is also providing great insight in the way our customers prefer to be approached about their water use.

With regards to metering, our PCC recovery plan aims to install 30,000 meters by the end of AMP7. In December 2021 we accelerated our metering programme with the introduction of metering during the change of occupier (COO) process, with a monthly target of 440 meter installs from COO and optant metering.

We also introduced a not for revenue programme which commenced in October 2022 to help us meet the 30,000 target. The aim is to achieve this target by December 2023 rather than March 2025 with the installation of 20,000 meters installed on empty boundary boxes. We have designed a leaflet which is posted through the customers door on completion of the work promoting the benefits of metering and encouraging them to switch to metered billing. So far, we have seen 283 customers revert to a meter from 11,212 installs which is a rate of 0.97%.

The graph below shows the running total of meter installs (left hand axis). At present we are ahead of our programme and if we continue at our current rate, we will meet our 30,000 target by October 2023.

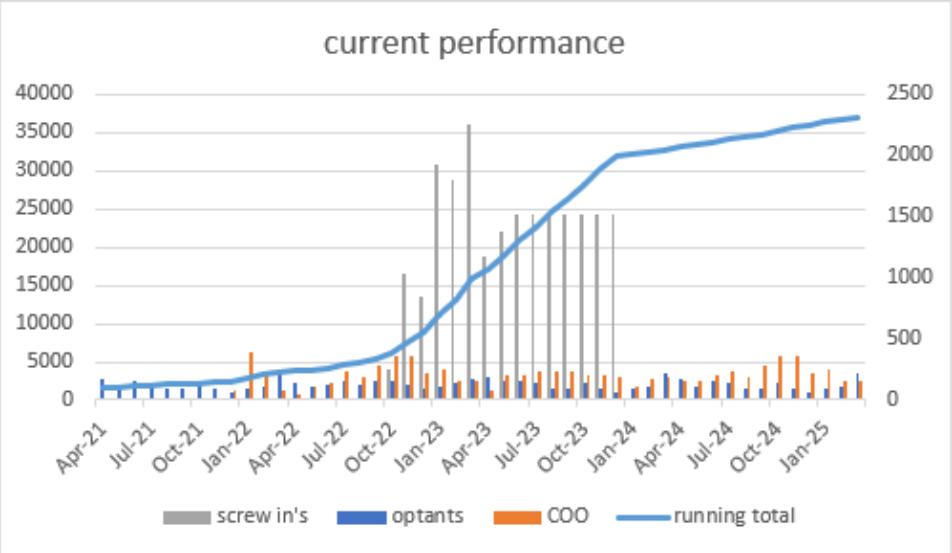

Figure 10: Metering performance and forecast from April 2021 to January 2025

The not-for-revenue meters that are being installed in AMP7 will in due course be smart enabled, or replaced with smart meters, as our smart meter programme rolls out across our supply area. Customers will be able to receive their smart data regardless of whether they have been transitioned to measured billing.

We are still developing our smart meter programme. We will commence the programme of smart meter roll out in 2025 and will continue to do so over the next 8 years to deploy across our supply area for both household and non-household connections. In preparation for the AMP8 programme, the programme team is stood up and we are now developing the core systems and integrations required to successfully operate a smart meter network.

We are currently in the pre-tender/supplier engagement phase for our meter installation, smart meter, and smart network provider tenders. We are working hard to engage the market to develop our propositions and intend to conduct a regulated procurement process over 2023/24 and plan to select partners in Q4 of 2024.

A smart meter trial (more of a test pilot) is planned to be conducted in Q2/Q3 2025 once the smart meter and network provider have been onboarded. This pilot will test our end-to-end processes, data flows and ensure we are set up correctly for the full smart metering rollout. We will begin to communicate to our customers, retailers, and businesses in early 2025 and are currently developing a comprehensive customer journey, engagement and communications strategy that will ensure our customers are fully informed about smart metering and how it will affect them. Assuming the pilot is successful, and all our processes are in place we plan to begin our smart metering programme rollout in earnest from December 2025.

We are considering our options for all stages of our customers smart journey (pre-install, installation, post-installation) and will be consulting a range of stakeholders and customers to develop these strategies over the coming months.

5.2.2 Non-Household Consumption

Our outturn annual average non-household consumption (measured and unmeasured) is 32.25 Ml/d, compared to the rWRMP19 target of 30.74 Ml/d (+4.9%), which shows a strong recovery from pandemic levels, but not the response to summer messaging that we saw from household consumers.

This year we will be enhancing our levels of engagement with owners of NHH connections and running a series of trials to engage with our larger commercial connections and understand what data and support from us would help them to become more water efficient. As well as saving water this year it will also serve to inform the development of our smart metering offer to NHH customers.

5.3 Total Leakage

In this section we cover our leakage performance. Leakage is an element of demand that is mostly in the control of companies, but is also subject to the impact of weather, typically extremes of weather that cause ground movement. Our rWRMP19 target for 2022-23 was 24.69 Ml/d, whereas our outturn leakage is 32.19 Ml/d. Figure 11 shows how leakage has fluctuated over the reporting year, with the highest two peaks in the summer and winter during times of extreme weather.

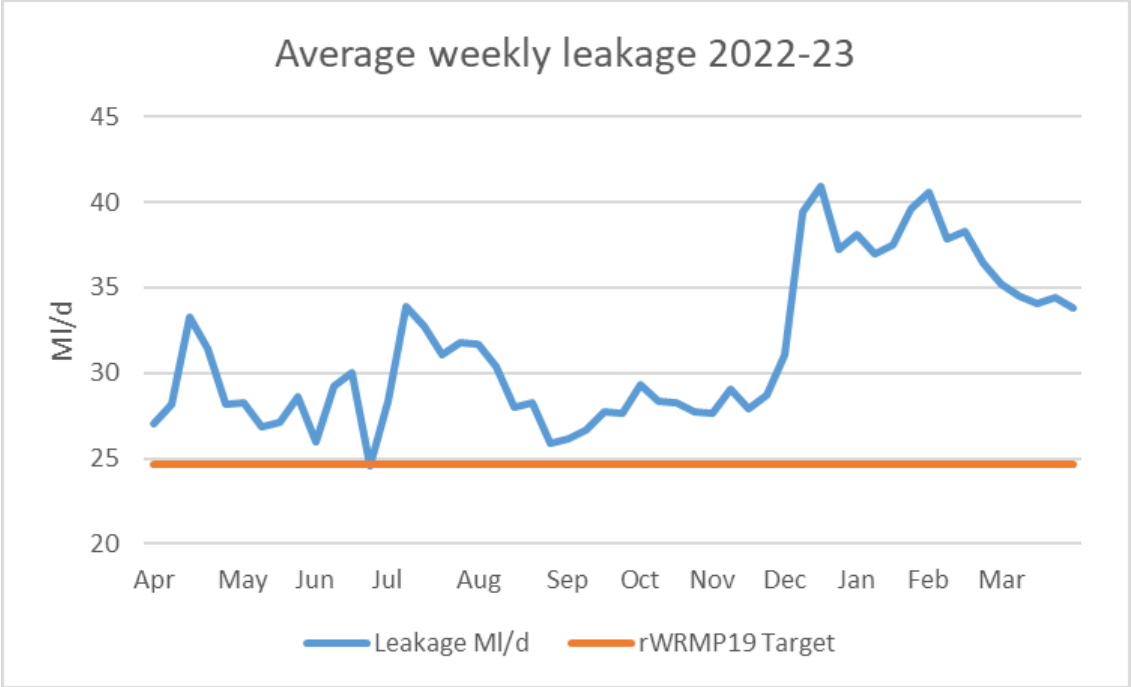

Figure 11: Outturn Leakage for 2022-23

The summer of 2022 had a significant impact on leakage as the very dry weather caused a breakout despite the additional work carried out as part of the Active Leakage Plan in response to the implementation of the Drought Plan (detailed in Appendix B). This prompted us to undertake a root cause assessment to understand our recent performance. Informed by that work, a recovery plan was put in place and progress against this plan is routinely reported to the Board. Performance began to improve, but then the cold weather in December 2022 caused another significant breakout. Our nightline increased by 9.16Ml/d overnight, with much of this abnormal demand resulting from burst pipes on both our network and also on customer-side pipes. Just under 3Ml/d was swiftly recovered through customer self-repairs of easily identified bursts on our network.

To recover the tail end of the impact of this weather event, we launched an enhanced recovery plan and increased resourcing and the capability of our wider resources to be actively deployed early on in future events.

Since the end of this reporting year, we have held regular meetings focussing on detection and repair performance. We have used a points-based leak system, with 52 points being required daily to achieve a 1 Ml/d reduction in leakage (without new leaks occurring). As a result, there has been a steady increase in detection and repair performance as shown in Figure 12.

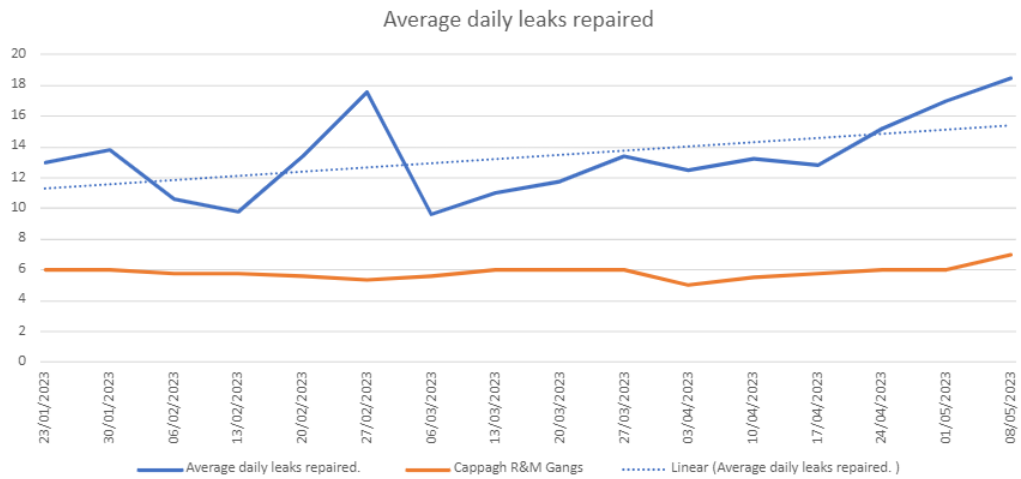

Figure 12: Average daily leaks repaired 2022-23

Our most recent finalised leakage figure at the end of April 2023 was 26.65 Ml/d, with an annual average Year To Date of 29.19 Ml/d. This is significant progress and with current resource level and performance we believe that we are on track to meet our rWRMP19 target by the end of AMP7.

5.4 Water Taken Unbilled & Distribution System Operational Use (DSOU)

"Water taken unbilled" contains two elements: Legally unbilled water includes water used for firefighting purposes, whilst water illegally unbilled includes use from void properties which are actually occupied. DSOU refers to water that has entered our network, but which is intentionally run to waste, such as water used for the purpose of mains flushing. It is different to that included in the process losses as it has already entered the network.

These two components combined account for a small volume of water in our rWRMP19 and WRMP24 at 0.5Ml/d. Our outturn values are comparable to this assumption.

6 HEADROOM ASSESSMENT

The target headroom allowance was revisited for the rWRMP19 using the new WRSE methodology. Further information is available in the Annual review 2022[13].The updated allowance was also used within our dWRMP24. The target headroom values for 2022-23 in the rWRMP19 are as follows:

- Dry year annual average 5.05 Ml/d
- Dry year critical period 5.81 Ml/d

These are the values we have used to calculate our supply demand balance.

[13] https://www.portsmouthwater.co.uk/wp-content/uploads/2023/01/Portsmouth-Water-WRMP-Annual-Review-June-2022_updated-Dec-2022.pdf

7 SUPPLY DEMAND BALANCE – 1 IN 200 DRY YEAR SCENARIO

This section describes the overall summary of the 2022-23 Supply demand balance situation, considering our performance for the year and comparing this against our rWRMP19 dry years (i.e 1 in 200-year drought) scenario as per the requirements of the guidance.

7.1 Forecast rWRMP19 and outturn supply demand balance – Dry year scenario

Using the outturn values described throughout this report, the final dry year SDB has been calculated for both annual average and critical period scenarios for 2022-23 (Table 13). The outturn SDB balance shown here is using the guidance definitions for each of the components (e.g theoretical maximum bulk supply). However, Table 14 shows our adjusted SDB using our actual bulk supply figures (accounted for in the WAFU, see section 4 for details) which reflects the real-world situation in which we maintained a positive SDB in both scenarios.

Supply Demand Balance (as per guidance)	Annual Average (Ml/d)		Critical Period (Ml/d)	
	rWRMP19	Outturn	rWRMP19	Outturn
Total Water Available for Use	174.42	169.67	225.50	223.69
Distribution Input	173.70	179.64	215.01	222.24
Target Headroom	5.05	5.05	5.81	5.81
Supply Demand Balance	**-4.33**	**-15.01**	**4.68**	**-4.36**

Table 13: Outturn Supply demand balance with theoretical maximum bulk supply

Supply Demand Balance (adjusted outturn)	Annual Average (Ml/d)		Critical Period (Ml/d)	
	rWRMP19	Outturn	rWRMP19	Outturn
Total Water Available for Use	174.42	187.46	225.50	238.98
Distribution Input	173.70	179.64	215.01	222.24
Target Headroom	5.05	5.05	5.81	5.81
Adjusted Supply Demand Balance	**-4.33**	**+2.77**	**4.68**	**+10.93**

Table 14: Outturn Supply demand balance with outturn bulk supply

We note that our rWRMP19 shows that we are no longer meeting our target headroom for a 1 in 200-year drought scenario under annual average i.e our risk and uncertainty allowance for the SDB is fully utilised. It means there is a slightly higher risk we would need to introduce emergency restrictions in a very severe drought. This reflects a reduced benefit from our supply side options and revisions to the baseline demand forecast to reflect outturn values and new WRSE methodologies.

The conclusion with respect to our performance in 2022-23 is that we have maintained a positive SDB, so customers were not at risk in either the annual average or critical period scenarios. However, for a dry year we recognise that if Southern Water had requested the full 30 Ml/d bulk supply everyday throughout the year, the outturn annual average SDB would have been in deficit as demonstrated by Table 13 and in the data tables in Appendix A.

We would like to take this opportunity to reassure our customers, regulators and stakeholders that we are doing everything within our capabilities to safeguard the service to our customers and the regional supplies to Southern Water. Although our outturn dry year (1 in 200-year) SDB within Table 13 is negative, we would not realistically be faced with this scenario as a 1 in 200-year event can only develop over multiple dry recharge seasons. Our RdWRMP24 will be published in time for our next Annual Review 2024 which eliminates the deficits due to updated forecasts and data, provided the timely implementation of our AMP7 schemes. The forward look section below provides further details on the work required throughout the remainder of AMP7 and into AMP8.

8 FORWARD LOOK

As we look forwards, we still have challenges to resolve around our resilience in extreme dry weather events and although there is no immediate risk, we are working hard on the mitigation measures outlined in our rWRMP19 to minimise risk as we look towards the implementation of our RdWRMP24. For example, this report has outlined the substantial progress on installing meters against the end of the AMP7 target and preparations for the smart metering trial in AMP8.

We also recognise the importance of delivering our remaining AMP7 schemes to ensure a healthy starting position for WRMP24. We have already made a key decision with respect to our Source J scheme (and associated additional bulk supply to Southern Water), and have completed the scheme at Source H. We will continue to work on the schemes at Sources C and L, ready to deliver combined benefit by 2024-25.

We have also recognised the importance of taking a bottom-up approach to accurately quantify process losses. We will be investigating this further in the coming months and will report progress in our Annual Review 2024.

As part of the development of our RdWRMP24, we have revisited our demand management options (including PCC and leakage) following changes over time in guidance as well as feedback from the dWRMP24. This has led us to review and refine our 'basket' of options, bringing in industry experts to ensure that we could deliver an ambitious, innovative and value delivering final choice programme of work that would deliver against our 2050 target. As part of our 'High+' option basket we have made the decision to reduce leakage by 50% by 2040, 10 years ahead of the national target. We have constructed a programme of work that builds on our success and investments whilst driving forward with new and exciting innovations and improvements. We believe that the historic low leakage that will be achieved at the end of AMP7 could slow down the rapid rate of progress in overall leakage reduction given diminishing returns on effort that is likely to characterise a status-quo, no change strategy. We believe that the next significant step benefit in overall leakage reduction will be in the reduction of customer side leakage. This is included in our overall reported numbers, and we believe that this may make up as much as 50% of the remaining leakage as we move forward into AMP8. It is therefore hugely important for us that our universal smart metering programme is fully funded for our AMP8/9 submissions as the inroads into this area of relatively untouched leakage will be huge as our installation and follow up customer hyper-care programme roll out.

Our RdWRMP24 will be submitted in the coming months which is our most ambitious and collaborative plan yet. Through this plan, we will become more resilient to increasingly severe drought events, at the same time as reducing our reliance and impact upon the precious chalk-based environment that characterises our supply area. We are acutely aware of the need to mitigate against any risks to our security of supply and will continue to work closely with all relevant stakeholder to ensure that the implementation of our WRMP24 will provide a robust and achievable way forwards as we progress towards AMP8.

APPENDIX A – Data Tables

WRMP ANNUAL REVIEW DATA RETURN - WATER BALANCE COMPONENTS

ANNUAL AVERAGE

Water Company: Portsmouth Water
Number of resource zones: 1
Year of data submission: 2022/23
Reporting against WRMP: Revised WRMP19

Row numbering in line with WRMP structure	Component	Derivation and type of data	Units	DP	Data requirement	Water company total data
	SUPPLY					
	Resources					
1_{AR}	Raw water abstracted	Input outturn data	Ml/d	2dp	Required	202.01
2_{AR}	Raw water imported (in the reporting year)	Input outturn data	Ml/d	2dp	Required	0
3_{AR}	Potable water imported (in the reporting year)	Input outturn data	Ml/d	2dp	Required	0
5_{AR}	Raw water exported (in the reporting year)	Input outturn data	Ml/d	2dp	Required	0
5.1_{AR}	Non potable water supplied	Input outturn data	Ml/d	2dp	Required	0
6_{AR}	Potable water exported (in the reporting year)	Input outturn data	Ml/d	2dp	Required	12.22
7_{AR}	Deployable output	Input dry year figure	Ml/d	2dp	Required	213.12
12AR	Water Available For Use (own sources)	(Deployable Output + changes to DO) - (Treatment works losses and operational use + outage experienced).	Ml/d	2dp	Required	199.67
13AR	Total Water Available For Use	WAFU own sources + (total water imported) - (total water exported). Total WAFU is based on maximum contractual volumes as stated in WRMP19.	Ml/d	2dp	Required	169.67
	Process Losses					
9_{AR}	Treatment works losses and operational use	Input outturn data	Ml/d	2dp	Required	10.15
10_{AR}	Outage experienced	Input outturn data	Ml/d	2dp	Required	3.29
	DEMAND					
11_{AR}	Distribution input (in reporting year)	Outturn data for: Total household and non-household consumption + water taken unbilled + distribution system operational losses + total leakage	Ml/d	2dp	Required	179.64
	Consumption					
23_{AR}	Measured non household - consumption	Input outturn data	Ml/d	2dp	Required	31.70
24_{AR}	Unmeasured non household - consumption	Input outturn data	Ml/d	2dp	Required	0.56
25_{AR}	Measured household - consumption	Input outturn data	Ml/d	2dp	Required	33.00
26_{AR}	Unmeasured household - consumption	Input outturn data	Ml/d	2dp	Required	79.27
29_{AR}	Measured household - pcc	Outturn data: (Measured household consumption * 1,000,000) / (measured household population * 1,000)	l/h/d	0dp	Required	147
30_{AR}	Unmeasured household - pcc	Outturn data: (Unmeasured household consumption * 1,000,000) / (Unmeasured household population * 1,000)	l/h/d	0dp	Required	155
31_{AR}	Average household - pcc	Outturn data: (Measured and unmeasured household consumption * 1,000,000) / (measured and unmeasured household population * 1,000)	l/h/d	0dp	Required	153
32_{AR}	Water taken unbilled	Input outturn data	Ml/d	2dp	Required	2.38
33_{AR}	Distribution system operational use	Input outturn data	Ml/d	2dp	Required	0.54
	Leakage					
34_{AR}	Measured non household - uspl	Input outturn data	Ml/d	2dp	Required	0.58
35_{AR}	Unmeasured non-household - uspl	Input outturn data	Ml/d	2dp	Required	0.05
36_{AR}	Measured household - uspl	Input outturn data	Ml/d	2dp	Required	5.14
37_{AR}	Unmeasured household - uspl	Input outturn data	Ml/d	2dp	Required	6.79
38_{AR}	Void properties - uspl	Input outturn data	Ml/d	2dp	Required	0.38
39_{AR}	Distribution Losses	Input outturn data	Ml/d	2dp	Required	19.25
40_{AR}	Total leakage	Outturn data: Total USPL + distribution losses	Ml/d	2dp	Required	32.19
	CUSTOMERS					
	Properties					
42_{AR}	Measured non-household - properties	Input end of reporting year data	000's	3dp	Required	11.946
43_{AR}	Unmeasured non-household - properties	Input end of reporting year data	000's	3dp	Required	1.511
44AR	Void non households - properties	Input end of reporting year data	000's	3dp	Required	2.454
45_{AR}	Measured household - properties	Input end of reporting year data	000's	3dp	Required	106.699
45.7_{AR}	Measured void household - properties	Input end of reporting year data	000's	3dp	Required	2.359
46_{AR}	Unmeasured household - properties	Input end of reporting year data	000's	3dp	Required	195.427
47_{AR}	Unmeasured void household - properties	Input end of reporting year data	000's	3dp	Required	4.333
48_{AR}	Total resource zone properties (inc voids)	End of reporting year data : Total non-household properties + total void non-household properties + total household properties + total void household properties	000's	3dp	Required	324.729
	Population					
49_{AR}	Measured non-household - population	Input end of reporting year data	000's	3dp	Required	12.634
50_{AR}	Unmeasured non-household - population	Input end of reporting year data	000's	3dp	Required	1.598
51_{AR}	Measured household - population	Input end of reporting year data	000's	3dp	Required	224.712
52_{AR}	Unmeasured household population	Input end of reporting year data	000's	3dp	Required	511.378
53_{AR}	Total resource zone population	End of reporting year data: Unmeasured and measured household population + Unmeasured and measured non-household population	000's	3dp	Required	750.322
	Metering					
57_{AR}	Total measured household metering penetration (incl. voids)	Outturn data: Measured household properties exc. voids / (measured household properties exc. voids + unmeasured household properties exc. voids) + measured and unmeasured household void properties)	%	2dp	Required	34.55
57.1	Total households with a meter installed	Input outturn data (See technical annex for guidance)	%	2dp	Optional	
	Total numbers of household meters installed	Input outturn data	000's	3dp	Required	12.328
	SUPPLY-DEMAND BALANCE					
16AR	Target headroom	Input adjusted reporting year figure or dry year WRMP	Ml/d	2dp	Required	5.05
18AR	Observed supply-demand balance (in reporting year)	(Total WAFU - DI) - target headroom	Ml/d	2dp	Required	-15.01

QA check 1	Distribution input	23AR + 24AR + 25AR + 26AR + 32AR + 33AR + 40AR	0.00
QA check 2	Water available for use (own sources)	7AR - (9AR + 10AR)	0.00
QA check 3	Total properties	42AR + 43AR + 45AR + 45.7AR + 46AR + 47AR	0.00
QA check 4	Total population	49AR + 50AR + 51AR + 52AR	0.00
QA check 5	Household metering	42AR / (42AR + 43AR + 45.7AR + 47AR)	0.00
QA check 6	Average pcc	((25AR + 26AR) * 1,000,000) / ((49AR + 50AR) * 1,000))	0.00
QA check 7	Total leakage	34AR + 35AR + 36AR + 37AR + 38AR + 39AR	0.00
QA check 8	Supply-demand balance	(13AR - 11AR) - 16AR	0.00

WRMP ANNUAL REVIEW DATA RETURN - WATER BALANCE COMPONENTS

CRITICAL PERIOD

Water Company: Portsmouth Water
Number of resource zones: 1
Year of data submission: 2022/23
Reporting against WRMP: Revised WRMP19

Row numbering in line with WRMP structure	Component	Derivation and type of data	Units	DP	Data requirement	Water company total data
	SUPPLY					
	Resources					
1_{AR}	Raw water abstracted	Input outturn data	Ml/d	2dp	Required	224.26
2_{AR}	Raw water imported (in the reporting year)	Input outturn data	Ml/d	2dp	Required	0
3_{AR}	Potable water imported (in the reporting year)	Input outturn data	Ml/d	2dp	Required	0
5_{AR}	Raw water exported (in the reporting year)	Input outturn data	Ml/d	2dp	Required	0
5.1_{AR}	Non potable water supplied	Input outturn data	Ml/d	2dp	Required	0
6_{AR}	Potable water exported (in the reporting year)	Input outturn data	Ml/d	2dp	Required	14.71
7_{AR}	Deployable output	Input dry year figure	Ml/d	2dp	Required	262.4
12AR	Water Available For Use (own sources)	(Deployable Output + changes to DO) - (Treatment works losses and operational use + outage experienced).	Ml/d	2dp	Required	253.69
13AR	Total Water Available For Use	WAFU own sources + (total water imported) - (total water exported). Total WAFU is based on maximum contractual volumes as stated in WRMP19.	Ml/d	2dp	Required	223.69
	Process Losses					
9_{AR}	Treatment works losses and operational use	Input outturn data	Ml/d	2dp	Required	4.60
10_{AR}	Outage experienced	Input outturn data	Ml/d	2dp	Required	4.11
	DEMAND					
11_{AR}	Distribution input (in reporting year)	Outturn data for: Total household and non-household consumption + water taken unbilled + distribution system operational losses + total leakage	Ml/d	2dp	Required	222.24
	Consumption					
23_{AR}	Measured non household - consumption	Input outturn data	Ml/d	2dp	Required	31.70
24_{AR}	Unmeasured non household - consumption	Input outturn data	Ml/d	2dp	Required	0.56
25_{AR}	Measured household - consumption	Input outturn data	Ml/d	2dp	Required	42.92
26_{AR}	Unmeasured household - consumption	Input outturn data	Ml/d	2dp	Required	111.95
29_{AR}	Measured household - pcc	Outturn data: (Measured household consumption * 1,000,000) / (measured household population * 1,000)	l/h/d	0dp	Required	191
30_{AR}	Unmeasured household - pcc	Outturn data: (Unmeasured household consumption * 1,000,000) / (Unmeasured household population * 1,000)	l/h/d	0dp	Required	219
31_{AR}	Average household - pcc	Outturn data: (Measured and unmeasured household consumption * 1,000,000) / (measured and unmeasured household population * 1,000)	l/h/d	0dp	Required	210
32_{AR}	Water taken unbilled	Input outturn data	Ml/d	2dp	Required	2.38
33_{AR}	Distribution system operational use	Input outturn data	Ml/d	2dp	Required	0.54
	Leakage					
34_{AR}	Measured non household - uspl	Input outturn data	Ml/d	2dp	Required	0.58
35_{AR}	Unmeasured non-household - uspl	Input outturn data	Ml/d	2dp	Required	0.05
36_{AR}	Measured household - uspl	Input outturn data	Ml/d	2dp	Required	5.14
37_{AR}	Unmeasured household - uspl	Input outturn data	Ml/d	2dp	Required	6.79
38_{AR}	Void properties - uspl	Input outturn data	Ml/d	2dp	Required	0.38
39_{AR}	Distribution Losses	Input outturn data	Ml/d	2dp	Required	19.25
40_{AR}	Total leakage	Outturn data: Total USPL + distribution losses	Ml/d	2dp	Required	32.19
	CUSTOMERS					
	Properties					
42_{AR}	Measured non-household - properties	Input end of reporting year data	000's	3dp	Required	11.946
43_{AR}	Unmeasured non-household - properties	Input end of reporting year data	000's	3dp	Required	1.511
44AR	Void non households - properties	Input end of reporting year data	000's	3dp	Required	2.454
45_{AR}	Measured household - properties	Input end of reporting year data	000's	3dp	Required	106.699
45.7_{AR}	Measured void household - properties	Input end of reporting year data	000's	3dp	Required	2.359
46_{AR}	Unmeasured household - properties	Input end of reporting year data	000's	3dp	Required	195.427
47_{AR}	Unmeasured void household - properties	Input end of reporting year data	000's	3dp	Required	4.333
48_{AR}	Total resource zone properties (inc voids)	End of reporting year data : Total non-household properties + total void non-household properties + total household properties + total void household properties	000's	3dp	Required	324.729
	Population					
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52_{AR}	Unmeasured household population	Input end of reporting year data	000's	3dp	Required	511.378
53_{AR}	Total resource zone population	End of reporting year data: Unmeasured and measured household population + Unmeasured and measured non-household population	000's	3dp	Required	750.322
	Metering					
57_{AR}	Total measured household metering penetration (incl. voids)	Outturn data: Measured household properties exc. voids / (measured household properties exc. voids + unmeasured household properties exc. voids) + measured and unmeasured household void properties)	%	2dp	Required	34.55
57.1	Total households with a meter installed	Input outturn data (See technical annex for guidance)	%	2dp	Optional	
	Total numbers of household meters installed	Input outturn data	000's	3dp	Required	12.328
	SUPPLY-DEMAND BALANCE					
16AR	Target headroom	Input adjusted reporting year figure or dry year WRMP	Ml/d	2dp	Required	5.81
18AR	Observed supply-demand balance (in reporting year)	(Total WAFU - DI) - target headroom	Ml/d	2dp	Required	-4.36

QA check 1	Distribution input	23AR + 24AR + 25AR + 26AR + 32AR + 33AR + 40AR	0.00
QA check 2	Water available for use (own sources)	7AR - (9AR + 10AR)	0.00
QA check 3	Total properties	42AR + 43AR + 45AR + 45.7AR + 46AR + 47AR	0.00
QA check 4	Total population	49AR + 50AR + 51AR + 52AR	0.00
QA check 5	Household metering	42AR / (42AR + 43AR + 45.7AR + 47AR)	0.00
QA check 6	Average pcc	((25AR + 26AR) * 1,000,000) / ((49AR + 50AR) * 1,000))	0.00
QA check 7	Total leakage	34AR + 35AR + 36AR + 37AR + 38AR + 39AR	0.00
QA check 8	Supply-demand balance	(13AR - 11AR) - 16AR	0.00

APPENDIX B - DROUGHT REVIEW 2022 (DRAFT)

PLEASE NOTE THAT THIS IS A DRAFT AND IS SUBJECT TO CHANGE. A FINAL VERSION WILL BE AVAILABLE ALONGSIDE THE WRMP24 STATEMENT OF RESPONSE

1 EXEC SUMMARY

It is a statutory requirement that all water companies publish a Drought Plan which sets out the tactical measures to maintain supplies of wholesome water to our customers during the varying degrees of drought events, whilst at the same time continuing to protect the environment. The latest version of our Drought Plan was published in April 2022.

We started the calendar year of 2022 with below average groundwater levels and this trend continued into the summer. On the 17th of August 2022 we crossed our Level 1 drought trigger as we officially entered a 'developing drought' and formally enacted our Drought Plan.

The actions we took are detailed in the sections in this report and included:

- An enhanced communications campaign to spread customer awareness of the developing drought conditions and provide water efficiency tips, including direct appeals to voluntarily reduce water consumption,
- An enhanced Active Leakage Control and Pressure Management Plan; and,
- Increased production activity to ensure the effective operability of our sites

Groundwater levels did not drop sufficiently to cross our Trigger 2 Level which meant that the developing drought did not progress to an official 'drought'. Therefore, we did not need to introduce mandatory use restrictions for customers, nor prepare Drought Permit applications.

Despite the impacts that the weather had on our leakage levels and PCC, we are proud to say we effectively managed our resources to always maintain supplies to customers within our resource zone with no restrictions. The developing drought in the summer of 2022 has increased our understanding of how we can operate during future events. The following points are our key lessons learnt, and how we can use the experience for future planning:

- Early modelling of various rainfall scenarios is essential for pre-emptive work to mitigate the impacts of a developing drought.
- Our enhanced communications plan was effective, but can and will be improved (both internally and externally) with the support of our new Communications and Marketing Manager
- We would have benefitted from real-time PCC data so that we could have more effectively focussed our efforts and seen the impacts of our actions with higher granularity. We aim to improve this with the roll out of our smart metering programme, and the support of our new Data and Insights Business Manager.
- Our Active Leakage Management plan was effective but would have been more so with additional resources which has now been rectified.
- The development of our internal Production Plan will ensure 'summer readiness'
- We maintained supplies throughout the summer without the use of restrictions, despite record levels of demand.

Based on this review of summer 2022, we are not planning on making any changes to our current Drought Plan. However, once the Production Plan is produced, we will reassess that decision and work closely with the Environment Agency to agree on next steps.

2 INTRODUCTION

It is a statutory requirement that all water companies publish a Drought Plan which sets out the tactical measures to maintain supplies of wholesome water to our customers during the varying degrees of drought events, whilst at the same time continuing to protect the environment. The latest version of our Drought Plan was published in April 2022.

Shortly after the publication of our Drought Plan, it became evident that our groundwater levels were declining, and that in the summer of 2022 we were likely to pass our first Drought Trigger. This meant that we would be in a 'developing drought' scenario, and the actions within the Drought Plan would be implemented. Table 1 shows a summary of the different stages of drought, and the corresponding drought management actions we would take in each.

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

Table 1: Drought management actions for Levels 1 to 3

This section describes the water resource position that led us into the developing drought, and a summary of the actions that we implemented as per our Drought Plan.

a. Water Resource position

Groundwater levels are a good indicator of the water available from the chalk aquifer from which we abstract most of our water for supply. We therefore monitor the levels on a daily basis and compare them to the 30-year long term average (LTA), and our position relative to the Drought Trigger lines.

As the graph in Figure 1 shows, we started the calendar year of 2022 with below average groundwater levels due to relatively low rainfall in the previous months. During the spring as groundwater levels continued to decline, we modelled the impact that various rainfall scenarios would have on our groundwater levels throughout the rest of the year, particularly focusing on the summer months when demand is at its highest.

Modelling suggested that continued below-average rainfall would result in our Level 1 drought trigger being passed, although it would be unlikely to pass into a Level 2 'Drought'.

As a result, we pre-emptively convened our Internal Drought Management Group in July. The group met every fortnight to discuss the emerging developing drought conditions and the coordination of our response.

The modelled scenario became the reality as the rainfall throughout spring and summer was not sufficient to return the groundwater levels back to the long-term average, and they continued to decline as shown in Figure 2. On the 17th of August 2022 we crossed our Level 1 drought trigger as we officially entered a 'developing drought'.

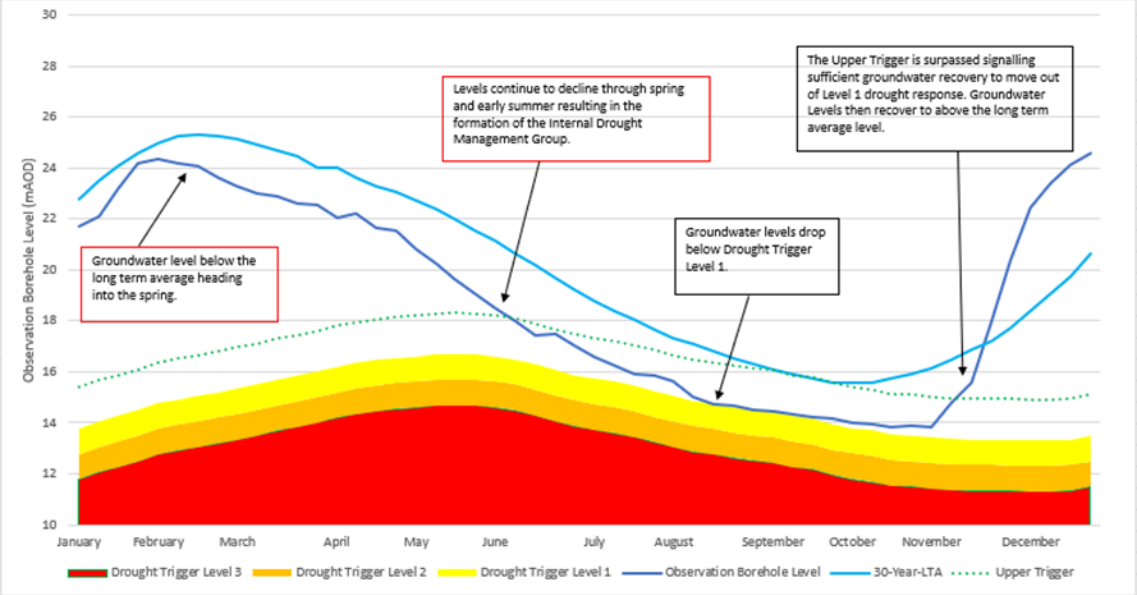

Figure 1: Groundwater levels compared to 30 Year LTA and Level 1 Drought Trigger

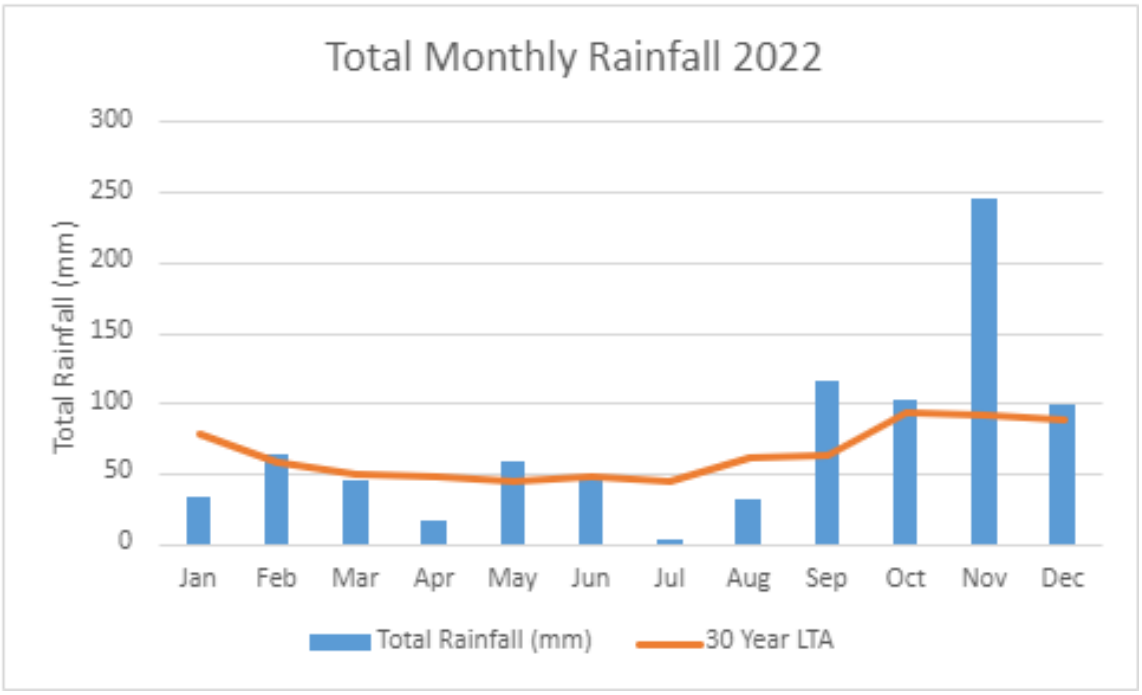

Figure 2: Total monthly rainfall 2022

b. Drought Management Actions

After crossing our Level 1 drought trigger, we formally commenced our operations for a 'developing drought' in accordance with our Drought Plan.

The actions we took are detailed in the sections in this report and included:

- An enhanced communications campaign to spread customer awareness of the developing drought conditions and provide water efficiency tips, including direct appeals to voluntarily reduce water consumption,
- An enhanced Active Leakage Control and Pressure Management Plan; and,

- Increased production activity to ensure the effective operability of our sites

As our modelling predicted, groundwater levels did not drop sufficiently to cross our Trigger 2 Level which meant that the developing drought did not progress to an official 'drought' in accordance with our Drought Plan. Therefore, we did not need to introduce mandatory use restrictions for customers, nor prepare Drought Permit applications.

The Autumn rainfall we experienced after the Summer meant that our aquifers began to recharge, and groundwater levels rose back above our upper trigger level in November 2022, signalling a return to 'business as usual' status. Our Internal Drought Management Group continued to meet fortnightly until 16th November 2022. Before standing down the group we reflected upon our summer, the effectiveness of our response and to form our considered responses to the required Environment Agency prospect reports.

During the developing drought event, we are proud to say we effectively managed our resources to always maintain supplies to customers within our resource zone with no restrictions. This report sets out the details on how we did this, and then lessons we learned and the actions we are taking in response to this.

c. Southern Water

Our neighbouring water company, Southern Water (SWS) had also been monitoring their drought conditions throughout the year. Their Drought Triggers are based on the surface water levels in the Rivers Test and Itchen. SWS reported they first dropped below their '60-day' trigger on the River Test on June 17th. This is their 'pre-consultation' trigger where formal dialogue began with the EA and other stakeholders, including Portsmouth Water. A draft drought permit application was made on 24th June.

Surface water levels continued to decline, and during the week commencing July 11th, their '35-day' trigger was breached. This is the period before a potential breach of Hands-Off Flow Licence as specified in their Section 20 agreement with the Environment Agency. As a result, SWS submitted a final drought permit for the River Test on July 19th. Having crossed their Level 2 Drought Trigger, SWS implemented TUBs on 5th August in Hampshire and the Isle of Wight.

Throughout the year, we maintained communications with SWS to understand their water resource position but did not implement TuBs for the reasons outlined above.

3 DEMAND

Our Distribution Input (DI) is the amount of water we put into our network each day and is our headline measure of demand. The components of demand include Per Capita Consumption (PCC) and leakage. Figure 3 shows how our **monthly average** DI has varied over the last three reporting years. The peak in summer 2022 was greater than we've seen in recent years, including at the height of covid restrictions in 2020. However, once the hot weather abated, DI reduced significantly and continued at levels comparable to the previous two years.

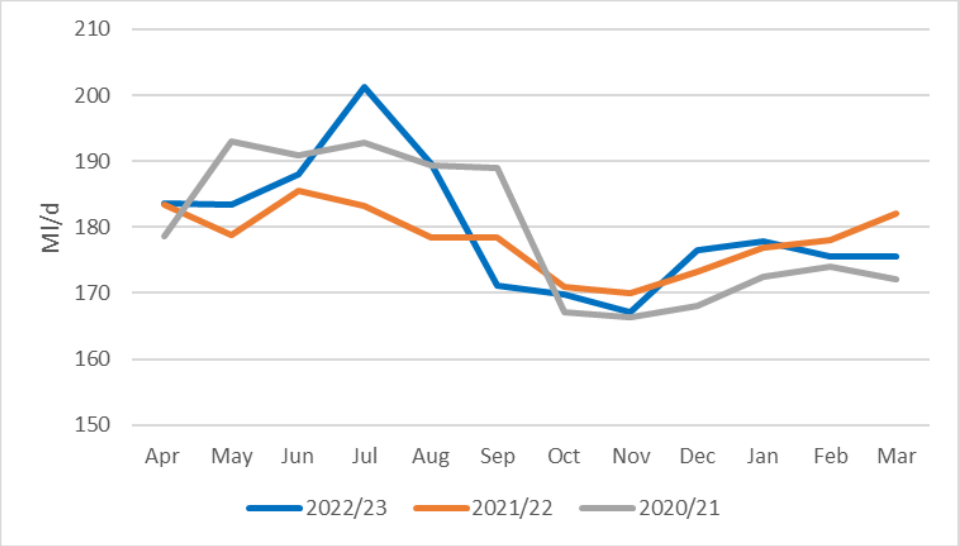

Figure 3: Distribution Input (monthly averages)

The DI trend broadly follows the same trend as PCC and leakage in that there is a peak in July which abates in August and is significantly reduced by September and October. It therefore indicates that:

- The summer heatwaves and dry weather caused both a rise in consumption and leakage
- An effective communications campaign and active leakage management plan, combined with the slight increase in rainfall in August helped to reduce DI

The following sections will detail our drought management actions throughout the summer 2022.

4 ENHANCED COMMUNICATIONS CAMPAIGN

In this section we discuss the content and effectiveness of our enhanced communication plan which we implemented throughout the period of developing drought.

In preparation for the predicted developing drought, we designed an enhanced communication plan, for the first time using an external marketing agency to help us with content.

The plan was designed to work across multiple platforms and to:

- Raise awareness of the water resource position.
- Appeal to customers to voluntarily use less water.
- Give our customers simple, seasonally relevant ways they might save water.
- To signpost where people could go to find out more information if they wanted to.

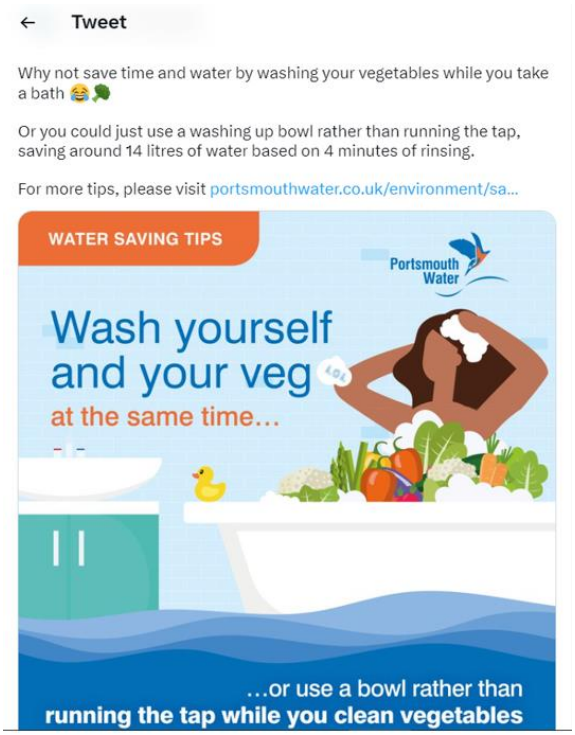

Figure 4: Example of water efficiency messaging on social media

With the continued dry weather and in sympathy with national messaging and campaigns from our neighbouring companies in the Southeast, we initiated our communication plan in May through an increased social media presence and emails asking our customers to help us to conserve water. However, upon crossing Trigger Level 1 on 17th August we intensified our efforts, in accordance with our Drought Plan.

We aimed to initially hit a light-hearted, eye-catching tone in our communications (see an example in Figure 4), with plans to change that tone to a more serious one should conditions worsen, and we would start to consider the introduction of TuBs. This possibility was always considered to be remote, but preparations were made, nonetheless.

In order to raise awareness of our water resource position, we developed a water resources dashboard that we shared monthly on our social media platforms. An example of the dashboard for August 2022 can be seen below in Figure 5. It shares current groundwater position, rainfall levels, customer demand levels and a water efficiency tip.

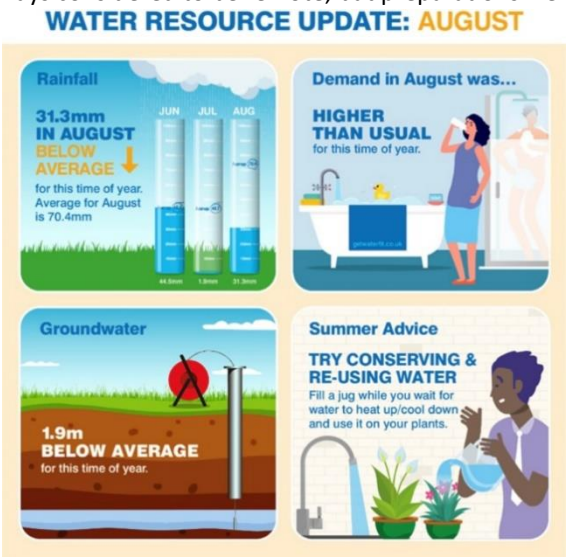

Figure 5: Water Resource dashboard shared on social media platforms

In between these dashboards we also shared water efficiency tips twice a week. Some further examples of the messages we showed on social media platforms are shown below as Figure 6.

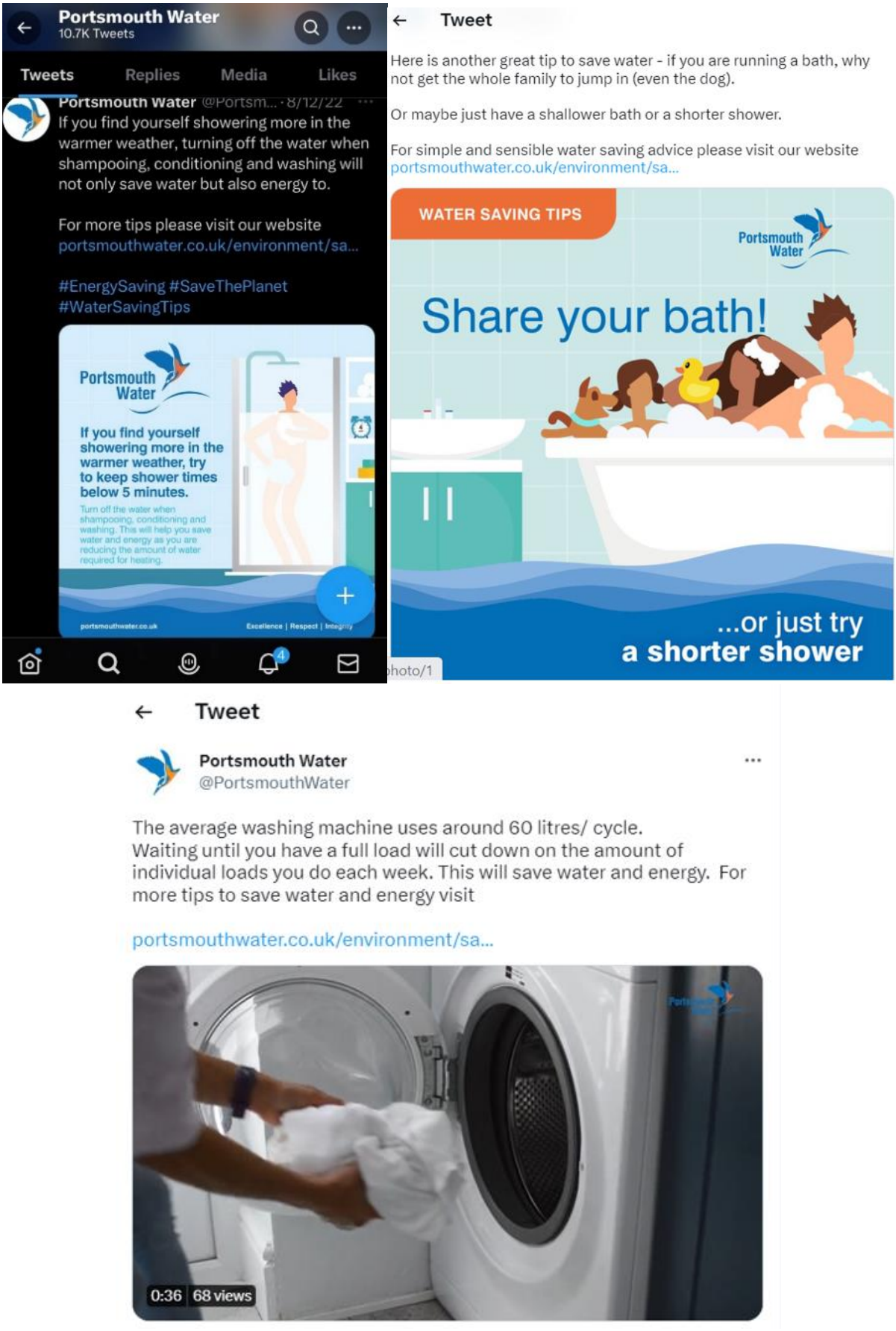

Figure 6: Examples of water efficiency messaging shared fortnightly on social media platforms

In our posts we also continued to promote our GetWaterFit platform, encouraging customers to sign up in order to receive water saving devices and further efficiency tips that were specific to their personal situation.

As part of our contingency planning for a more extreme drought developing, we investigated alternative means of communications including paid advertising using local news outlets, delivered household leaflets, and an advertising campaign displayed on local buses, bus stops and advertising hoardings. Mock ups of how these would have looked are shown below in Figure 7.

Figure 7: Advertising mock-ups as part of our advertising contingency plan

We also explored the options for direct communications with our customers in the event that local zones experienced high demand which could potentially threaten supply interruptions. This preparation was opportune because during a heatwave in July, extreme levels of demand were experienced throughout our company area, specifically in Chichester and Bognor.

As a result, we issued 43,000 SMS text messages and 104,000 e-mails to residents urging them to reduce their water consumption for the period of the hot weather to avoid supply interruptions.

d. Impacts on demand

Figure 8 shows **monthly average** PCC throughout the last 3 years. There was a clear peak in PCC as the hot weather started in the summer, with the July heatwave causing the largest increase in water consumption. Despite the extreme temperatures, the peak of PCC was not as high as the peak seen in the height of covid restrictions. Speculatively, this could be attributed to the early implementation of our communications plan in early May controlling the peak seen in July. A number of factors will have contributed to the significant reduction in PCC in the months that followed, including:

- Increased awareness due to the scale of the national debate around drought and water usage
- Customer consciousness of water efficiency following the implementation of the SWS TuBs
- The intensification of our communications plan after 17th August
- The abating heatwaves and increase in rainfall

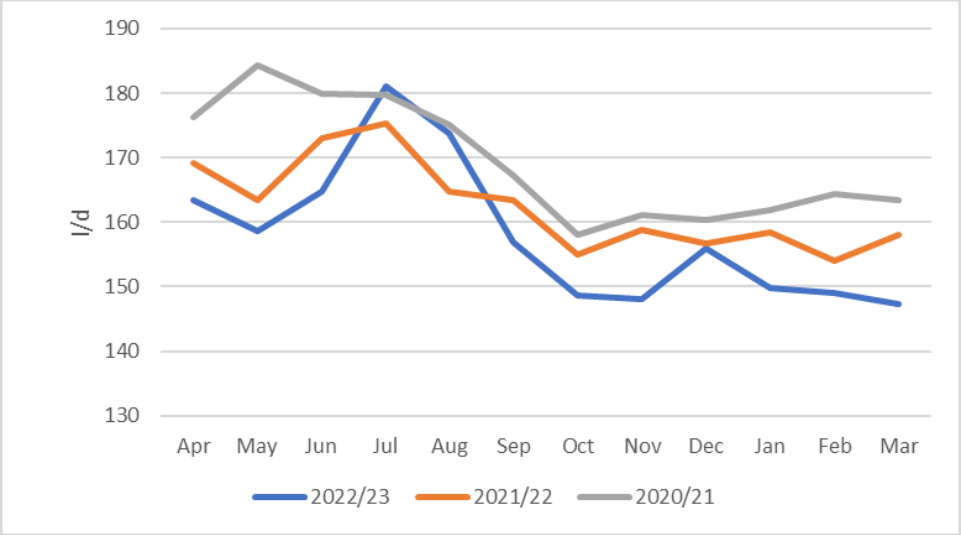

Figure 8: Average PCC (household and non-household) over the last 3 years

It is hoped that the impacts of the campaign and the developing drought conditions helped to change behaviours which continued throughout the year, as shown by the reduced PCC levels when compared to the previous two years. To more accurately assess the impact that our actions had on PCC, we would have needed real-time data. This is discussed in the lessons learnt section below, where we explain what we could have done differently and our actions going forwards.

e. Lessons learnt

Although we were able to effectively roll out our communications plan which helped reduce demand, we learnt valuable lessons along the way. This section outlines those lessons learnt, and how they will enable us to improve our effectiveness during future events, so that we can aim to reduce demand even further to mitigate against interruptions to supply and network stresses.

Customer Reach

During the developing drought, we found social media to be a very quick and effective tool to reach our customers for providing updates and messages on a regular basis. We recognise the power of this platform and aim to increase our social media presence and capabilities for the future. We have since hired an experienced Communications and Marketing Manager within the company, who will provide invaluable experience in enhancing our social media reach and messaging. We will work closely with them in the months preceding any dry weather event, to ensure a timely and effective campaign. They will also be a welcome member of the Drought Event Management Group.

Campaign planning

As part of our contingency planning, we explored alternative means of communications including paid advertising using local news outlets, delivered household leaflets, and an advertising campaign displayed on local buses, bus stops and advertising hoardings. We now have a greater understanding on the lead times required for each of these communication channels. Local printed media outlets including household delivered leaflets require a six-week notice period whilst the local bus companies require four weeks. This understanding allows us to factor in the lead times when implementing the communication strategy should they be required.

Drought awareness

Throughout the summer, we received calls and emails from customers asking about our drought status and restrictions. As previously mentioned, other water companies in the Southeast may implement drought management actions at slightly differing times based on location and drought triggers. This may potentially

lead to confusion amongst the public, especially if the customers do not use social media, or may not have seen our other methods of communication.

We are aiming to improve our drought messaging and awareness as outlined in our 'customer reach' lessons learnt, but we can also improve this by increasing the awareness of drought events within all our staff, especially those who interact with customers directly. We will post more updates on our internal platform, email updates to all staff, and encourage department leads to regularly update their staff on drought status and restrictions. Having an aware and well-educated workforce, especially those who are likely to be interacting with customers such as meter readers, leakage technicians and customer service operatives, would lead to increased awareness and confidence within the public, which will help reduce demand by spreading the message to use water wisely.

Data collection

Although we can retrospectively see the contribution that our communications may have had on demand, it would be invaluable to be able to obtain real-time PCC data during these events, so that we can monitor the effectiveness of our actions and adapt accordingly. We are working towards widespread penetration of smart meters which will support this, and we have recently employed a Data and Insights Business Manager, who is looking at implementing systems to allow a greater degree of PCC analysis. In the future we should be able to improve our targeted communications in terms of location and method, based on daily PCC readings.

5 LEAKAGE AND PRESSURE MANAGEMENT

This section describes how our leakage was impacted by the developing drought, what actions we took, and how we are moving forwards to mitigate against the impact of drought events in the future.

As groundwater levels continued to decrease throughout the spring and the reality of a developing drought become evident, in June we implemented our 'Active Leakage Recovery Plan', pre-empting the action formally required by the crossing of our Level 1 Drought Trigger.

The purpose of this plan was to focus on; data, increasing leakage detection rates, focusing repair resource and optimising the pressure management of our network. The specific work carried out is outlined in the points below:

- **Data –** this workstream sought to maintain 90% operability of all District Meter Areas (DMA) and Small Area Meters as well as undertake in-depth logging of non-household use in 5 DMAs. The granularity of this meant we were able to increase the effectiveness of targeting the detection efforts.
- **Detection –** mobile acoustic loggers were deployed to zones where they would have maximum effect.
- **Repair –** Leakage teams had a stretched target to reduce their outstanding jobs by 50%
- **Pressure management –** the team worked to optimise our ability to control fluctuations of pressure in key areas of our network, with the effect of reducing the volume of water lost through active leaks prior to repair, whilst also calming the network to reduce new leaks breaking out.

This work was initially successful and resulted in a drop in average weekly leakage of just over 5Ml/d from 30.0 Ml/d to 24.6 Ml/d by early July.

However, the lack of rainfall and high temperatures in July had a significant impact on ground movement which caused leakage to increase by c.10Ml/d. In response, we intensified the plan by diverting resource from other areas of the business to help with Active Leakage Control activity, and initiated weekend repairs. Our increased efforts meant that our leakage levels were recovered to pre-summer levels by mid-September. Figure 9 reflects our leakage performance from April 2022 to March 2023.

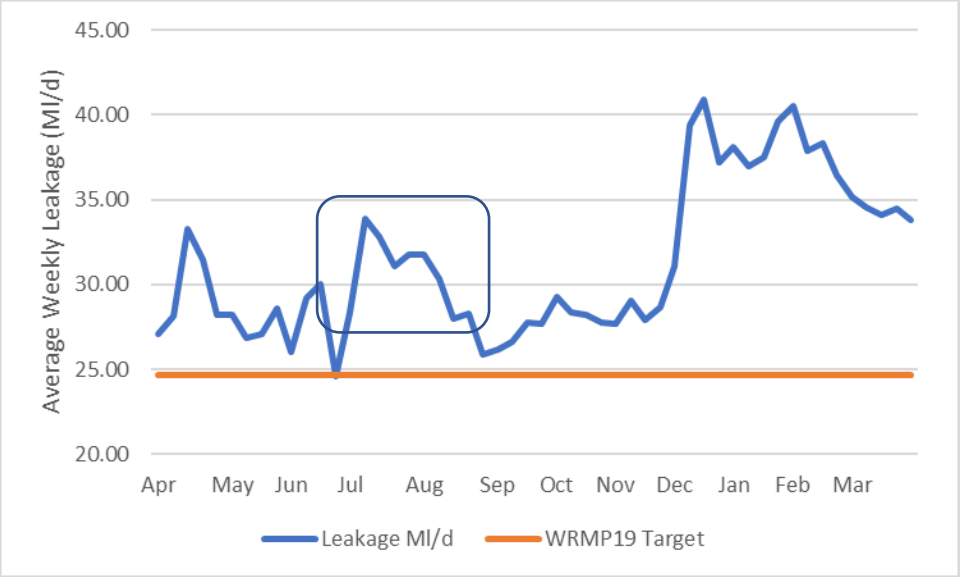

Figure 9: Total average leakage levels April 2022 to March 2023

The graph shows a further spike in leakage levels during December 2022. However, this is not explained in this document; please see the Water Resources Management Plan Annual Review 2023 for further details.

f. Lessons Learnt

Leakage detection and repair plays a fundamental role in our daily business operations, and we are continuously finding ways to further decrease our levels of leakage. The rapid increase in leakage experienced in July taught us some valuable lessons which are outlined in this section.

Resources

During the summer, we implemented our Active Leakage Recovery Plan two months in advance of crossing the Drought Trigger Level 1. Whilst this mitigated what could have been an even more impactful July, we may have seen further increased resilience had we implemented an enhanced Active Leakage Recovery Plan sooner, or with increased rigour early on. We have therefore employed five additional leakage detection staff, as well as secured a contractor who can supply additional support to our leakage teams when required. The additional resources are dedicated to recovering our leakage performance throughout the year as business as usual, and during times of developing drought events.

Further investments

Over the next 12-months we are continuing to focus on driving down leakage as part of our 'business as usual' activity. We are investing in new technologies that will increase leakage detection frequency and location, enabling faster repair times which will drive down outturn leakage. This will be beneficial all year round but will be particularly useful during future drought events as we will be able to react more efficiently.

Specifically, we have purchased 200 new-generation sensors, which use artificial intelligence technology to provide rapid, pinpoint locations. These sensors can be installed throughout our network to provide a wide range of coverage, particularly in areas vulnerable to leakage.

We are also planning to invest in satellite imagery that works by detecting elevated chlorine levels in surface and shallow subsurface water. Chlorine is an indicator of the presence of treated water and therefore a point of interest to investigate a potential leak. Satellite imagery will be most effective during dry weather and drought events where there is minimal sub surface shallow water because of rainfall. Therefore, this will be particularly valuable during any future drought events.

Finally, we are set to purchase several of the latest generation hand-held mobile acoustic monitors. These monitors are highly intuitive and require minimal training to operate. This characteristic will allow for a wider pool of Portsmouth Water staff to be able to undertake leak detection operations, which will ultimately increase detection rates and the speed with which we can sweep our network.

6 PRODUCTION

Despite a summer of low groundwater levels and rapid increases in demand during intense hot conditions, our production team maintained a constant supply of wholesome water to our customers. This section explains how we achieved that, and what we learnt going forwards for similar events in the future.

Our Final Drought Plan (Apr 22) does not include any supply-side drought management actions other than a single drought permit to maintain supplies to our customers in severe drought events. Nonetheless, as it became evident that groundwater levels were declining and below average rainfall was forecast, a detailed plan was produced by the Production Team to ensure that we had options should they be required. This included:

- Maximising Deployable Output (DO) at boreholes,
- Managing outage; and,
- How and when to recommission sites currently not in use.

Low lift pumps were used to maintain supply to our largest water treatment works and we explored the option of reinstating one of our four decommissioned sites. Work was carried out at one site which was close to being returned into service however, as demand dropped, the decision was taken to leave the site on standby and not to be fully recommissioned.

Due to the increase in workload during this time, additional resources had to be brought in to support the Production Team. Internal resources, including office-based staff, were diverted to work at our abstraction sites to help maintain DO. Despite the intense conditions and consistent high levels of demand, we were resilient to the developing drought and maintained supply throughout.

Bulk Supplies

During summer 2022 we successfully maintained our existing Bulk Supply Agreements with Southern Water. The existing agreements mean that up to 30Ml/d of water is available for up to 1-in-200-year drought event. We supplied the water requested of us by Southern through the reserving process outlined in our Bulk Supply agreement. This equated to an average over the summer months of 13.63 Ml/d.

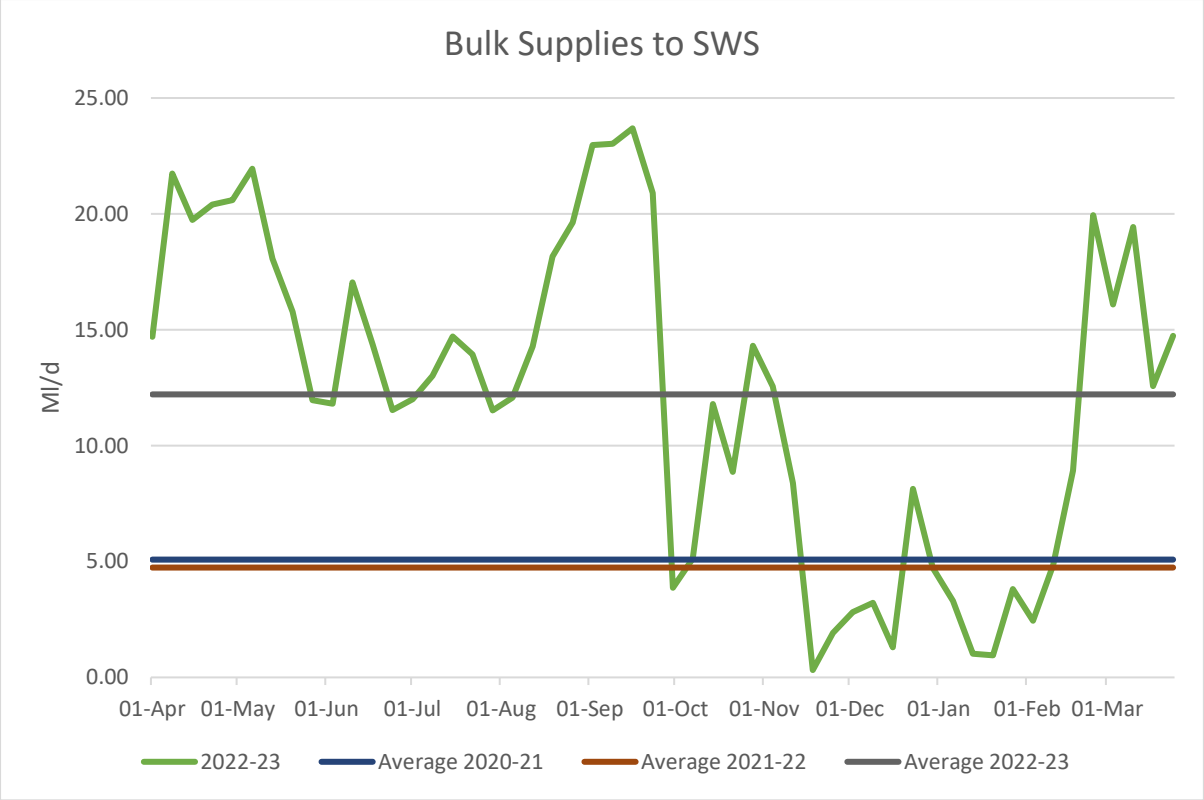

Figure 10: Outturn Bulk Supplies to Southern Water 2022-23

Figure 10 shows the weekly average exports throughout the year, alongside the averages compared to the previous two years. It is evident that the 2022-23 average bulk supplies significantly exceeded those seen previously.

g. Lessons Learnt

Despite record breaking yield at five of our abstraction boreholes we do not intend to increase the deployable output from these sites in the long term as we are committed to reducing groundwater abstractions to protect and enhance the environment.

Production Plan

Following the events of last summer, we are currently developing a detailed production plan to enable a proactive and structured approach to dealing with any future developing drought events. It will be an internal document which includes demand and groundwater projections, alongside any planned outage and bulk supply reservations for Southern Water. This will improve foresight in planning and further increase the integration of the production team with the water resource planning.

We now also have a greater understanding of what short-term supply-side options we have should a drought occur, which will be included in the production plan for increasing resilience, including:

- Maximising DO at boreholes
- Managing outage
- Returning infrequently used sites into production

Once we have developed the production plan, we will re-assess whether there should be any material changes to the Drought Plan as a result. Changes may include the introduction of more supply-side options. This will be discussed with the Environment Agency.

7 FUTURE RESILIENCE

This section provides comment against various elements of future resilience and how the impacts of the developing drought event may be used in our plans going forwards.

Levels of Service

Our water resource zone showed resilience to the developing drought conditions during the Summer of 2022 without the need to implement any mandatory water restrictions. Our planned levels of service and use of demand drought options are to remain consistent with the dWRMP24 and Drought Plan 2022. Having not been required to implement them, we will continue to use the demand savings assumptions associated with Temporary Use Bans and Non-Essential Use Bans.

Resilience Schemes

From 2029, the completion of Havant Thicket Reservoir unlocks new local and regional options for future water security. The reservoir capabilities have been tested using the Pywr model and has been coupled with peak demands to demonstrate resilience to droughts occurring once every 500 years, as detailed in our draft WRMP24.

Additional drought resilience can be attributed to the installation of smart meters across our network, a leakage reduction target of 50%, and enhanced water efficiency activity; all of which are included in our draft WRMP24. The cumulative savings from these options combined with Havant Thicket Reservoir means that we have a level of resilience up to a 1:500-year drought event.

As described in sections above, we will review the production plan when it is available and assess whether there are any material changes requiring an amendment to our current Drought Plan, or whether additional information such as new supply-side drought management options will be included in our next Drought Plan.

Demand forecasting

Following the extreme elevated demand experienced during the summer 2022 heatwaves, it has confirmed why levels of high demand need to be factored into demand forecast assumptions. We model dry year critical periods within our Pywr model runs to simulate high demands within our water resource zone to identify resilience to drought events and the subsequent network constraints.

The 2022-23 DI was higher than our WRMP DI forecasts. This is to be expected since the forecasts include demand with the implementation of mandatory restrictions. Since we did not have to impose these, it is considered that our demand forecasting and Levels of Service remain appropriate. We will be able to reassess this if we cross our Level 2 drought trigger in the future as we will have the data to support any changes.

Outage

Outages that were experienced at sites last summer were temporary and resolved quickly. Therefore, the outage assessment does not need review based on the experiences of last year.

8 CONCLUSIONS AND FURTHER WORK

The developing drought in the summer of 2022 has increased our understanding of how we can operate during future events. The following points are our key lessons learnt, and how we can use the experience for future planning:

- Early modelling of various rainfall scenarios is essential for pre-emptive work to mitigate the impacts of a developing drought.

- Our enhanced communications plan was effective, but can and will be improved (both internally and externally) with the support of our new Communications and Marketing Manager
- We would have benefitted from real-time PCC data so that we could have more effectively focussed our efforts and seen the impacts of our actions with higher granularity. We aim to improve this with the roll out of our smart metering programme, and the support of our new Data and Insights Business Manager.
- Our Active Leakage Management plan was effective but would have been more so with additional resources which has now been rectified.
- The development of our internal Production Plan will ensure 'summer readiness'
- We maintained supplies throughout the summer without the use of restrictions, despite record levels of demand.

Based on this review of summer 2022, we are not planning on making any changes to our current Drought Plan. However, once the Production Plan is produced, we will reassess that decision and work closely with the Environment Agency to agree on next steps.