Final Draft Water Resources Management Plan 2024

Annex 16: Common Understanding of Bulk Transfers between Southern Water and Portsmouth Water

May 2025

Portsmouth Water

WATER for LIFE

from Southern Water

Contents

List of Tables

List of Figures

Glossary

Acronym	Term
DO	Deployable Output
HAZ	Hampshire Andover WRZ (Western area)
HKS	Hampshire Kingsclere (Western area)
HWZ	Hampshire Winchester (Western area)
HRZ	Hampshire Rural (Western area)
HSE	Hampshire Southampton East (Western area)
HSW	Hampshire Southampton West (Western area)
IOW	Isle of Wight (Western area)
SNZ	Sussex North (Central area)
SWZ	Sussex Worthing (Central area)
SBZ	Sussex Brighton (Central area)
KME	Kent Medway East (Eastern area)
KMW	Kent Medway West (Eastern area)
KTZ	Kent Thanet (Eastern area)
SHZ	Sussex Hastings (Eastern area)
WRSE	Water Resources South East
WRZ	Water Resource Zone
WSW	Water Supply Works
WTW	Wastewater Treatment Works

1 Introduction

1.1 Common understanding

Southern Water and Portsmouth Water published their draft Water Resources Management Plans (dWRMP24s) in November 2022 for a 14-week consultation that ended in February 2023. Following consultation on the dWRMP24, Southern Water revised the dates for some of its schemes. This represents a material change to the dWRMP24 that was consulted upon. Southern Water reconsulted on its revised dWRMP24 (rdWRMP24) from 11th September – 4th December 2024.

Portsmouth Water amended its dWRMP24 to recognise feedback from customers, regulators and stakeholders and formally submitted a rdWRMP24 to the Secretary of State in late 2023. This was published as final in October 2024.

The dWRMP24s published by both companies and rdWRMP24 published by Southern Water, included several bulk transfers (imports and exports) that represent key links between the two companies. Revised versions of this annex provide a common understanding of these bulk supplies and the way they are expected to be utilised over the duration of the companies' plans, from 2025 to 2075. They have also presented the results of sensitivity testing to explore the impact of scheme delays on customer supplies and the volumes of water that could then be provided through existing bulk transfers.

The timing of investments and utilisation data presented in this annex, including that from sensitivity testing, are based on the output of investment modelling by the Water Resources South East (WRSE) group comprising Affinity Water, Portsmouth Water, SES Water, Southern Water, South East Water and Thames Water. The model has been used to develop the Best Value Plan (BVP) for the WRSE region, which is reflected in the WRMP24s of the individual WRSE member companies.

Version 1.0 of this annex was originally submitted as part of the rdWRMP24 by Portsmouth Water and the interim rdWRMP24 by Southern Water submitted to Defra in August 2023, following consultation on the dWRMP24s. It has now been updated for submission as part of Southern Water's rdWRMP24 re-consultation exercise and is incorporated in Portsmouth Water's Final WRMP24, that was published in October 2024.

The changes to Southern Water's fdWRMP24 do not materially change the contents of this annex from the version that was submitted in August 2023. This annex was updated to be fully consistent with Southern Water's rdWRMP24, the final Portsmouth Water WRMP24 and to present the results of new sensitivity testing.

Section 2 of this annex describes the areas supplied by Southern Water and Portsmouth Water and the bulk transfers between the companies included in both the WRSE Regional Plan and the companies' individual WRMP24s.

Section 3 presents a summary of the existing imports and exports as well as the Havant Thicket Reservoir approved scheme and associated bulk supply.

Section 4 presents changes to the baseline imports and exports as set out in dWRMP24s of both companies.

Section 5 covers sensitivity testing and Section 6 describes the next steps to provide a forward look.

1.2 Representations on the dWRMP24s

In its feedback to Southern Water's dWRMP24, the Environment Agency sought clarifications on the bulk transfers between the two companies. These are discussed below.

1.2.1 Proposed bulk supply from Southern Water to Portsmouth Water in 2040-41

The options considered for the WRSE Regional Plan included an option to export water from Southern Water's Itchen Water Supply Works (WSW) to Portsmouth Water's Source A. This option is selected from 2040-41. The Environment Agency sought further clarity on this option and in particular its implications on the River Itchen catchment.

This transfer does not impact the River Itchen and will ultimately be supported by:

- a new import from Thames Water to Southern Water (Thames to Southern Transfer – T2ST), and
- the Hampshire Water Transfer and Water Recycling Project (HWTWRP).

Further information on the utilisation of this bulk supply is provided in Section 4.4 of this annex.

1.2.2 Existing bulk supply from Portsmouth Water to Southern Water in Sussex

The Environment Agency also sought further clarity on Portsmouth Water's bulk supply to Southern Water's Sussex North Water Resource Zone (SNZ) in the Central area. The Environment Agency wanted Southern Water to:

- communicate clearly with Portsmouth Water around the potential risk of this bulk supply transfer, timeline for delivery and any agreement between the two companies, and
- to consider a Contingency Plan and a potential alternative option to address the risk.

Southern Water and Portsmouth Water have agreed that this bulk supply can continue to be included in the WRMP24s for up to 15Ml/d on a 'best endeavours' basis. Regular dialogue between the companies and a consistent use of the water reservation capability in the contractual arrangements surrounding the transfer goes a long way to mitigating any risk.

However, Southern Water's Drought Plan contains a toolbox of interventions which could be implemented if the full 15Ml/d bulk supply was not available. In addition, it has considered contingency options (Annex 21 to the fdWRMP24) which could be implemented if the need arose.

In developing Southern Water's rdWRMP24 and the subsequent final draft WRMP24 (fdWRMP), the following scenarios have been considered:

- The bulk import is limited to 2.5Ml/d under normal year conditions but available at 15Ml/d during drought conditions.
- The bulk import is limited to 5Ml/d under all planning scenarios.
- The bulk imports is limited to 10Ml/d under all planning scenarios.

The results are discussed in Section 4. Southern Water and Portsmouth Water will continue to work together on a joint Pywr water resources model to validate the WRSE BVP solutions at a network/hydrological scale.

1.2.3 Planned additional 9Ml/d bulk supply from Portsmouth Water Source J to Southern Water in Hampshire from 2024-25

This bulk supply was included in Southern Water's Water Resources Management Plan 2019 (WRMP19) as well as Portsmouth Water's WRMP19 and retained in both companies' WRMP24/fdWRMP24.

Following detailed investigation work, Portsmouth Water no longer considers the additional 9Ml/d supply to Southern Water's Western area to be viable (see Section 3.3). The Environment Agency asked Southern Water to update its WRMP24 in line with the outcome of Portsmouth Water's investigations.

This option was removed from Southern Water's constrained list of options for the interim rdWRMP24 once Portsmouth Water confirmed that this option was no longer feasible. It remains excluded from Southern Water's rdWRMP24 and fdWRMP.

1.2.4 Transfer utilisation information

In its representation to Portsmouth Water's dWRMP24 consultation, the Environment Agency asked for information on utilisation of these transfers. This is provided in Sections 3 and 4.

2 Supply Areas and Existing Transfers

2.1 Southern Water supply area

Southern Water provides water services to nearly 2.6 million customers and wastewater services to nearly 4.6 million customers across an area of 4,450 square kilometres, extending from Kent in the east, through parts of Sussex, to Hampshire and the Isle of Wight in the west. The region supplied by Southern Water is divided into three areas (Western, Central and Eastern) and 14 WRZs (Figure 1). It also provides wastewater services, including in areas where water is supplied by other water companies.

Water supplies are largely reliant on groundwater from the widespread chalk aquifer that sits under much of the region. Groundwater makes up around 70% of its total water supply. Groundwater is also important in maintaining flows to the River Test and River Itchen in Hampshire.

River abstractions account for 23% of Southern Water's water supplies. Four surface water impounding reservoirs provide the remaining 7% of supplies: Bewl Water, Darwell, Powdermill and Weir Wood. The total storage capacity of these four reservoirs is 42,390 million litres (Ml). South East Water is entitled to 25% of the yield from the River Medway Scheme, which incorporates the storage within Bewl Water Reservoir.

In addition to South East Water, Southern Water shares borders with Affinity Water, Portsmouth Water, SES Water, South West Water, Thames Water and Wessex Water. Water is shared between Southern Water and a number of these companies through existing pipelines.

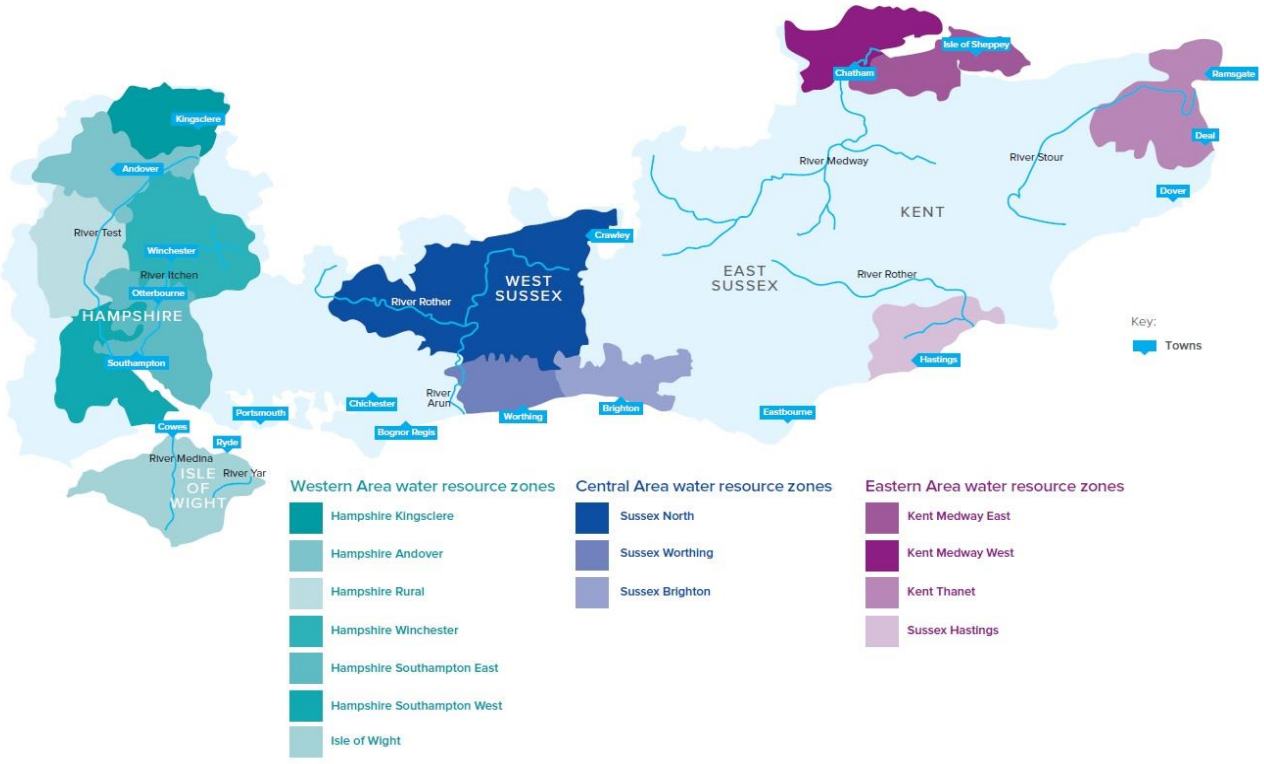

Figure 1: The Southern Water supply area.

2.2 Portsmouth Water supply area

Portsmouth Water has been providing Portsmouth and the wider surrounding area with high quality drinking water since 1857. Through amalgamation over time, the supply area has expanded beyond Portsmouth to

supply the towns of Gosport, Fareham, Havant, Chichester and Bognor Regis, in the counties of Hampshire and West Sussex (see Figure 2). It consists of a single WRZ.

On average, Portsmouth Water distributes around 175 million litres of water each day to over 740,000 customers in around 320,000 properties. It also provides water to Southern water. Portsmouth Water only supplies drinking water to its customers. Southern Water provides the wastewater service to Portsmouth Water customers.

Figure 2: The Portsmouth Water supply area

2.3 Interactions between Southern Water and Portsmouth Water supply areas

A Pywr (Python for Water Resources) model represents how water moves through the water network to the end user. The model can also be used to measure water system resilience and robustness to certain climates and to test what infrastructure investments and policies may be needed in order to ensure resilient water supplies.

Southern Water and Portsmouth Water have built a high-level WRSE Pywr model for Southern Water's Western area and Portsmouth Water's supply area to develop a more granular Pywr model, reflecting the network and known river and groundwater constraints in more detail. The aim of this exercise was to understand how the Havant Thicket Reservoir provides conjunctive-use benefit with the Hampshire Water Transfer and Water Recycling Project (HWTWRP), at key time intervals (2030, 2040 and 2050) in the network development. As a result of this further work since the initial publications of the dWRMP24s, the size variants of the water recycling plant at Portsmouth Harbour Wastewater Treatment Works (WTW) have been revised to 20Ml/d, 40Ml/d and 60Ml/d. Consequently, the minimum water recycling plant capacity has been uplifted from 15Ml/d to 20Ml/d.

The results of the Pywr modelling were incorporated in the revised draft Regional Plan, Portsmouth Water's rdWRMP24 and Southern Water's interim rdWRMP24, all submitted to Defra in August 2023. They were also incorporated into Portsmouth Water's Final WRMP24 published in October 2024 and Southern Water's fdWRMP24. The use of coherent datasets and assumptions by companies means that the transfers can be more appropriately considered.

A summary of key transfers between Southern Water and Portsmouth Water supply areas, as included in the revised draft Regional Plan and fdWRMP24 of Southern Water and the Final WRMP24 of Portsmouth Water, is shown in Figure 3. The interactions develop over time to include Havant Thicket Reservoir and the HWTWRP as discussed in later sections of this annex.

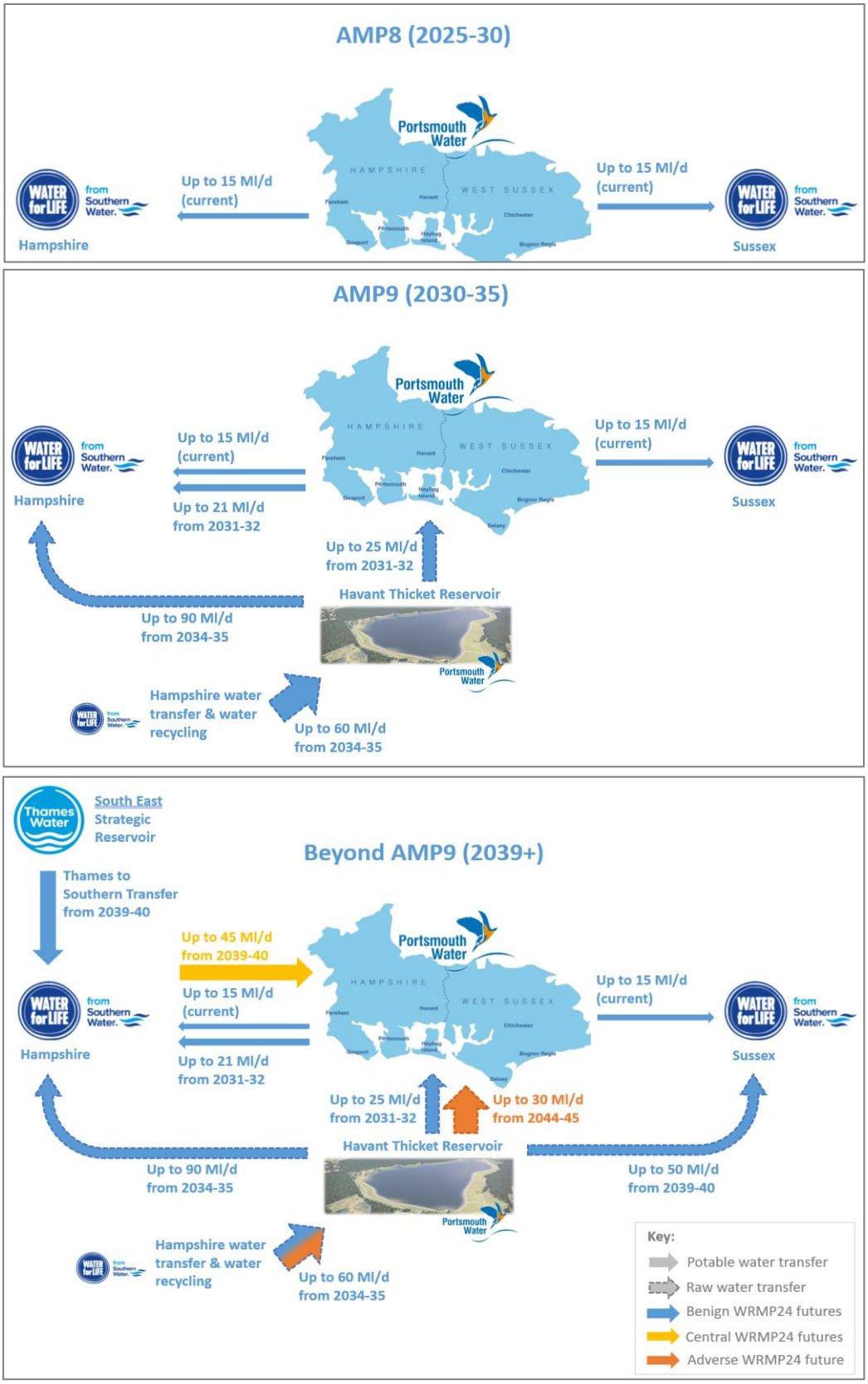

Figure 3: Summary of interactions between Southern Water and Portsmouth Water supply areas

3 Baseline Imports and Exports

3.1 Summary of existing imports and exports

Southern Water has several bulk transfer agreements with its neighbouring water companies, including Portsmouth Water. It also transfers water across its WRZs (Table 2). In addition, it provides non-potable supplies to two large industrial users; one in the Hampshire Southampton West WRZ (HSW) and the other in the Sussex Hastings WRZ (SHZ).

For the purposes of developing the WRMP24s, it is assumed that all existing transfers will continue until the expiry year of their contracts, unless there is a specific option to modify any of them at an earlier date.

Beyond their expiry date the WRSE investment model treats these existing bulk transfer agreements as options to use if required.

Table 1: Southern Water's existing bulk transfers with neighbouring water companies

Type[1]	Donor WRZ[2]	Recipient WRZ[2]	Potable or raw	Maximum volume (Ml/d)	Contract expiry
Export to AFW	KTZ	RZ7	Potable	1.24	
Export to SEW	KME	RZ6	Potable	7.8	
Export to SEW	KMW	RZ7	Potable	12.3	
Export to SEW	KMW	RZ7	Raw		
Export to SEW	SHZ	RZ3	Raw	8/17th of Bewl/Darwell Yield	
Export to SEW	KME	RZ6	Potable	7.5	
Export to SEW	KMW	RZ6	Potable	0.5	
Export to SEW	SNZ	RZ5	Potable	5.4	2031
Export to WSX	HAZ	WSX	Potable	0.41	
Import from AFW	RZ7	KTZ	Potable	0.1	
Import from SES	SES	SNZ	Potable	0.8	2025-26
Import from PRT	PRT	HSE	Potable	15.0	2028-29
Import from PRT	PRT	SNZ	Potable	15.0	2026
SEW bulk supply near Canterbury	SEW	KTZ	Potable	2	tbc[2]

[1] AFW = Affinity Water, PRT = Portsmouth Water, SES = SES Water, SEW = South East Water, WSX = Wessex Water
[1] HAZ = Hampshire Andover, KME = Kent Medway East, KMW = Kent Medway West, RZ = Resource Zone, SHZ = Sussex Hastings, SNZ = Sussex North

Table 2: Southern Water's existing interzonal transfers

Donor WRZ[1]	Recipient WRZ[1]	Link	Potable or Raw	Maximum volume (Ml/d)
HRZ	HSE	Interzonal Transfer (HSE-HRZ) Abbotswood - existing	Potable	5.1
HSE	IOW	Interzonal Transfer (HSW-IOW) Cross-Solent main existing	Potable	20.0
HSE	HWZ	Interzonal Transfer (HWZ-HSE) Existing Transfer	Potable	9.6
HSW	HSE	Interzonal Transfer (HSW-HSE) Existing Transfer	Potable	16.8
HSW	HSE	Interzonal Transfer (HSW-HSE) Existing Transfer	Potable	2.7
HSW	HSE	Interzonal Transfer (HSW-HSE) Existing Transfer	Potable	5.6
HSW	HRZ	Interzonal Transfer (HSW-HSE) Romsey Town and Broadlands Valve	Potable	3.1
SNZ	SWZ	Interzonal Transfer (SWZ-SNZ) Rock Road bi-directional - existing	Potable	11.8
SWZ	SNZ	Interzonal Transfer (SWZ-SBZ) V6 Valve Additional capacity	Potable	13.1
SWZ	SBZ	Interzonal Transfer (SWZ-SBZ) V6 Valve - existing	Potable	16.8

Donor WRZ[1]	Recipient WRZ[1]	Link	Potable or Raw	Maximum volume (Ml/d)
KME	KTZ	Interzonal Transfer (KTZ-KME) Existing Transfer	Potable	12.0
KMW	KME	Interzonal Transfer (KMW-KME) Existing Transfer	Potable	37.1

[1]HAZ = Hampshire Andover, HRZ = Hampshire Rural, HSE = Hampshire Southampton East, HSW = Hampshire Southampton West, KME = Kent Medway East, KMW = Kent Medway West, KTZ = Kent Thanet, SBZ = Sussex Brighton, SWZ = Sussex Worthing, SNZ = Sussex North

3.2 Existing Portsmouth Water export to Southern Water in Sussex

Portsmouth Water has an existing bulk supply agreement with Southern Water to supply SNZ. The required infrastructure was constructed in 2004.

The maximum transfer rate is 15Ml/d and only allows water to flow from Portsmouth Water to Southern Water. There is a cross connection between the bulk supply to SNZ and an existing Southern Water main to its Sussex Worthing WRZ (SWZ). This connection provides operational flexibility for Southern Water but does not increase the total transfer capacity.

Within the WRSE investment model, the existing 15Ml/d bulk supply to SNZ is treated as part of the baseline until 2025-26, beyond which point it becomes an option that can be selected if required.

For the purpose of WRMP24, WRSE has considered 9 possible supply-demand balance 'futures' or 'situations' based on different combinations of population growth, climate change and Environmental Destination scenarios. Situation 1 is the most challenging i.e. has the greatest projected supply-demand balance deficit, and Situation 9 is the least challenging. Situation 4 is the reported pathway for Southern Water and Portsmouth Water's respective WRMP24s and is used for populating WRMP24 tables. The utilisation of this transfer across 9 supply-demand balance situations is shown in Figure 4.

The utilisation is also shown for different drought severities, from a normal year scenario, through to a hybrid 1-in-200 year to 1-in-500 year scenarios. The 1-in-500 scenario is considered both under 'average' and 'critical period' conditions. The utilisation plot for the 'critical period' reflects utilisation under a peak summer demand scenario.

Under all the situations and drought scenarios, the model uses the full 15Ml/d transfer during the first year of the WRMP24 planning period, meeting the maximum contractual transfer rate.

Once the transfer becomes optional, the utilisation is low under normal year conditions, until 2033-34. However in the drought scenarios, the transfer is utilised at the full 15Ml/d rate during the period 2025-26 to at least 2033-34. Beyond 2033-34, the utilisation is variable, depending on the supply-demand balance situation.

In Situation 4, the annual average export eventually lowers to zero. This is due to a reduction in the volume of water available for Portsmouth Water to supply rather than a reduction in need from Southern Water. The reduction in water available is due to higher levels of environmental protection and climate change impacts resulting in abstraction reduction, as well as increased demand due to population growth and climate change. However, Portsmouth Water is able to provide the supply for a short duration over the 1-in-500 'critical period'.

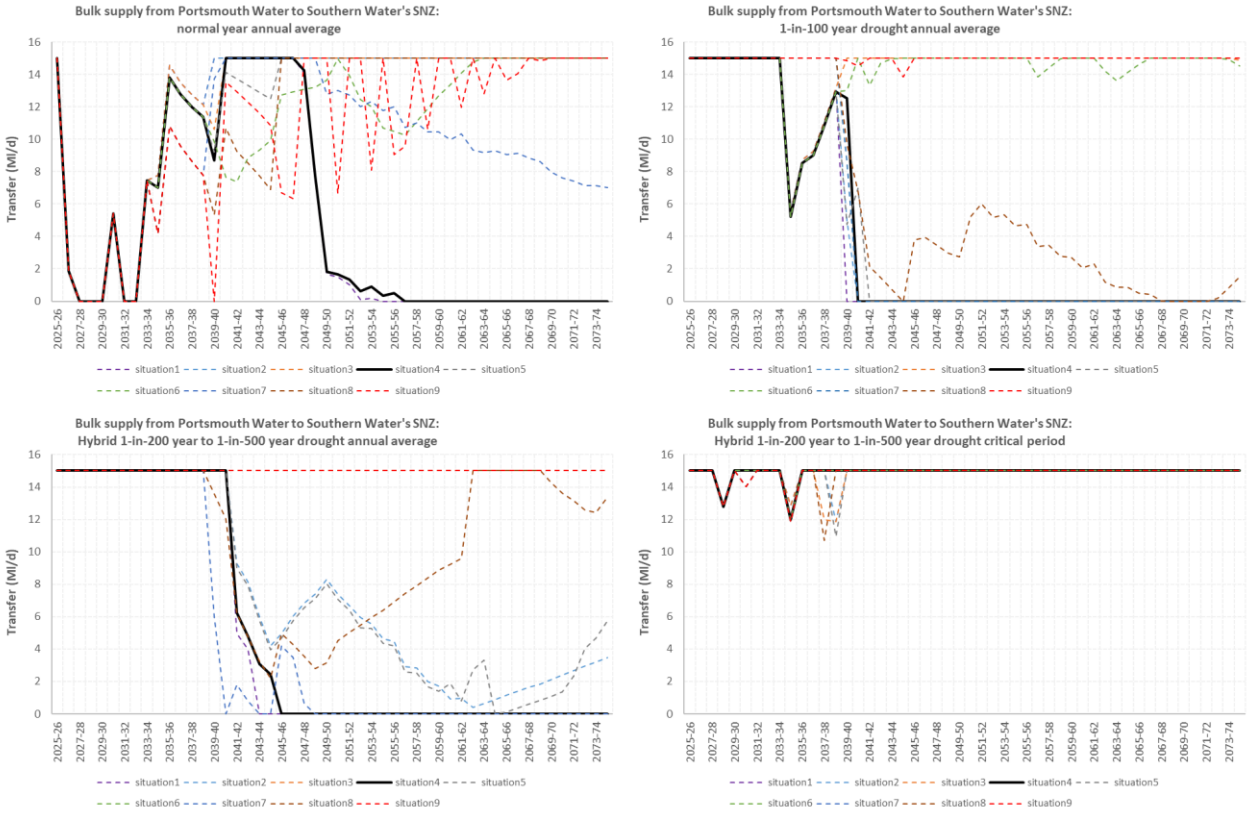

Figure 4: Utilisation of the 15Ml/d capacity export from Portsmouth Water to Southern Water's SNZ.

3.3 Existing Portsmouth Water export to Southern Water in Hampshire

Portsmouth Water has an existing bulk supply agreement with Southern Water to supply its Hampshire Southampton East (HSE) WRZ for up to 15Ml/d. Water is abstracted from the River Itchen at Portsmouth Water Source A, treated at a Portsmouth Water treatment works and then transferred to Southern Water.

Initially, Portsmouth Water's dWRMP24 included the provision to increase the supply by another 9Ml/d following planned enhancements to its Source J in 2024-25. However, as was previously stated in WRMP19, the ability to provide this additional bulk supply was dependent upon the success of borehole investigations at Source J and Portsmouth Water's subsequent ability to license the required assets.

The subsequent groundwater investigations have concluded that Portsmouth Water will not be able to provide the additional 9Ml/d bulk supply to Southern Water. Therefore, the option to increase the bulk capacity was removed from both companies' rdWRMP24.

In the WRSE investment model, the existing 15Ml/d bulk supply to HSE is treated as part of the baseline until 2028-29, beyond which it becomes an option that can be selected if needed.

Under all supply-demand balance situations and planning scenarios, the model uses the full 15Ml/d transfer until 2028-29. Once the transfer becomes optional, the utilisation is maintained at 15Ml/d under normal year conditions until 2038-39. The transfer is also needed in drought scenarios, but the utilisation is variable, depending on the adaptive planning situation (Figure 5).

In Situation 4, the annual average export is reduced to zero under normal year, 1-in-100 year and 1-in-500 year planning scenarios as Portsmouth Water no longer has the resources to maintain this supply due to

higher levels of environmental protection, population growth and climate change. However, the potential to provide the supply over a short period of time during the 1-in-500 ‘critical period’ is retained.

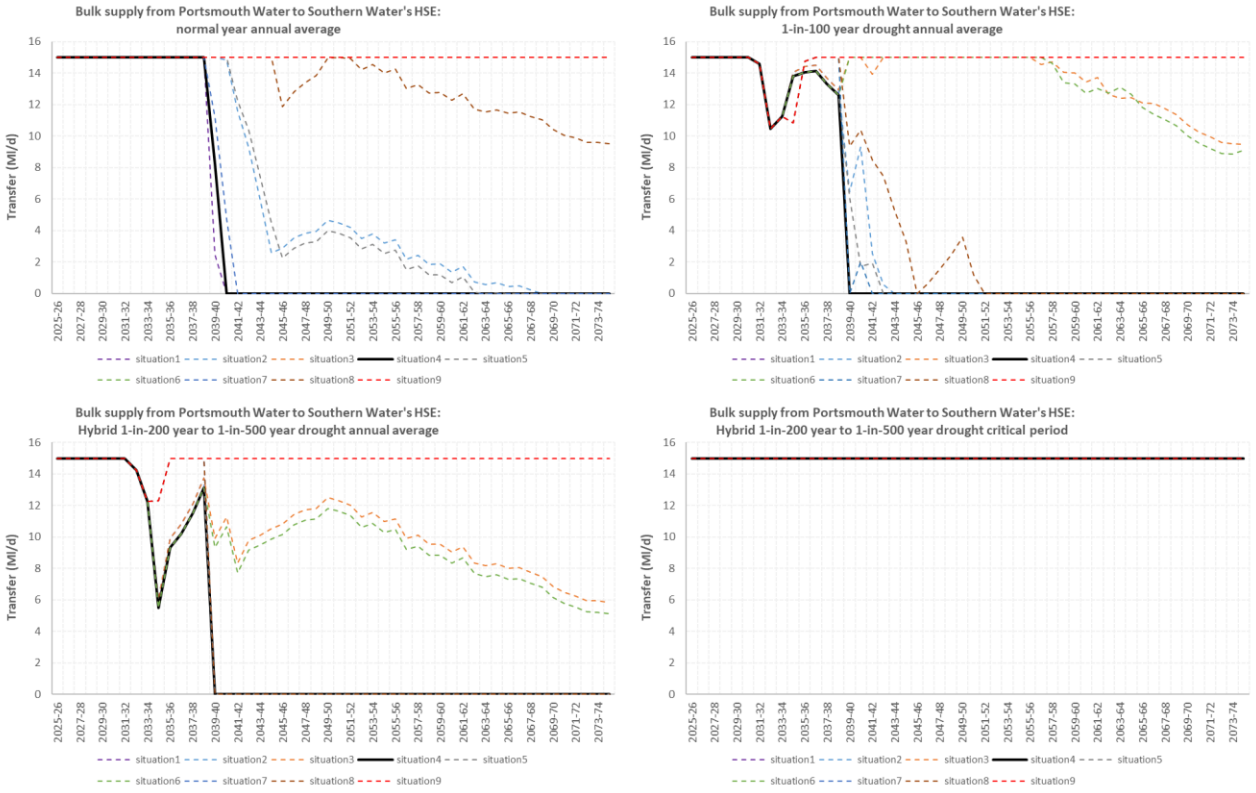

Figure 5: Utilisation of the 15Ml/d capacity export from Portsmouth Water to Southern Water’s HSE.

3.4 Havant Thicket Reservoir Approved Scheme and associated bulk supply

Portsmouth Water’s dWRMP24 baseline includes the Havant Thicket Reservoir Approved Scheme, which involves filling the reservoir with chalk spring water in the winter and re-abstraction in a drought, to support a new 21Ml/d treated bulk export to HSE from 2029-30. The scheme is referred to as the ‘Approved Scheme’ in this document because it has received planning permission and construction of the reservoir has begun.

The HWTWRP is a separate Southern Water scheme that involves transferring recycled water from Portsmouth Harbour WTW to Havant Thicket Reservoir, before transferring it onward to Itchen WSW. The HWTWRP is undergoing public consultation in Summer 2024 and the modelled utilisation of this scheme within the regional plan is presented separately in Section 4.5.

A key change since the dWRMP24 is that the year of first possible use for the Approved Scheme has been revised from 2029-30 to 2031-32. The delay is the result of an opportunity to future proof the scheme by allowing for a tunnelled connection with HWTWRP, if approved, along with other geotechnical engineering factors which have come to light. This adjustment is included in the WRSE investment model and Southern Water’s interim rdWRMP24.

The Deployable Output (DO) benefit (including conjunctive-use benefits) to Portsmouth Water from the Havant Thicket Reservoir Approved Scheme across different adaptive planning situations and drought scenarios is shown in Figure 6. No water is taken from the reservoir to support this transfer under normal year conditions, but it is taken under drought conditions, as originally planned.

The utilisation of the treated supply to Southern Water across different adaptive planning situations and drought scenarios is shown in Figure 7. The full 21Ml/d capacity of this transfer is utilised from 2031-32 under all drought planning scenarios and supply-demand situations as per the contractual arrangement, which is supported by Portsmouth Water abstraction from the Havant Thicket Reservoir.

Under normal year conditions, a 1Ml/d 'sweetening' flow is allowed. This is required to keep the pipeline operational. Portsmouth Water will not take water from Havant Thicket Reservoir unless there is an emergency, such as drought. Under normal year conditions any export to HSE will be supported by existing Portsmouth Water groundwater and surface water sources.

Constraining the normal year flow for the transfer in the model to 1Ml/d is necessary to avoid the model promoting a growth in abstraction from the Chalk catchments in Portsmouth Water's supply area.

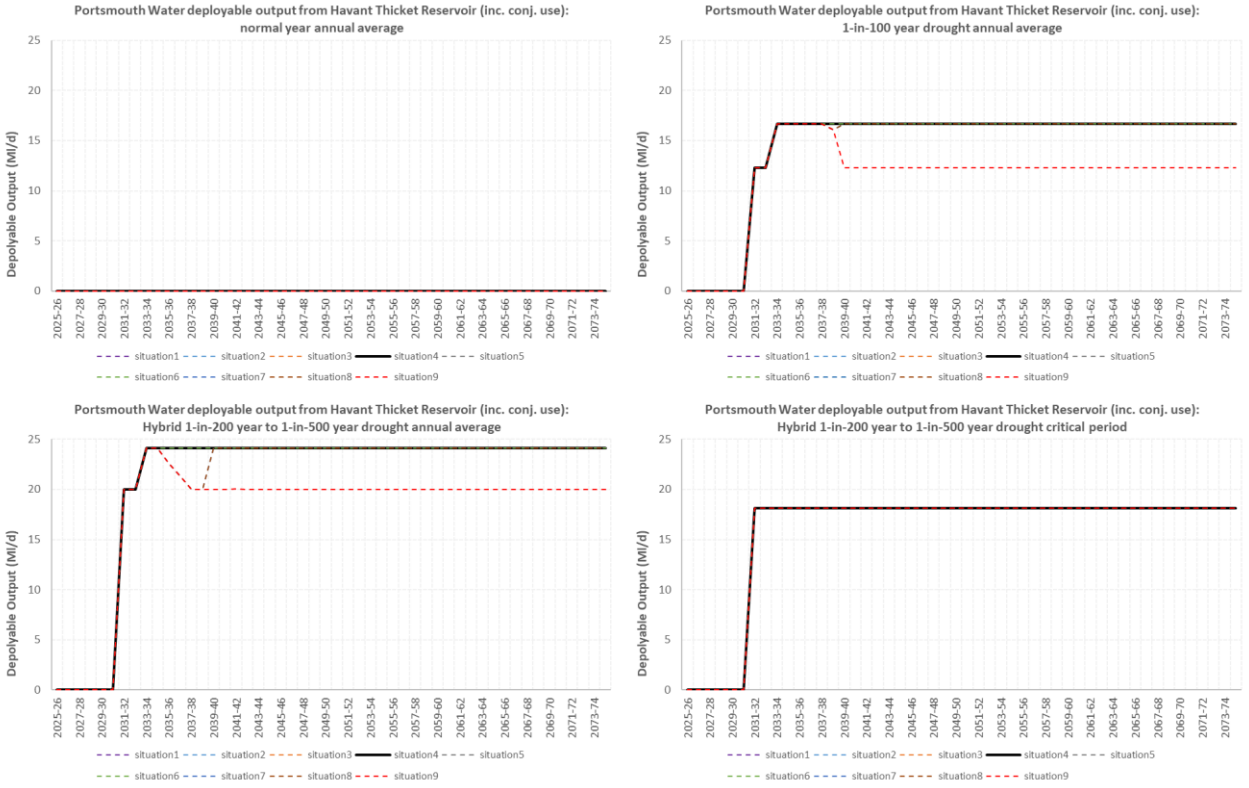

Figure 6: Deployable Output linked to Havant Thicket Reservoir Approved Scheme.

Figure 7: Utilisation of the 21Ml/d capacity export from Portsmouth Water to Southern Water's HSE, associated with the Havant Thicket Reservoir Approved Scheme.

4 WRMP24 Changes to the Baseline Position

4.1 Southern Water's Hampshire Grid

In addition to Southern Water's existing interzonal transfers, Southern Water's supply forecast for the Western area has been developed assuming implementation of the 'Hampshire Grid' which were selected as preferred options in WRMP19 to improve connectivity across Hampshire and reduce drought risks. The transfers are planned to improve connectivity between HAZ, HRZ, HWZ, HSE and HSW. These transfers are being developed as part of Southern Water's Water for Life Hampshire programme and would allow some of the existing WRZs in Hampshire to be amalgamated in larger WRZs in future. Their design capacities are summarised in Table 3.

Table 3: Hampshire grid transfer options currently being developed

Donor WRZ	Recipient WRZ	Link	Potable or Raw	Maximum volume (Ml/d)
HSE	HWZ	Interzonal transfer (HSE-HWZ): Itchen WSW to Yew Hill WSW bi-directional (74Ml/d)	Potable	74.0
HWZ	HSE	Interzonal transfer (HSE-HWZ): Itchen WSW to Yew Hill WSW bi-directional (74Ml/d)	Potable	74.0
HSW	HAZ	Interzonal transfer (HWZ-HAZ): Winchester to Andover bi-directional (15Ml/d)	Potable	15.0
HAZ	HSW	Interzonal transfer (HWZ-HAZ): Winchester to Andover bi-directional (15Ml/d)	Potable	15.0
HSW	HSW	Interzonal transfer (HSE-HSW): Yew Hill WSW to River Test WSW bi-directional (60Ml/d)	Potable	60.0
HSW	HSW	Interzonal transfer (HSE-HSW): Yew Hill WSW to River Test WSW bi-directional (60Ml/d)	Potable	60.0
HSW	HRZ	Interzonal transfer (HSW-HRZ): Romsey Town and Broadlands valve expansion (5Ml/d)	Potable	5.0
HRZ	HSW	Interzonal transfer (HSW-HRZ): Romsey Town and Broadlands valve expansion (5Ml/d)	Potable	5.0

4.2 HWTWRP and the Havant Thicket Reservoir to Itchen WSW raw water transfer

Southern Water's dWRMP24 included the first use of the HWTWRP option in 2030-31. This scheme includes a water recycling plant at Portsmouth Harbour WTW that transports recycled water to Havant Thicket Reservoir and a new raw water transfer from Havant Thicket Reservoir to Southern Water's Itchen WSW in HSE. Following a detailed evaluation of the risks involved in the delivery of this scheme, the first year of use for the HWTWRP is revised to 2034-35.

The DO from water recycling within the HWTWRP (excluding conjunctive use benefits) across different adaptive planning situations and drought scenarios is shown in Figure 8. A minimum 20Ml/d sweetening flow is required to keep the pipeline and the water treatment works operational. In the first five years of use, the HWTWRP provides between 20Ml/d and 30Ml/d. From 2039-40 the utilisation increases to 60Ml/d in most years for Situation 4, initially to facilitate the raw water transfer and satisfy demand in the Southern Water's Western area, although that changes further into the future. Although the WRSE investment model had the option of selecting modular increases in the capacity of the water recycling plant, the 60Ml/d capacity variant is selected from the very start (2034-35) under the regional BVP which in turn supports a transfer from Havant Thicket Reservoir to Southern Water's Itchen WSW of up to 90Ml/d.

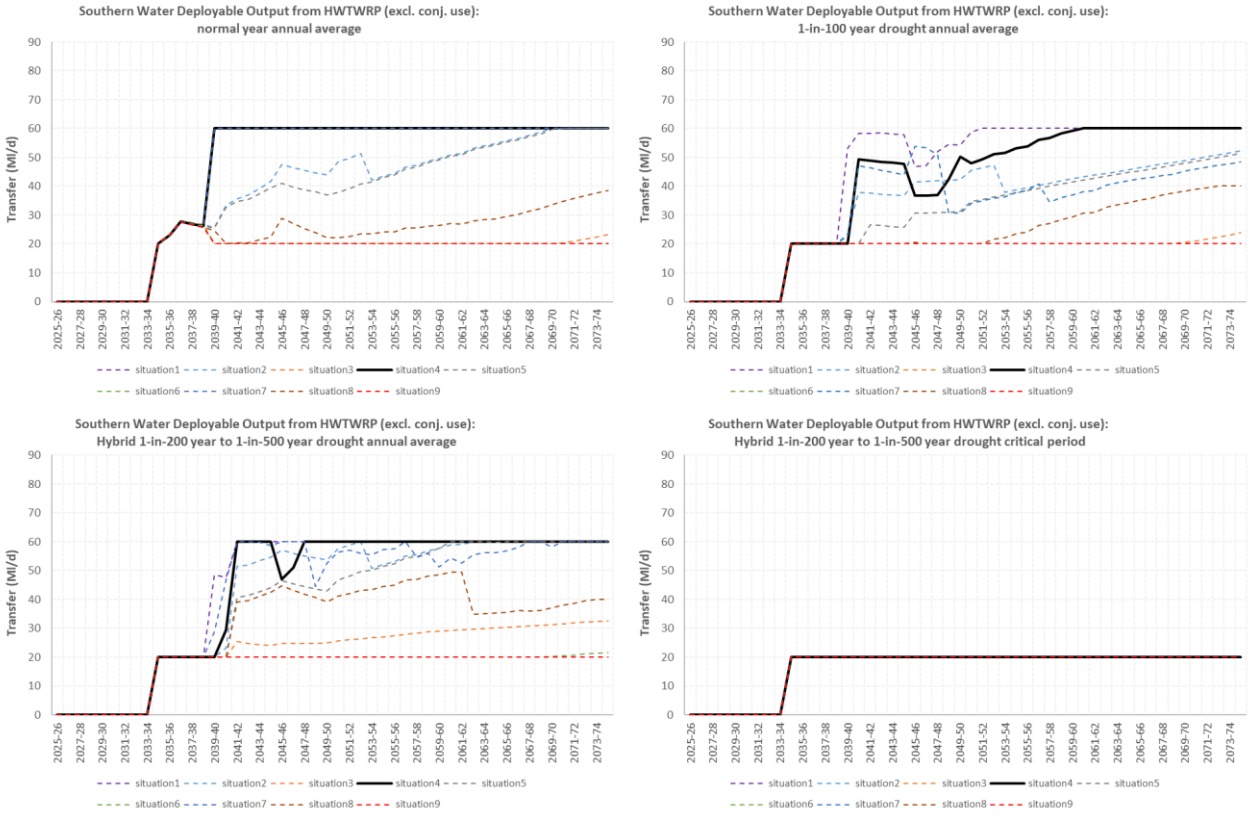

Figure 8: Deployable Output benefit of the HWTWRP, excluding conjunctive use benefits.

The utilisation of the raw water transfer from Havant Thicket Reservoir to Itchen WSW across different adaptive planning situations and drought scenarios is shown in

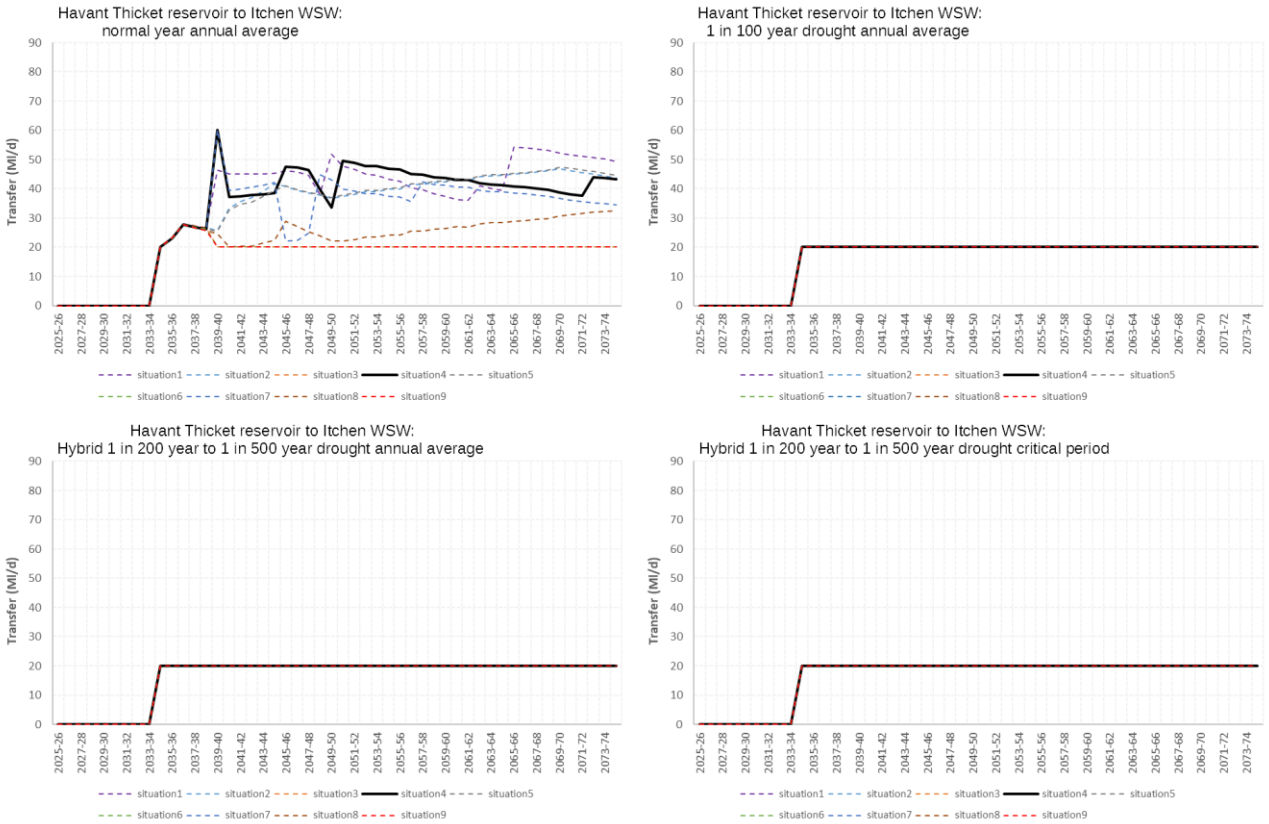

Figure 9. Utilisation is greatest (up to 60Ml/d) and more variable within the normal year scenario. This is driven by Southern Water's Environmental Destination and the lack of conjunctive use benefit in its Hampshire WRZs from the HWTWRP in a normal year. This lack of a conjunctive use benefit was demonstrated by the joint Southern Water and Portsmouth Water Pywr model.

The HWTWRP DO shown in Figure 8 is greater than that transferred to Itchen WSW shown in

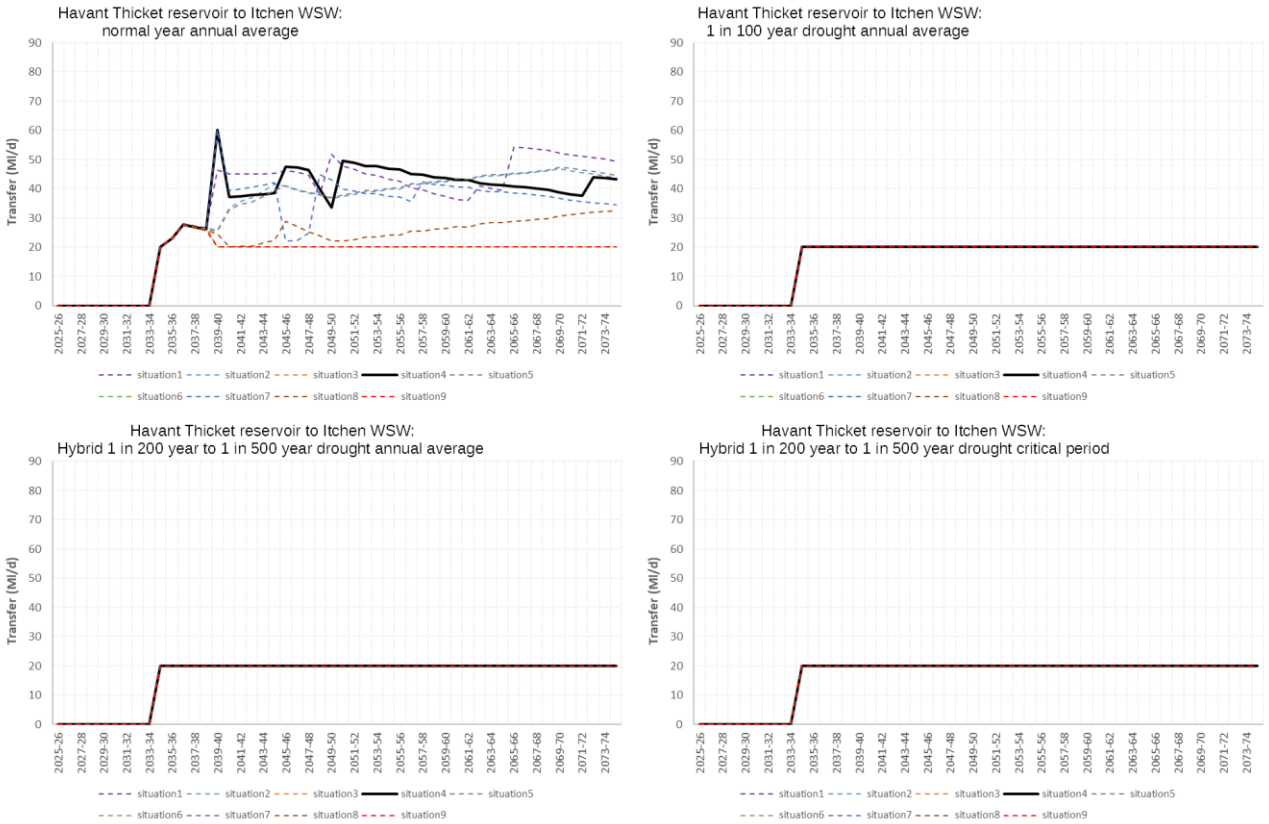

Figure 9. This is because some of the DO from the HWTWRP is transferred via Havant Thicket Reservoir and new pipeline infrastructure to either Southern Water's Pulborough WSW in its SNZ and / or the Portsmouth Water supply area, as discussed later.

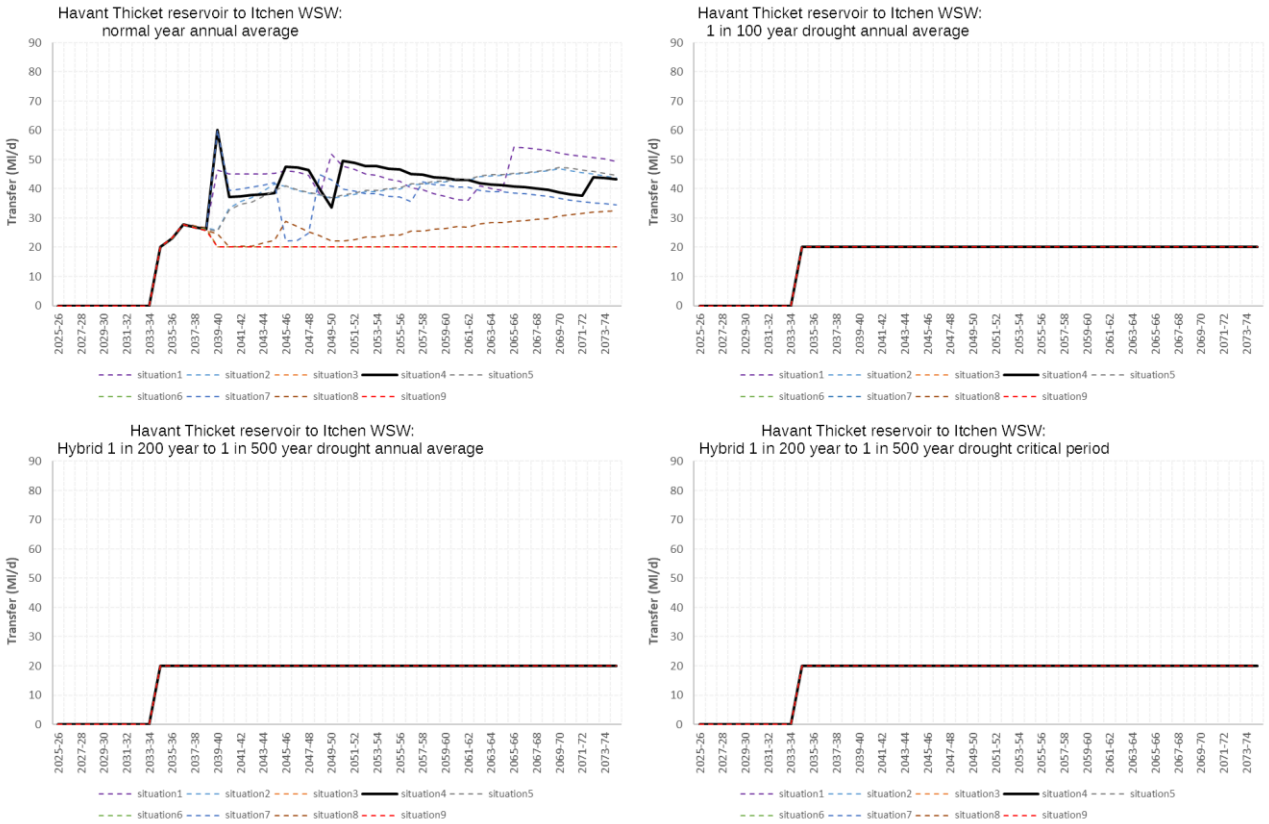

Figure 9: Utilisation of the 90Ml/d capacity transfer from Havant Thicket Reservoir to Itchen WSW in HSE.

4.3 Bulk export from Havant Thicket Reservoir to SNZ

Southern Water's dWRMP24 included the option to develop a new transfer from Havant Thicket Reservoir to Southern Water's Pulborough WSW in SNZ, which is supported by DO from the HWTWRP. This transfer is selected again in the rdWRMP24 and in the fdWRMP.

The utilisation of this raw water transfer to Pulborough WSW across different adaptive planning situations and drought scenarios is shown in Figure 10. The transfer is utilised across most scenarios, although it is not needed in the 1-in-500 critical period scenario.

Utilisation commences in 2039-40 and varies significantly depending on the adaptive planning situations. The peak annual use is constrained to 40Ml/d because the HWTWRP water recycling capacity is 60Ml/d and 20Ml/d is always needed for the sweetening flow to Itchen WSW. Under the reported pathway (Situation 4), the peak utilisation occurs in the early 2040s, utilising the full DO of HWTWRP to meet demand in the Southern Water supply area.

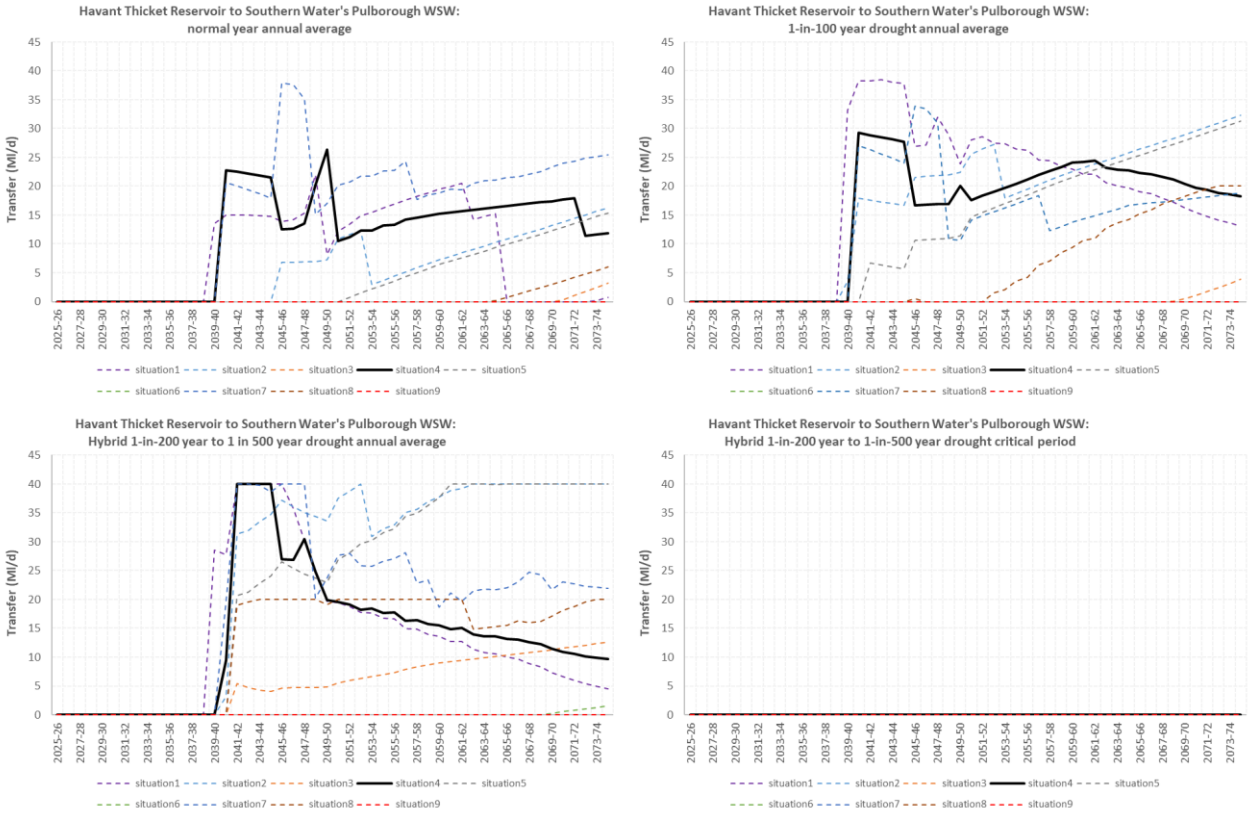

Figure 10: Utilisation of the transfer from Havant Thicket Reservoir to Southern Water's SNZ.

4.4 Southern Water to Portsmouth Water transfer

Portsmouth Water's Final WRMP24 included the option of developing a new treated water import of up to 45Ml/d from Southern Water's HSE. Following the refinement of plans the import is still utilised in the fdWRMP24, but with an earlier start date of 2039-40.

The utilisation of this treated import to Portsmouth Water across different adaptive planning situations and drought scenarios is shown in Figure 11. The transfer is utilised across most scenarios under the reported pathway (Situation 4), but it is not needed in the 1-in-500 year critical period scenario.

The import to Portsmouth Water from 2039-40 is enabled by the implementation of key WRSE regional schemes i.e. HWTWRP, Thames Water's South East Strategic Reservoir Option (SESRO), and a new transfer from SESRO into Southern Water's Hampshire WRZs (T2ST).

The earliest year of benefit from SESRO is 2039-40. Once T2ST is available along with HWTWRP, it creates a surplus water in Southern Water supply area that can be transferred to Portsmouth Water.

The contractual 21Ml/d export from Portsmouth Water to Southern Water under the Havant Thicket Reservoir Approved Scheme (Figure 7), results in a degree of re-circulation of water when considering this alongside the new import from Southern Water to Portsmouth Water (Figure 11). A rethink of contractual arrangements between Southern Water and Portsmouth Water is needed to optimise the bulk transfers between the two companies prior to the development of Water Resources Management Plan 2029 (WRMP29).

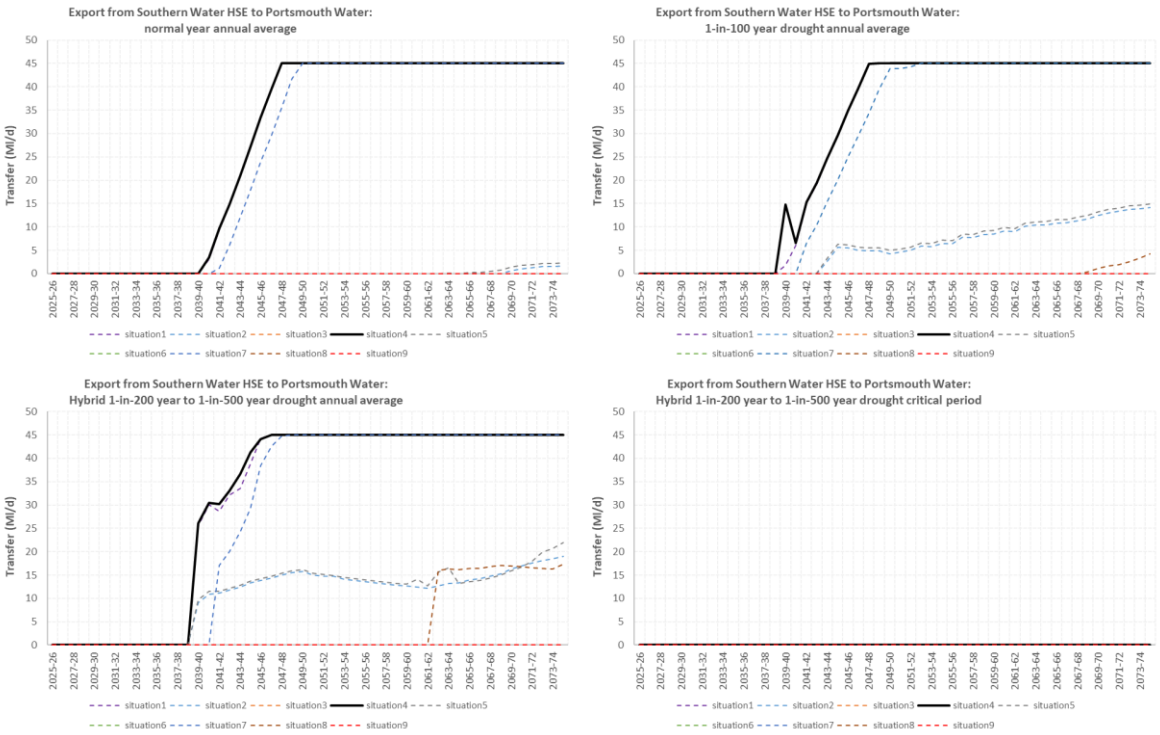

Figure 11: Utilisation of the export from Southern Water to Portsmouth Water.

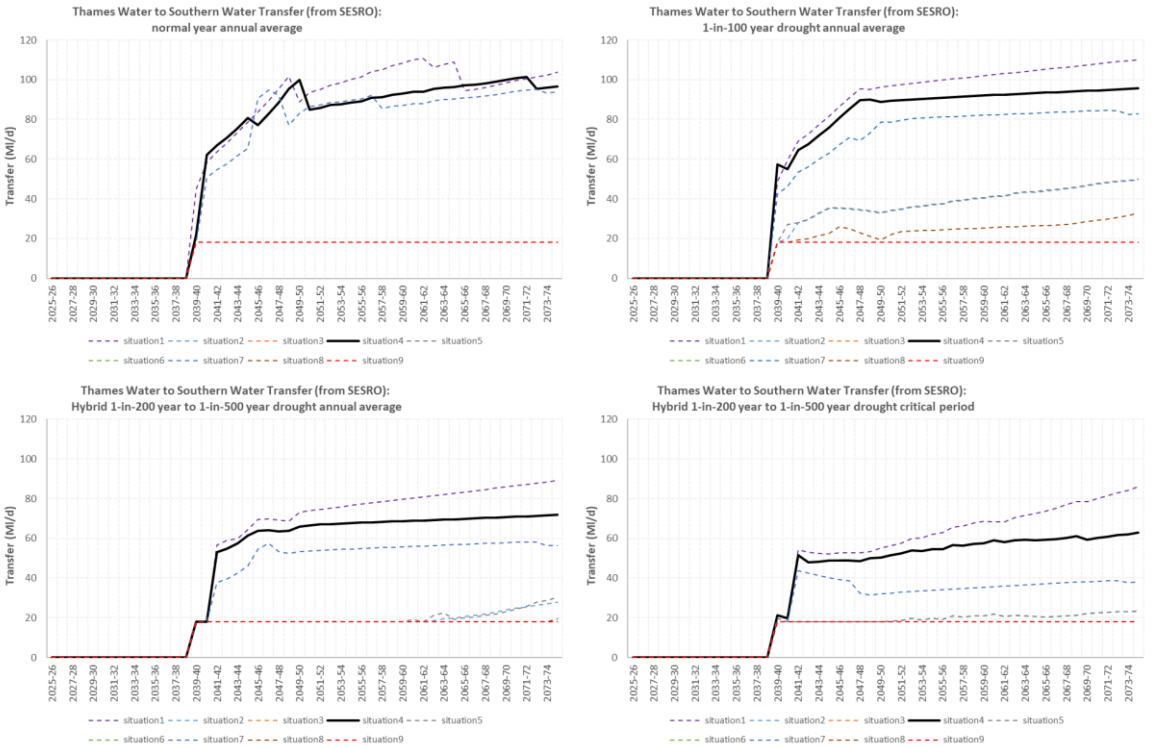

Figure 12: Utilisation of the Thames to Southern Transfer (T2ST) in Southern Water's Hampshire area.

4.5 HWTWRP supply to Portsmouth Water via Havant Thicket Reservoir

Portsmouth Water's WRMP24 shows a need from 2047 onwards for further interconnectivity and treatment capacity to transfer and treat water across its supply area to utilise the water more effectively from Havant Thicket Reservoir. In the dWRMP24 these options were not selected in the reported pathway (Situation 4), but they are selected in the rdWRMP24 driven by the need to find additional water resulting from anticipated higher sustainability reductions in chalk catchments.

The rdWRMP24 suggests this would require up to 20Ml/d of additional treatment works capacity at Portsmouth Water's Works A from the mid to late 2040s and up to 20Ml/d of new treatment works capacity at the location of service Reservoir C from the early 2050s (see Figure 13 and Figure **14**). These options are predicated on the prior construction of the proposed HWTWRP, which provides the source of water. This water is predominantly needed in drought scenarios, and the need for water grows over time. Portsmouth Water also requires a small supply in Situation 4 (up to 5Ml/d) during a normal year beyond the mid-2050s.

The water taken by Portsmouth Water would be blended reservoir water (i.e. with contributions from rainfall, recycled water and spring water).

Portsmouth Water will seek to reduce the dependency on HWTWRP in WRMP29 through the development of new options, although the need for recycled water in a drought is expected to remain. Portsmouth Water recognises that the regulators would prefer it to have a larger volume of water available from a wider pool of feasible options in future WRMPs, now that the magnitude and complexity of the water resources challenge is better understood. The company also appreciates that some of its customers would prefer it to minimise the reliance upon the HWTWRP, particularly under a normal year scenario.

Figure 13: Utilisation of the raw water transfer from HWTWRP to Portsmouth Water Works A via Havant Thicket Reservoir.

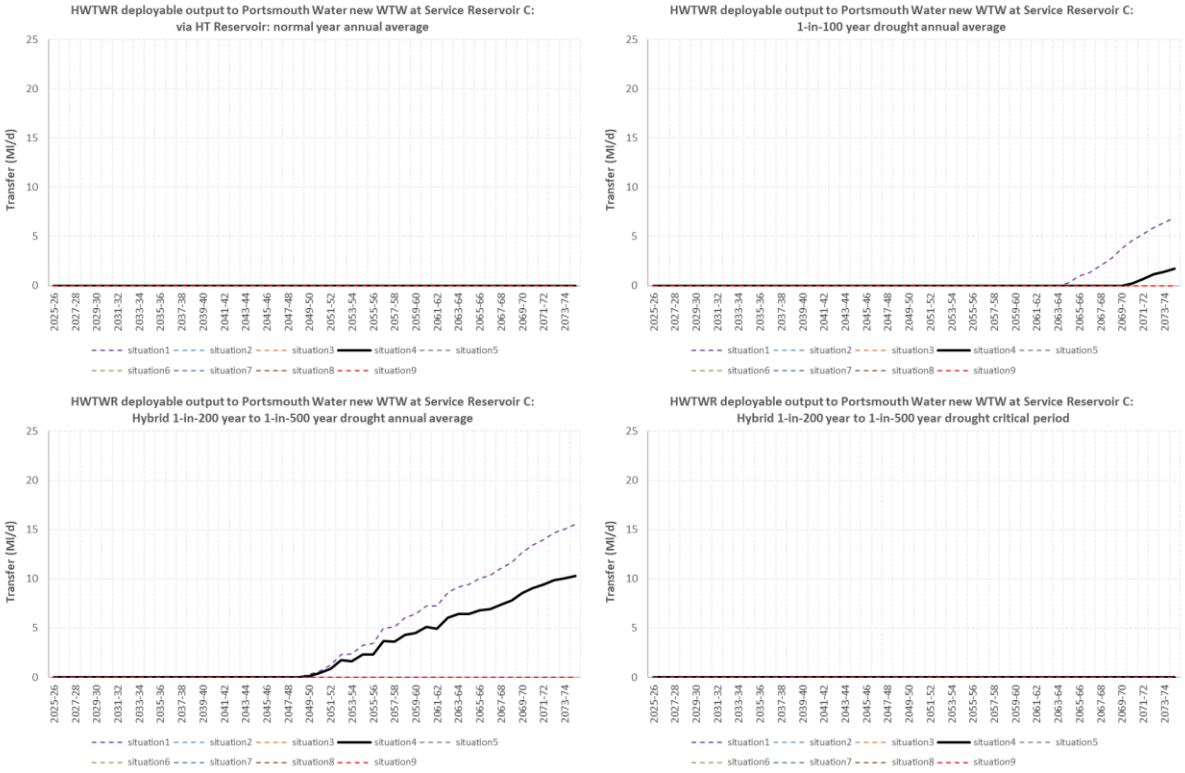

Figure 14: Utilisation of the transfer from HWTWRP to Portsmouth Water.

5 Sensitivity Testing

5.1 Selection of 'what if' scenarios

The core adaptive planning approach used by Southern Water and Portsmouth Water already incorporates a significant degree of scenario testing associated with climate change, population growth and Environmental Destination. However, the companies have also completed sensitivity tests ('what if' scenarios) to understand the potential impact of scheme delays or reduced availability of bulk supplies. It should be noted that these are tests to the plan and are not included as part of the preferred plan.

The sections below describe the results of the following sensitivity tests that have been carried out to understand the impacts of delays in the delivery of key schemes and transfers between Southern Water and Portsmouth Water, or the impact of capping existing transfers:

- A delay in the first year of benefit from the Havant Thicket Approved Scheme including the 21Ml/d bulk supply to Southern Water from 2031-32 to 2034-35.
- A delay in the first year of benefit from the HWTWRP from 2034-35 to 2039-40.
- A cap of 2.5Ml/d on the export from Portsmouth Water to the Southern Water's HSE in a normal year scenario.
- A cap of 2.5Ml/d on the export from Portsmouth Water to the Southern Water's SNZ in a normal year scenario.
- A cap of 5Ml/d on the export from Portsmouth Water to the Southern Water's SNZ under all planning scenarios.
- A cap of 10Ml/d on the export from Portsmouth Water to the Southern Water's SNZ under all planning scenarios.
- Reduced Portsmouth Water demand on Havant Thicket Reservoir and Southern Water imports. This test helps to demonstrate how Portsmouth Water influences the selected capacity of the HWTWRP.

5.2 Delay to Havant Thicket Approved Scheme to 2034-35

In the dWRMP24s of Southern Water and Portsmouth Water, the Havant Thicket Reservoir Approved Scheme, including a 21Ml/d bulk supply to the Southern Water's HSE, first provides benefit from 2031-32. Given the complex nature of the scheme, a scenario has been tested where the first year of benefit is delayed to 2034-35. The other change for this scenario is that the River Test Drought Order is available at its full 80Ml/d capacity under droughts less severe than 1-in-500 year severity from 2034-35. All other inputs to the investment model remain unchanged from the rdWRMP24 and Southern Water's fdWRMP and Portsmouth Water's Final WRMP24. Southern Water have developed a resilience strategy to address the revised dates. It can be found in Annex 20 of the fdWRMP.

The investment model is able to achieve supply-demand balance in this scenario. The solution had no material impact on the supply demand balance for Portsmouth Water, because a delay in implementing the reservoir consequently delays the 21 Ml/d export to Southern Water's HSE.

The loss of 21Ml/d to HSE during droughts is accommodated by increasing imports from HSW and HWZ to HSE and increased volume from the Candover Drought Option in HSE.

A key factor is the continued availability of Candover and River Test drought options to Southern Water during this period. Southern Water's fdWRMP24 requires these options to be available under all drought conditions up to 2033-34 to maintain supply-demand balance. As long as this is the case, a delay in the first year of benefit from Havant Thicket Approved Scheme to 2034-35 can be accommodated.

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5.3 Delay to HWTWRP to 2039-40

In Southern Water's fdWRMP24, benefit from the HWTWRP is first available from 2034-35. A scenario has been run by delaying the first year of benefit from this scheme to 2039-40. The availability of Candover Drought Order in HSE and the River Test Drought Permit/Order in HSW was also extended to 2039-30 under all drought scenarios.

In this case supply-demand balance could not be achieved, with deficits in HSE under normal year conditions (9.9Ml/d in 2035-36, 16.6Ml/d in 2036-37, 15.7Ml/d in 2037-38 and 15Ml/d in 2038-39). The deficits occur due to implementation of Environmental Destination in HSE and HSW in 2034-35. Under normal year conditions, water available for use (WAFU) in HSE drops from 43.5Ml/d in 2034-35 to 18.2Ml/d in 2035-36 and from 73.6Ml/d in 2034-35 to 52.7Ml/d in 2035-36 in HSW. Supply-demand balance is achieved under drought conditions as Candover and River Test drought options continue to be available until 2039-40.

In order to maintain supply-demand balance under this scenario, implementation of Environmental Destination will need to be delayed to 2039-40 along with an extension in the availability of Candover and River Test drought options to 2039-40.

The sensitivity test had no material impact on the supply-demand balance for Portsmouth Water. However, if the scheme is delayed beyond 2039-40, Southern Water's ability to provide a new import to Portsmouth Water is expected to be compromised.

5.4 Capping bulk export from Portsmouth Water to HSE and SNZ under normal year conditions

Most of Southern Water's sources are undergoing WFD 'No Deterioration' investigations and the outcomes are expected by 2025 to 2027 depending on the source. Further information can be found in Annex 9 of Southern Water's rdWRMP24.

Portsmouth Water will be investigating most of its abstractions from Chalk catchments in AMP8 (2025-2030) and the WFD related capping of abstraction licences is not expected to commence until after 2029-30. For this reason, sensitivity testing was carried out by reducing the volume of bulk export from Portsmouth Water to 2.5Ml/d from a maximum contractual volume of 15Ml/d in both HSE and SNZ under normal year conditions. The 2.5Ml/d cap is more representative of current and historic transfer rates. All other inputs remained unchanged from rdWRMP24. The results are shown in Figure 15 and Figure 16.

The results show that Portsmouth Water's existing 15Ml/d export to Southern Water's SNZ can be restricted to 2.5Ml/d in a normal year without causing deficits in the supply-demand balance for SNZ. This loss of supply from Portsmouth Water is compensated by increasing bulk imports from SES Water and South East Water during the 2030s (see Figure 17 and Figure 18. A reduction in bulk export from Portsmouth Water to SNZ to 2.5Ml/d under normal year conditions can therefore be accommodated.

The capping of export to HSE to 2.5Ml/d under normal year conditions leads to unresolved deficits in HSE in 2025-26 (9.2Ml/d), 2026-27 (9.9Ml/d) and 2027-28 (9.5Ml/d) deficits, respectively. From 2028-29 there are no deficits as the development of Hampshire grid by that time allows for water to be moved from HWZ and HSW to HSE).

A third sensitivity test was completed where exports to SNZ and HSE were simultaneously constrained to 2.5Ml/d in a normal year to see if this would lead to deficits in SNZ. However, the results were similar to the previous two runs with no deficits in the SNZ, and deficits in the HSE from 2025-26 to 2027-28.

The sensitivity testing indicates that abstractions and exports will need to be carefully managed to mitigate the risk of water body deterioration during AMP8. Portsmouth Water and Southern Water will work together with the Environment Agency to achieve this.

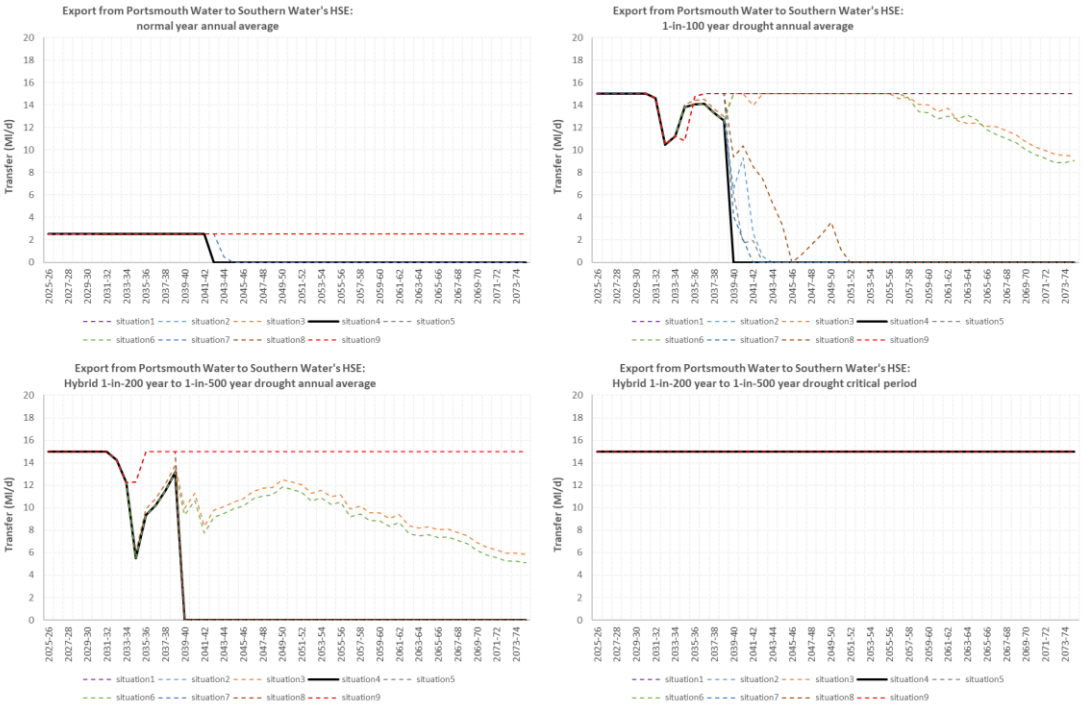

Figure 15: Utilisation of the export from Portsmouth Water to Southern Water's HSE with supply under normal year conditions restricted to 2.5Ml/d.

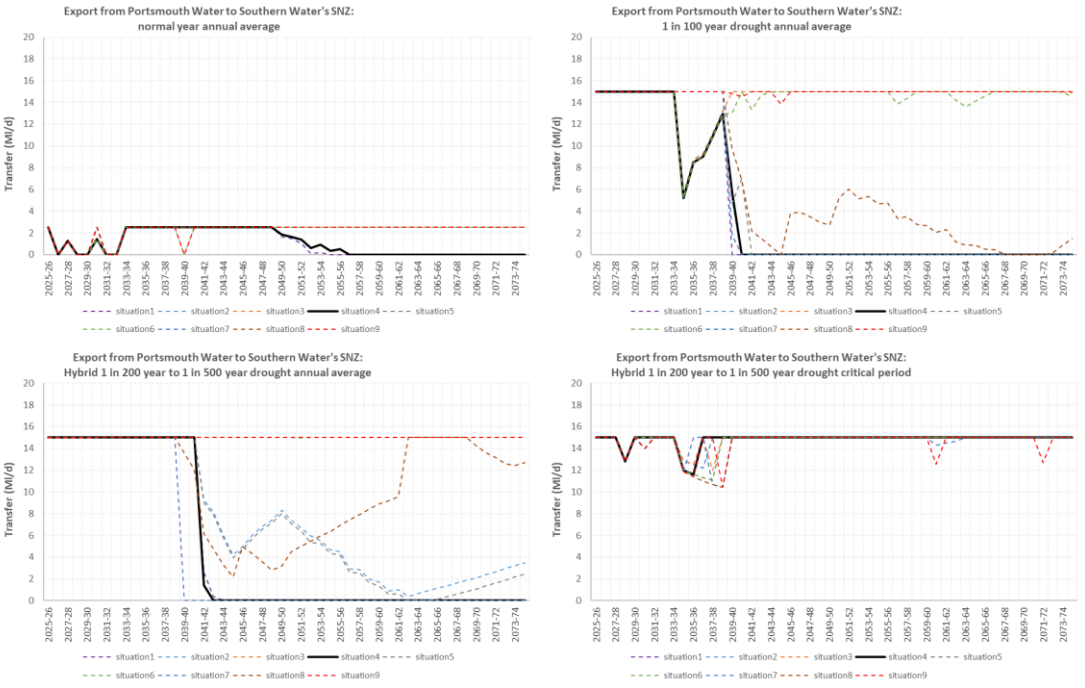

Figure 16: Utilisation of bulk import from Portsmouth Water to Southern Water's SNZ with the volume capped at 2.5Ml/d under normal year conditions.

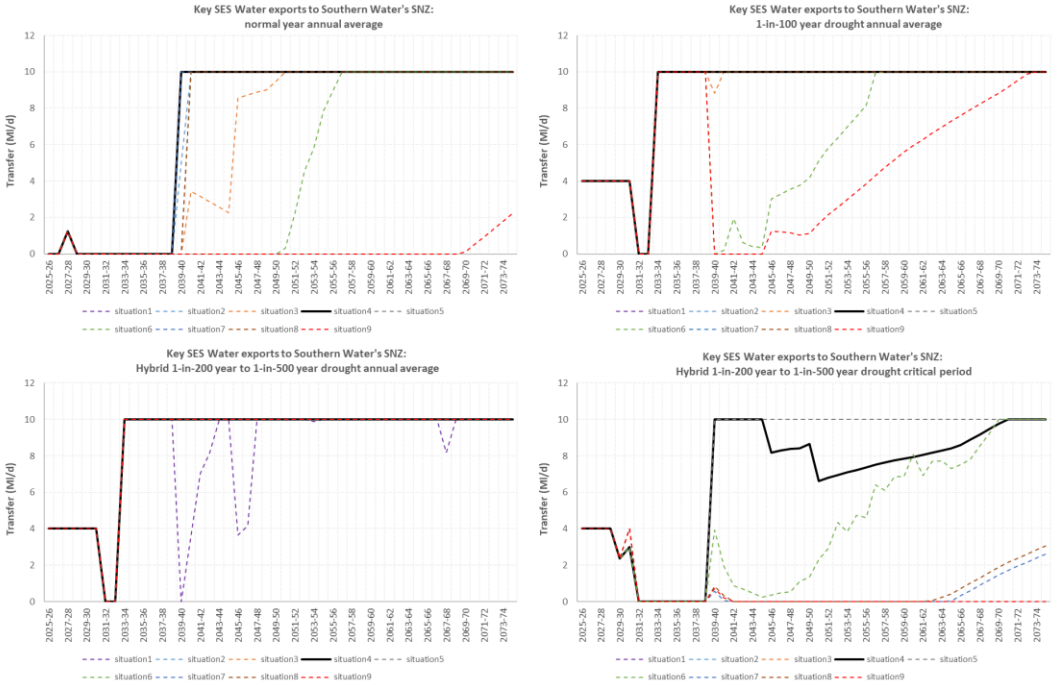

Figure 17: Utilisation of SES Water bulk supply in Southern Water's SNZ in the rdWRMP24 with the bulk import from Portsmouth Water available at 15Ml/d under normal year conditions.

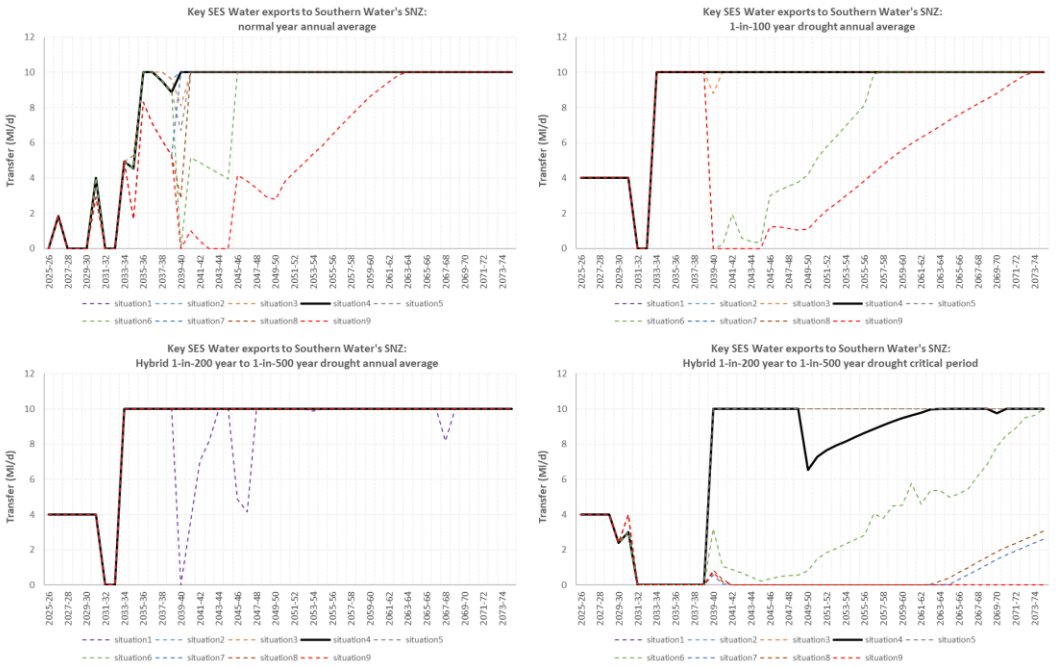

Figure 18: Utilisation of SES Water bulk supply in Southern Water's SNZ with the bulk import from Portsmouth Water capped at 2.5Ml/d under normal year conditions

5.5 Capping export from Portsmouth Water to SNZ under all scenarios

The WFD 'No Deterioration' related sensitivity tests described above were focussed on capping existing transfers to Southern Water at 2.5Ml/d under normal year conditions while still allowing up to 15Ml/d to be supplied to SNZ in a drought.

Two further tests were carried out by capping the bulk exports form Portsmouth Water to SNZ to 5Ml/d and 10Ml/d. No other changes were made to the inputs for Southern Water's fdWRMP24 and Portsmouth Water's Final WRMP24.

The results are shown in Figure 19 and Figure 20. Supply-demand balance is achieved in both cases. The key differences from rdWRMP24 are:

- Prior to 2029-30 there is increased reliance upon the Pulborough surface water drought option under drought conditions.
- Post 2029-30, once the Pulborough surface water drought option is no longer available in droughts less severe than 1-in-500 year severity, the utilisation of Littlehampton recycling option is increased to compensate for reduced supply from Portsmouth Water along with a reduction in transfer from SNZ to SWZ.
- Post 2040 the development of a water recycling option in SNZ is brought forward.

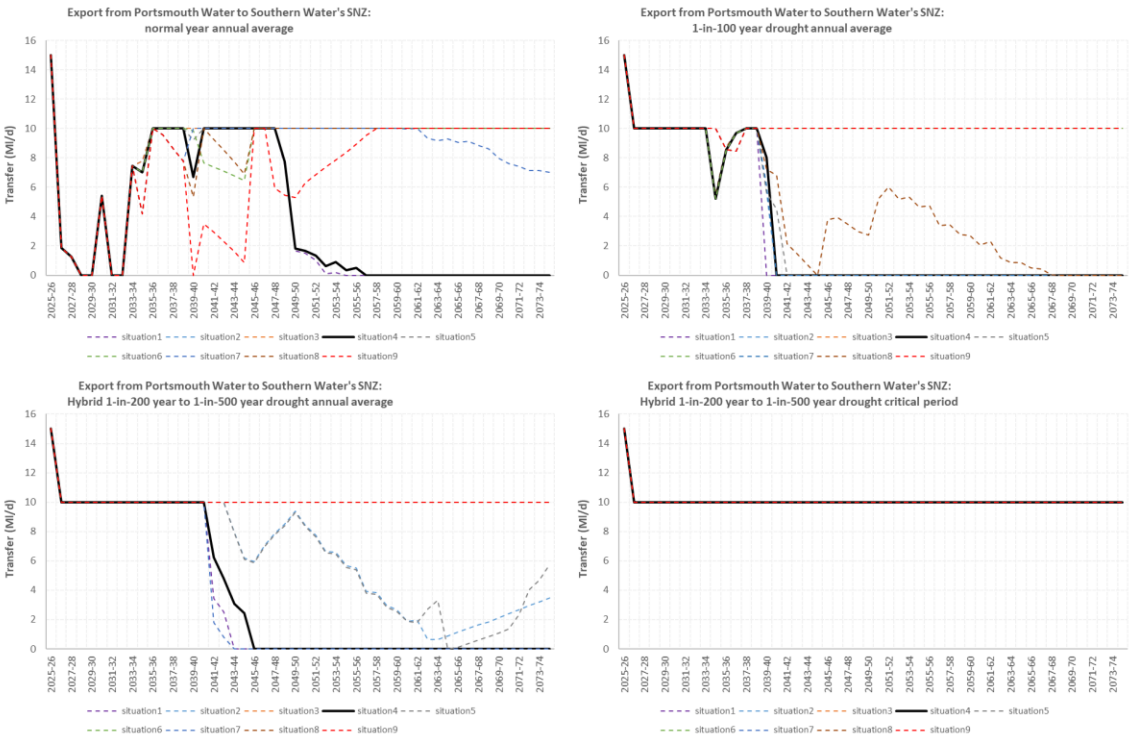

Figure 19: Utilisation of the export from Portsmouth Water to Southern Water's SNZ with supply under all conditions restricted to 10Ml/d.

Figure 20: Utilisation of the export from Portsmouth Water to Southern Water's SNZ with supply under all conditions restricted to 5Ml/d.

5.6 HWTWRP and reduced Portsmouth Water demand

To improve the understanding of how Portsmouth Water influences the selected capacity of the HWTWRP, a sensitivity test was completed where the Portsmouth Water Environmental Destination is 'low' across all adaptive planning branches. This effectively reduces Portsmouth Water's need for water compared with the need in its Final WRMP24, removing the need to import water from Southern Water from 2039-40.

In Southern Water's fdWRMP24, a 60Ml/d capacity HWTWRP is selected. Portsmouth Water requires a new import of water from Southern Water, commencing in 2039-40 under normal year and drought scenarios. In the mid- to late- 2040s, Portsmouth Water also requires additional- water from Havant Thicket Reservoir in a drought scenario (see sections 4.4 and 4.5 above).

Under this scenario of reduced demand, Portsmouth Water does not require the import from Southern Water or the additional water from Havant Thicket Reservoir, and instead exports to Southern Water continue. However, a 60Ml/d capacity HWTWRP is still selected by the investment model, driven by Southern Water's demand for water in the late 2030s and early 2040s. High utilisation of the 60Ml/d HWTWRP is maintained throughout (see Figure 21), with increased transfers to Southern Water's SNZ. This allows more water to be transferred from SNZ to SWZ, removing the need for a Southern Water desalination scheme on the River Arun that is needed from 2044-45 in the fdWRMP24.

The sensitivity test demonstrates that Portsmouth Water's demand for water in rdWRMP24 is not influencing the selected capacity of the HWTWRP. However, once constructed, the HWTWRP becomes an important local source of water. When combined with SESRO and T2ST, the HWTWRP supports the longer term needs of both Southern Water and Portsmouth Water.

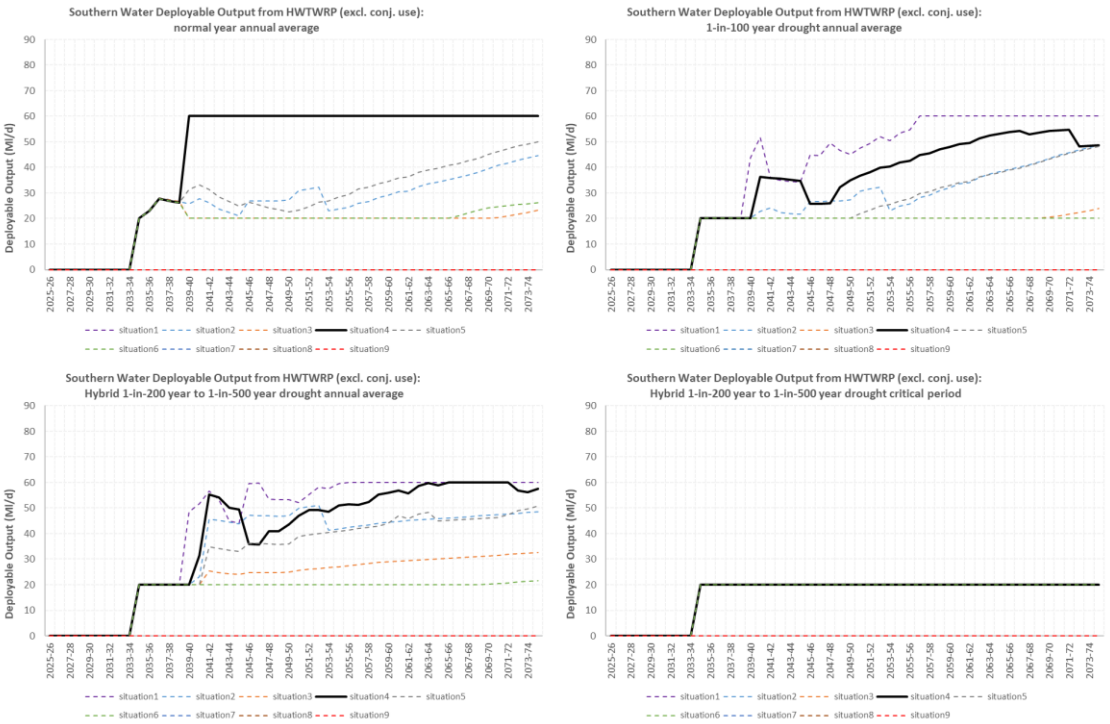

Figure 21: Deployable Output benefit of the HWTWRP excluding conjunctive use benefits, with Portsmouth Water demands removed.

6 Next Steps/Forward Look

6.1 Beyond WRMP24

Beyond finalisation of WRMP24 and finalisation of the Regional Plan and going forward, Portsmouth Water and Southern Water will continue to work with other WRSE member companies to develop WRMP29. A key part of this work will be to develop new options once the magnitude and complexity of the water resources challenge is better understood upon the completion of the current WINEP investigations.