Final Draft Water Resources Management Plan 2024

Annex 12: Options Appraisal

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from Southern Water

Contents

Glossary

Acronym	Term
ADO	Average Deployable Output
AFW	Affinity Water
AMP	Asset Management Programme
AMR	Automated Meter Reads
AONB	Area of Outstanding Natural Beauty
ASR	Aquifer Storage and Recovery
CAMS	Catchment Abstraction Management Strategy
CCTV	Close Circuit Television
CHAMP	Coastal Habitats Management Plan
CSMG	Common Standard Monitoring Guidance
DO	Deployable Output
DWF	Dry Weather Flow
DWI	Drinking Water Inspectorate
DWSP	Drinking Water Safety Plan
GAC	Granular Activated Carbon
HAZ	Hampshire Andover
HKZ	Hampshire Kingsclere
HLS	High Level Stewardship
HRZ	Hampshire Rural
HSE	Hampshire Southampton East
HWTWRP	Hampshire Water Transfer and Water Recycling Project
HSW	Hampshire Southampton East
HWZ	Hampshire Winchester
IOW	Isle of Wight
KME	Kent Medway East
KMW	Kent Medway West
KTZ	Kent Thanet
LGS	Lower Greensand
mAOD	meters above ordnance datum
MAR	Managed Aquifer Recharge
MBR	Membrane Bio-Reactor

Acronym	Term
Ml/d	Mega or million litres per day
MRF	Minimum Required Flow
PDO	Peak Deployable Output
Ramsar	The Ramsar Convention on Wetlands of International Importance
RAPID	Regulator Alliance for Promotion of Infrastructure Development
RSPB	Royal Society for the Protection of Birds
SAC	Special Area of Conservation
SBZ	Sussex Brighton
SES	SES Water
SHZ	Sussex Hastings
SINC	Sites of Importance for Nature Conservation
SNZ	Sussex North
SPA	Special Protection Area
SSSI	Site of Specific Scientific Interest
SuDS	Sustainable Drainage Systems
SWS	Southern Water
SWZ	Sussex Worthing
T2ST	Thames to Southern Transfer
UMP	Universal Metering Programme
WFD	Water Framework Directive
WINEP	Water Industry National Environment Programme
WRMP	Water Resources Management Plan
WRMU	Water Resources Management Unit
WRSE	Water Resources South East
WRZ	Water Resource Zone
WSR	Water Service Reservoir
WSW	Water Supply Works
WSX	Wessex Water
WTW	Wastewater Treatment Works

1 Introduction

This annex was submitted to regulators as part of our revised draft WRMP24 (rdWRMP24) submission but was not publicly consulted on in 2024 because it had not been subject to the necessary security and commercial confidentiality checks. Following this consultation we have made these checks so that this and all of the WRMP24 documents can be published on our website (in some cases in a redacted form).

This annex describes the options that were assessed as part of our Water Resources Management Plan 2024 (WRMP24) following the options appraisal process described in Section 6 of our final draft WRMP24 (rdWRMP24) technical report. A summary of the options appraisal process is provided below.

1.1 Unconstrained options

The options appraisal process starts with developing an unconstrained list of options, which is a high-level list including generic types, taking account of government policy and aspirations. It includes options and studies from past WRMPs as well as new ones identified through consultation with customers and stakeholders.

Each unconstrained option was assessed against an initial set of screening criteria to see if it should be taken forward to the feasible list of options. The purpose of this screening process is to remove options that are impractical or have unacceptable environmental or economic impacts.

We assessed the unconstrained list of options against the following criteria:

- **Will the option deliver beneficial environmental outcomes, whether on its own or in combination?** Does it provide additional benefits such as improved water quality, reduced flood risk or improved catchment management, over and above the objective of improving water resources? Can it contribute to environmental sustainability?
- **Would the option provide enhanced resilience through broadening types or locations of water resources available for supply?** This could include links to areas or sources that may respond differently to certain drought conditions or a resource that is not weather dependent (e.g. desalination or water recycling).
- **Can the option be delivered in a phased or modular way?** This increases the flexibility of the option in response to future changes in the forecast supply-demand balance.
- **Is the option likely to be technically feasible?** For example, the location of Aquifer Storage and Recovery (ASR) options would be limited to locations with suitable geology.
- **Does the option help address our water resources planning problem, or could it be used to provide a regional benefit?** Can it provide water or water saving in the water resources zone (WRZ), or can it provide a direct or conjunctive-use water resource benefit with a neighbouring water company.
- **Is the option likely to meet both customer and regulator expectations?** If an option is likely to meet public resistance or may contravene environmental and planning restrictions, government policy or impact upon Water Framework Directive (WFD) ‘No Deterioration’ objectives, then it may need to be omitted or given a longer timeline for implementation.
- **What is the indicative cost and capacity of the option and when is it likely to become available?** If an option is disproportionately expensive or its capacity is too small to be suitable/practicable to meet the projected supply-demand deficit or part of it, then it may not be considered viable. Similarly, an option is also assessed in terms of the time required to develop and achieve benefit from it. If an option cannot be developed in time, then we would look for alternatives that can.
- **Is the option likely to be particularly risky to implement, or the output highly uncertain?** This considers aspects like land availability, deliverability of the option in terms of achieving the estimated

output, the availability and reliability of the required technology and experience within the company in developing and operating similar options. It also looks at confidence in the lead-in time required to develop the option, the likely spend profile and the nature and amount of environmental and engineering work required at each stage from planning to delivery.

This screening criteria allows us to narrow down the unconstrained list to a smaller list of feasible options.

1.2 Feasible list of options

Options that progressed to the feasible list were subject to a further screening process which included consideration of the water resource problem faced in each WRZ, and the flexibility of options for investment modelling. For example:

- Are there sufficient options in each WRZ?
- Is there sufficient connectivity?
- Do the options contain enough granularity (i.e. different sizes of options)?
- Is there a need for modular options?
- Is the granularity of those modular options sufficient?

We worked alongside Water Resources South East (WRSE) to answer these questions, particularly in terms of any new options developed as part of WRMP24.

Each option was assessed against the following criteria:

- **Monetised costs and benefits:** economic assessment of each option and engineering judgement.
- **Non-monetised costs and benefits:** environmental and social factors.
- The opportunity to employ **mitigation measures** in cases where environmental and/or social impacts are identified.
- **Dependencies** or **mutual exclusivities** with other options and potentially with third parties, including neighbouring water companies.
- The **adaptability** of the option to future uncertainties, and/or the possibility to be implemented in a phased way. This includes assessing the risk to delivery from an extended programme that may spread over multiple AMP periods, before a scheme is implemented.
- The **reliability** and **resilience** of the option i.e. its vulnerability to future regulatory changes, climate change and increasingly severe droughts.

1.3 Constrained feasible list of options

In the final stage, each feasible option was screened against the following criteria:

- **Environmental and social assessment** - Strategic Environmental Assessment (SEA) and Habitats Regulations Assessment (HRA) have been produced which summarise the environmental and social costs and benefits and impacts upon European designated sites of each option. The SEA screening criterion illustrates:
  - the risk of adverse effects and, where available, mitigation measures; and
  - the opportunity for beneficial effects (e.g. improved water quality, reduced flood risk, improved catchment management) resulting from the option.
- **Links to other options** - in terms of mutual exclusivities and dependencies.
- **Risks** - including vulnerability of the option to future uncertainty relating to climate change impacts, regulatory changes, sustainability and acceptability of the option, potential planning constraints and risks and changes in customer behaviour (for some demand management options).
- **Phasing** - whether the option can be constructed in a phased or modular way, which would increase its flexibility to future changes in the forecast supply-demand balance.
- **Resilience** - an indication of the confidence that the option will 'deliver' the required supply-demand balance benefit.

The constrained feasible options were subjected to more detailed engineering and environmental assessment, to provide consistent and comparable information as an input to the selection of options for WRMP24. The options were then classified into option types and sub-types using WRSE classifications (Table 1).

Table 1: Option types and sub-types.

Option types	Option sub-types
Hard infrastructure	• New resources and storage • Transfers between and within regions • Reuse of water already abstracted
Near Efficient use and management of water	• Reducing leakage • Reducing household consumption • Embedding water efficient practice across industry
Green infrastructure	• Catchment solutions • Protecting vulnerable environments • Stopping damaging abstractions • Reducing net abstractions from the environment
Response to regional events	• Planning responses to extreme events • Coordinating activities across companies and sectors

Section 2 describes the constrained feasible options under each of the option types in Table 1. Options from the unconstrained list that were not considered for inclusion in the plan (i.e. rejected options) are listed in Section 3 along with the reason for rejection.

Our water supply region is divided into 3 main areas and 14 WRZs as shown in Table 2. Options are originally assessed at the WRZ level.

Table 2: Our supply areas and WRZs.

Supply area	WRZ
Western area	1. Hampshire Andover (HAZ) 2. Hampshire Kingsclere (HKZ) 3. Hampshire Winchester (HWZ) 4. Hampshire Rural (HRZ) 5. Hampshire Southampton East (HSE) 6. Hampshire Southampton West (HSW) 7. Isle of Wight (IOW)
Central area	8. Sussex North (SNZ) 9. Sussex Worthing (SWZ) 10. Sussex Brighton (SBZ)
Eastern area	11. Kent Medway East (KME) 12. Kent Medway West (KMW) 13. Kent Thanet (KTZ) 14. Sussex Hastings (SHZ)

2 Constrained feasible options

The constrained options considered under option type, along with their Deployable Output (DO) benefit are described in the sections below.

2.1 Hard infrastructure

2.1.1 Transfers between and within regions

Option name	Option description	DO benefit (Ml/d)[1]	Donor WRZ	Recipient WRZ
Bulk export (HSE): Itchen WSW[2] to PWC Source A (45Ml/d)	This is a bulk export from Southern Water's Itchen WSW to Portsmouth Water's Source A for up to 45Ml/d.	45.0	HSE	Portsmouth Water
Bulk export (SNZ): Pulborough to Havant Thicket Reservoir (20Ml/d)	This is a bulk export from Pulborough WSW to Havant Thicket Reservoir for up to 20Ml/d. This is part of the bi-directional bulk transfers proposed by WRSE for WRMP24. It is dependent on surplus water being identified by Southern Water.	20.0	SNZ	SHZ
Bulk export (SNZ): Pulborough to Havant Thicket Reservoir (50Ml/d)	This is a bulk export from Pulborough WSW to Havant Thicket Reservoir for up to 50Ml/d. This is part of the bi-directional bulk transfers proposed by WRSE for WRMP24. It is dependent on surplus water being identified by Southern Water.	50.0	SNZ	Portsmouth Water
Bulk import (HAZ): T2ST to Andover (20Ml/d)	This is bulk import to Andover spur as part of the proposed transfer from Thames Water to Southern Water (Thames to Southern Transfer - T2ST).	20.0	Thames Water	HAZ
Bulk import (HAZ): T2ST to Andover (20Ml/d)	This is the transfer from Andover spur Andover as part of T2ST.	20.0	Thames Water	HAZ
Bulk import (HKZ): T2ST to HKZ (5Ml/d)	This is bulk import to HKZ as part of T2ST.	5.0	Thames Water	HKZ
Bulk import (HSE): Havant Thicket Reservoir to Itchen WSW pipeline - first section (90Ml/d)	This option involves a new raw water transfer (pipe and break tank) between Havant Thicket Reservoir and Itchen WSW to transfer up to 90Ml/d. This is the second section from spur off to Portsmouth Water to Itchen WSW.	90.0	Portsmouth Water	HSE
Bulk import (HSE): Havant Thicket Reservoir to Itchen WSW pipeline - second section (90Ml/d)	This option involves a new raw water transfer (pipe and break tank) between Havant Thicket Reservoir and Itchen WSW to transfer up to 90Ml/d. This is the second section from spur off to Portsmouth Water to Itchen WSW.	90.0	Portsmouth Water	HSE
Bulk import (HSE): PWC Source A to Eastleigh extension (30Ml/d)	This is the extension of the existing import from Portsmouth Water's Source A to Southern Water's Eastleigh WSR[3] beyond the validity of the current agreement. The pipeline capacity is 30Ml/d but the current bulk supply agreement is for 15Ml/d.	15.0	Portsmouth Water	HSE
Bulk import (HSE): PWC Source A to Eastleigh WSR (30Ml/d)	Existing import from Portsmouth Water's Source A to Southern Water's Eastleigh WSR. The pipeline capacity is 30Ml/d but the current bulk supply agreement is for 15Ml/d.	15.0	Portsmouth Water	HSE
Bulk import (HSE): PWC Source A to Itchen WSW (21Ml/d)	This is a 21Ml/d import from Portsmouth Water, using a new pipeline from its Source A to Southern Water's Itchen WSW. This option is dependent on development of Havant Thicket Reservoir by Portsmouth Water.	21.0	Portsmouth Water	HSE

[1] Ml/d = Mega or million litres per day
[2] WSW = Water Supply Works
[3] WSR = Water Service Reservoir

Option name	Option description	DO benefit (Ml/d)[1]	Donor WRZ	Recipient WRZ
Bulk import (HSE): T2ST to Yew Hill WSW to Itchen WSW (120Ml/d)	This is bulk import of up to 120Ml/d as part of T2ST to HSE via Yew Hill WSW in HWZ.	120.0	Thames Water	HSE
Bulk import (KMW): London ring main to Near Rochester bi-directional (10Ml/d)	10Ml/d bi-directional transfer of treated water from Honor Oak (London Water Ring Main) to Near Rochester WTW. This scheme depends on the development of the Abingdon Reservoir by Thames Water.	10.0	Thames Water	KMW
Bulk import (KMW): London ring main to Near Rochester bi-directional (20Ml/d)	20Ml/d bi-directional transfer of treated water from Honor Oak (London Water Ring Main) to Near Rochester WTW. This scheme depends on the development of the Abingdon Reservoir by Thames Water.	20.0	Thames Water	KMW
Bulk import (KMW): London ring main to Near Rochester bi-directional (30Ml/d)	30Ml/d bi-directional transfer of treated water from Honor Oak (London Water Ring Main) to Near Rochester WTW. This scheme depends on the development of the Abingdon Reservoir by Thames Water.	30.0	Thames Water	KMW
Bulk import (KMW): London ring main to Near Rochester bi-directional (40Ml/d)	40Ml/d bi-directional transfer of treated water from Honor Oak (London Water Ring Main) to Near Rochester WTW. This scheme depends on the development of the Abingdon Reservoir by Thames Water.	40.0	Thames Water	KMW
Bulk import (KMW): London ring main to Near Rochester bi-directional (45Ml/d)	45Ml/d bi-directional transfer of treated water from Honor Oak (London Water Ring Main) to Near Rochester WTW. This scheme depends on the development of the Abingdon Reservoir by Thames Water.	45.0	Thames Water	KMW
Bulk import (KMW): London ring main to Near Rochester bi-directional (60Ml/d)	60Ml/d bi-directional transfer of treated water from Honor Oak (London Water Ring Main) to Near Rochester WTW. This scheme depends on the development of the Abingdon Reservoir by Thames Water.	60.0	Thames Water	KMW
Bulk import (KMW): London ring main to Near Rochester bi-directional (120Ml/d)	120Ml/d bi-directional transfer of treated water from Honor Oak (London Water Ring Main) to Near Rochester WTW. This scheme depends on the development of the Abingdon Reservoir by Thames Water.	120.0	Thames Water	KMW
Bulk import (KTZ): AFW - existing (0.1Ml/d)	This is an existing bulk import from Affinity Water to KTZ near Napchester.	0.1	Affinity Water	KTZ
Bulk import (KTZ): AFW - extension (0.1Ml/d)	This is an extension to the existing bulk import from Affinity Water to KTZ near Napchester beyond the termination of the current contract.	0.1	Affinity Water	KTZ
Bulk import (KTZ): SEW Canterbury to Near Canterbury (20Ml/d)	This is a bulk import from South East Water's SEW Canterbury to Southern Water's Near Canterbury WSW in KTZ for up to 20Ml/d. This is part of the bi-directional bulk transfers proposed by WRSE for WRMP24. It is dependent on surplus water being identified by the donor company.	20.0	South East Water	KTZ
Bulk import (SBZ): SEW to Brighton (20Ml/d)	This is a bulk transfer between South East Water's Cuckfield source and Southern Water's SBZ for up to 20Ml/d. This is part of the bi-directional bulk transfers proposed by WRSE for WRMP24. It is dependent on surplus water being identified by the donor company.	20.0	South East Water	SBZ
Bulk import (SBZ): SEW to Rottingdean (10Ml/d)	This option is for a pipeline to transfer 10Ml/d from South East Water's Barcombe WSW to Southern Water's Rottingdean WSR. This option is dependent on the development of Brighton WTW recycling option by South East Water.	10.0	South East Water	SBZ
Bulk import (SBZ): SEW to Rottingdean (20Ml/d)	This option is for a pipeline to transfer 20Ml/d from South East Water's Barcombe WSW to Southern Water's Rottingdean WSR. This option is dependent on the development of Brighton WTW recycling option by South East Water.	20.0	South East Water	SBZ
Bulk import (SHZ): SEW Deal to SHZ (4Ml/d)	This option is transfer 4Ml/d from South East Water to SHZ via Dear Reservoir.	4.0	South East Water	SHZ
Bulk import (SHZ): SEW to Rye (10Ml/d)	This is a bulk import from South East Water's Arlington source to Southern Water's Rye WSW for up to 10Ml/d. This is part of the bi-directional bulk transfers proposed by WRSE for WRMP24. It is dependent on South East Water having surplus water.	10.0	South East Water	SHZ

Option name	Option description	DO benefit (Ml/d)[1]	Donor WRZ	Recipient WRZ
Bulk import (SHZ): SEW to Rye (20Ml/d)	This is a bulk import from South East Water's Arlington source to Southern Water's Rye WSW for up to 20Ml/d. This is part of the bi-directional bulk transfers proposed by WRSE for WRMP24. It is dependent on South East Water having surplus water.	20.0	South East Water	SHZ
Bulk import (SHZ): SEW to Rye (40Ml/d)	This is a bulk import from South East Water's Arlington source to Southern Water's Rye WSW. This is part of the bi-directional bulk transfers proposed by WRSE for WRMP24. It is dependent on South East Water having surplus water.	40.0	South East Water	SHZ
Bulk import (SNZ): Drungewick Manor to Weir Wood (100Ml/d)	This is a bulk import from Thames Water's Drungewick Manor Source A to Southern Water's Weir Wood Reservoir for up to 100Ml/d. This is part of the bi-directional bulk transfers proposed by WRSE for WRMP24. It is dependent on surplus water being identified by Thames Water.	100.0	Thames Water	SNZ
Bulk import (SNZ): Drungewick Manor to Weir Wood (200Ml/d)	This is a bulk import from Thames Water's Drungewick Manor Source A to Southern Water's Weir Wood Reservoir for up to 200Ml/d. This is part of the bi-directional bulk transfers proposed by WRSE for WRMP24. It is dependent on surplus water being identified by Thames Water.	200.0	Thames Water	SNZ
Bulk import (SNZ): Drungewick Manor to Weir Wood (50Ml/d)	This is a bulk import from Thames Water's Drungewick Manor source to Southern Water's Weir Wood Reservoir for up to 50Ml/d. This is part of the bi-directional bulk transfers proposed by WRSE for WRMP24. It is dependent on surplus water being identified by Thames Water.	50.0	Thames Water	SNZ
Bulk import (SNZ): Havant Thicket Reservoir to Pulborough (20Ml/d)	This is a bi-directional transfer between Havant Thicket Reservoir and Pulborough WSW for up to 20Ml/d. This is part of the bi-directional bulk transfers proposed by WRSE for WRMP24. It is dependent on surplus water being available in Havant Thicket Reservoir.	20.0	Portsmouth Water	SNZ
Bulk import (SNZ): Havant Thicket Reservoir to Pulborough (50Ml/d)	This is a bi-directional transfer between Havant Thicket Reservoir and Pulborough WSW for up to 50Ml/d. This is part of the bi-directional bulk transfers proposed by WRSE for WRMP24. It is dependent on surplus water being available in the Havant Thicket Reservoir.	50.0	Portsmouth Water	SNZ
Bulk import (SNZ): PWC to Pulborough - extension (15Ml/d)	This is an extension to the existing bulk import of treated water from Portsmouth Water to Pulborough WSW beyond the current contractual arrangement.	15.0	Portsmouth Water	SNZ
Bulk import (SNZ): PWC to Pulborough (15Ml/d)	This is an existing bulk import of treated water from Portsmouth Water to Pulborough WSW.	15.0	Portsmouth Water	SNZ
Bulk import (SNZ): SES re-zoning (1.3Ml/d)	This is an existing arrangement whereby Southern Water's customers in parts of SNZ have be rezoned to get their supply directly from SES Water. Currently, 1.3Ml/d is being supplied through this arrangement.	1.3	SES Water	SNZ
Bulk import (SNZ): SES re-zoning (4Ml/d)	This is an option whereby the current rezoning of customers in SNZ to SES Water's supply network can be extended to get up to 4Ml/d from SES Water.	4.0	SES Water	SNZ
Bulk import (SNZ): SES to SNZ (10Ml/d)	This is bulk import between SES Water's Outwood sources and Southern Water's Turners Hill WSR for up to 10Ml/d. This is part of the bi-directional bulk transfers proposed by WRSE for WRMP24. It is dependent on surplus water being identified by SES Water.	10.0	SES Water	SNZ
Bulk import (SNZ): SEW RZ2 to Pulborough bi-directional (5Ml/d)	This is a bi-directional transfer between South East Water's RZ2 and Pulborough WSW for up to 10Ml/d. This is part of the bi-directional bulk transfers proposed by WRSE for WRMP24. It is dependent on surplus water being identified by South East Water.	10.0	South East Water	SNZ
Bulk import (SNZ): SEW RZ5 to Pulborough (10Ml/d)	This is a bi-directional transfer between South East Water's RZ5 and Pulborough WSW for up to 10Ml/d. This is part of the bi-directional bulk transfers proposed by WRSE for WRMP24. It is dependent on surplus water being identified by South East Water.	10.0	South East Water	SNZ

Option name	Option description	DO benefit (Ml/d)[1]	Donor WRZ	Recipient WRZ
Drought option - supply side (HSW): Sea tankering from Norway (45Ml/d)	This option has been submitted by a third party supplier and involves shipping of water from the outlet of a hydroelectric plant in Norway to Southampton docks and onto River Test WSW via temporary pipeline. This option is to be used during extreme droughts only.	45.0	A third party supplier.	HSW
Interzonal transfer (Bewl-SHZ): Existing transfer capacity (35Ml/d)	This option represents the existing transfer capacity between Bewl Reservoir and SHZ.	35.0	KMW	SHZ
Interzonal transfer (HAZ-HKZ): Andover to Kingsclere bi-directional (10Ml/d)	This 10Ml/d bi-directional transfer between HAZ and HKZ is part of the Hampshire Grid being developed to improve movement of water within Hampshire.	10.0	HAZ	HKZ
Interzonal transfer (HRZ-HSW): Romsey Town and Test valve (3.1Ml/d)	This is an existing potable transfer between Romsey Town in HSW and Broadlands in HRZ.	3.1	HSW	HRZ
Interzonal transfer (HRZ-HSW): Romsey Town and Test valve expansion (5Ml/d)	This is an existing potable transfer between Romsey Town in HSW and Broadlands in HRZ. The option involves installing a booster pumping station for the transfer. Modelling suggests a new booster with a flowrate of 5Ml/d is viable.	5.0	HSW	HRZ
Interzonal transfer (HSE-HRZ): Abbotswood - existing (1.1Ml/d)	This is the transfer between HRZ and HSE at Sandy Lane Abbotswood.	1.1	HRZ	HSE
Interzonal transfer (HSE-HSW): Yew Hill WSW to River Test WSW bi-directional (60Ml/d)	This is a bi-directional between HWZ and HSW being developed as part of the Hampshire Grid. It is an alternative to the HSE-HSW transfer that was included in WRMP19.	60.0	HWZ	HSW
Interzonal transfer (HSE-HWZ): Itchen WSW to Yew Hill WSW bi-directional (74Ml/d)	This bi-directional transfer between from Itchen WSW in HSE to Yew Hill in HWZ is being developed as part of the Hamsphire Grid.	74.0	HSE	HWZ
Interzonal transfer (HSW-HSE): Existing transfer (24Ml/d)	Existing transfers from HSW to HSE.	24.0	HSW	HSE
Interzonal transfer (HSW-HSE): Woodside transfer valve (10Ml/d)	This option proposes a new booster station at the Woodside transfer valve with a flowrate of 10Ml/d.	10.0	HSW	HSE
Interzonal transfer (HSW-IOW): Cross-Solent main existing (18Ml/d)	This is an existing transfer between HSW and IOW across the Solent.	18.0	HSW	IOW
Interzonal transfer (HSW-IOW): Triplicate cross-Solent main bi-directional (8Ml/d)	As part of this option, a third cross-Solent main would be installed to permit further transfer of treated water from the mainland to the IOW. The transfer is planned to be bi-directional.	8.0	HSW	IOW
Interzonal transfer (HWZ-HAZ): Winchester to Andover bi-directional (15Ml/d)	This is a bi-directional transfer between HAZ and HWZ for up to 15Ml/d. This is being developed as part of the Hampshire Grid.	15.0	HWZ	HAZ
Interzonal transfer (HWZ-HSE): Existing transfer (7.5Ml/d)	Transfer between HSE and HWZ at Olivers Battery.	7.5	HSE	HWZ
Interzonal transfer (KME-KTZ): KME-KTZ bi-directional (15.8Ml/d)	This option involves conditioning of existing Faversham4-Fleete main to enable bi-directional transfer of treated water between KME and KTZ. Additional pipeline would not be required but this is dependent on the existing main being structurally sound.	15.8	KTZ	KME

Option name	Option description	DO benefit (Ml/d)[1]	Donor WRZ	Recipient WRZ
Interzonal transfer (KMW-KME): Existing transfer (44.7Ml/d)	Current transfers from KMW to KME.	44.7	KMW	KME
Interzonal transfer (KMW-SHZ): Bewl Reservoir (35Ml/d) - existing	This is an existing transfer from Bewl Reservoir to SHZ.	35.0	KMW	SHZ
Interzonal transfer (KTZ-KME): Existing transfer (14Ml/d)	This the transfer from Faversham4 WSR in KME to Fleete Manston1 WSR in KTZ.	14.0	KME	KTZ
Interzonal transfer (KTZ-KME): Utilise full existing transfer capacity (9Ml/d)	The operational transfer is limited to the output from Faversham4 WSW. This option enables flows from the Faversham3 source to be directed, via an existing main, towards Faversham4 WSW. A soakaway is installed at Faversham4 to allow for reconditioning of the existing main and the addition of ultraviolet treatment at Faversham4 permits disinfection of the Faversham3 flows.	9.0	KME	KTZ
Interzonal transfer (SBZ-SWZ): Brighton to Worthing	This is a bi-directional transfer between Tenants Hill in Worthing and Brighton for up to 20Ml/d. This is part of the bi-directional bulk transfers proposed by WRSE for WRMP24. It is dependent on surplus water being identified by the donor company.	20.0	SWZ	SBZ
Interzonal transfer (SBZ-SWZ): Reverse transfer to allow SBZ to support SWZ (30Ml/d)	This option proposes a reversal of existing transfer between SWZ and SBZ to allow water to move from SBZ to SWZ.	30.0	SBZ	SWZ
Interzonal transfer (SNZ-SWZ): Pulborough to Worthing (10Ml/d)	This is a proposed transfer from Pulborough WSW in SNZ to SWZ for up to 10Ml/d.	10.0	SNZ	SWZ
Interzonal transfer (SNZ-SWZ): Pulborough to Worthing (30Ml/d)	This is a proposed transfer from Pulborough WSW in SNZ to SWZ for up to 30Ml/d.	30.0	SNZ	SWZ
Interzonal transfer (SNZ-SWZ): Pulborough to Worthing (60Ml/d)	This is a proposed transfer from Pulborough WSW in SNZ to SWZ for up to 60Ml/d.	60.0	SNZ	SWZ
Interzonal transfer (SWZ-SBZ): Pulborough winter transfer stage 2 (3Ml/d)	This option proposes a new main between Shoreham WSW/North Shoreham WSW and Brighton A WSR. This would allow 3Ml/d to be pumped via a different route and relieve pressure issues in the existing v6 main. Additional water from Pulborough WSW is only available during winter, so the benefit comes from resting groundwater sources in the Brighton Block during winter.	3.0	SWZ	SBZ
Interzonal transfer (SWZ-SBZ): V6 valve - existing (17Ml/d)	This is the existing capacity of the trunk main between SWZ and SBZ at v6 valve	17.0	SWZ	SBZ
Interzonal transfer (SWZ-SBZ): V6 valve additional capacity (13Ml/d)	This option involves increasing the capacity of the trunk main between SWZ and SBZ at the v6 valve.	13.0	SWZ	SBZ
Interzonal transfer (SWZ-SNZ): Rock Road bi-directional - existing (15Ml/d)	This is potable bi-directional transfer between SWZ and SNZ at Rock Road.	15.0	SWZ	SNZ

2.1.2 Increase raw water abstractions

Option name	Option description	DO benefit (Ml/d)	Recipient WRZ
Groundwater (HAZ): Recommission Chilbolton (0.5Ml/d)	This option involves recommissioning the mothballed Chilbolton WSW, with the inclusion of an ion exchange nitrate removal plant. The generated waste stream will require removal by tanker or discharge to sewer.	0.5	HAZ
Groundwater (HRZ): New boreholes at Romsey (4.8Ml/d)	The existing boreholes and well-and-adits that supply Romsey WSW are either out of service or operating below their full capacity due to water quality issues. This option proposes 3 replacement boreholes to increase DO on site by 5Ml/d. Scheme output is 13.7Ml/d. No additional treatment is required. Replacement borehole locations are distant from existing borehole locations and require new pipelines to connect to WSW.	5.0	HRZ
Groundwater (HRZ): Remove constraints at Kings Sombourne (2.5Ml/d)	This option involves the development of a new borehole and pump capacity to increase the DO from the site from the current 1.5Ml/d to the licensed 4Ml/d giving a potential benefit of 2.5Ml/d.	2.5	HRZ
Groundwater (HSW): Test MAR (5.5Ml/d)	This is a Managed Aquifer Recharge (MAR) option. It involves storing mains water in the confined chalk aquifer in winter months, with subsequent onsite abstraction from the same aquifer in summer/autumn critical low flow periods. The scheme includes an extended pilot trial period, before full development. Abstracted water will be treated onsite before entering supply.	5.5	HSW
Groundwater (IOW): New borehole at Eastern Yar3 (1.5Ml/d)	The option is to drill a new replacement borehole, 100m deep, for Eastern Yar3 augmentation well on the IOW. The existing borehole has over 90% loss in performance. Previous rehabilitation and cleaning has not resulted in notable improvement. A replacement well is required to regain resilience.	1.5	IOW
Groundwater (IOW): New boreholes at Newchurch (LGS) (1.9Ml/d)	This option proposes replacing all 3 Lower Greensand (LGS) boreholes on site so that the source can operate to its licenced capacity. Currently borehole 4 is non-operational. Boreholes 1 and 2 are operational but working at reduced capacity due to screen dewatering. No additional treatment is proposed.	4.5	IOW
Groundwater (KME): Recommission Gravesend (2.7Ml/d)	Gravesend source is a well-and-adit system. It was decommissioned in 2007 due to high nitrate levels. A new nitrate treatment plant was installed in 2006. Work by Atkins (2008) suggests that the problem was likely due to a faulty nitrate monitor. The report recommends: 1. Undertake a long-term step test with steps of seven days duration at rates of 3.0Ml/d, 3.3Ml/d and maximum pump capacity (approximately 3.66Ml/d) subject to stabilisation of pumping water levels during each step 2. Recalibrate or repair the online raw water nitrate monitor 3. Modify the cover to the satellite well chamber to facilitate improved access Refurbishment of the existing nitrate plant will be required.	5.0	KME
Groundwater (SBZ): Lewes Road (3.5Ml/d)	This option involves increasing pump capacity and WSR connectivity so that Lewes Road groundwater source can pump to Middle or High WSR. Output to the Low WSR is currently constrained by the header tanks at Hove.	3.5	SBA
Groundwater (SHZ): Reconfigure Rye Wells (1.5Ml/d)	Rye groundwater source is a well-and-adit system that is over 100 years old and has reached the end of its asset life. It abstracts from the Ashdown Beds. As part of this option, operational wells 1 and 3 are to be replaced by boreholes. Additional land may be required for at least one of the boreholes due to space constraints on site. Wells 2 and 4 are out of service and do not require replacement. There is an existing surface water WSW on site and no further treatment is required.	1.5	SHZ
Groundwater (SNZ): Bring West Chiltington back into service (3.1Ml/d)	Scheme to bring back West Chiltington source into service. It would need headworks (and flood works to protect headworks), possible re-drilling and transfer to Pulborough WSW for treatment.	3.1	SNZ
Groundwater (SNZ): New borehole at Petworth (4Ml/d)	The existing Petworth well-and-adit system is beyond its asset life. The option is to drill a new replacement borehole for Petworth WSW. The treatment works would require full refurbishment. The Hoe Farm trial/pilot boreholes drilled c. 700m south of the main Petworth WSW site indicated good potential yields of ca. 4Ml/d.	4.0	SNZ
Groundwater (SNZ): Petersfield refurbishment (1.6Ml/d)	Refurbishment of Petersfield WSW. Modification of the existing pipeline from Knightsfield WSR to Petersfield WSW to allow this to be used in reverse to release locked-in DO that refurbishing Petersfield WSW would create.	1.6	SNZ

2.1.3 New resources and storage

Option name	Option description	DO benefit (Ml/d)	WRZ
Desalination (KME): Isle of Sheppey (10Ml/d)	This option proposes a 10Ml/d desalination plant on the Isle of Sheppey. Locating a desalination plant on the Isle of would meet local demand while significantly reducing the need for transfers along the main from Deans Hill. This option could be enhanced to transfer treated water from the Isle of Sheppey to the wider KME. The most suitable would be the land south of Sheerness Docks, currently used for storage of imported cars. Water treated at this site would then be pumped to Southdown WSR and Kins Borough WSR on the island for distribution to customers.	10.0	KME
Desalination (KME): Isle of Sheppey (10Ml/d) Phase 2	This option proposes a 20Ml/d increase in the capacity of an existing desalination plant on the Isle of Sheppey. Depending on the capacity of the initial plant (10Ml/d or 20M/d), this option could lead to a total desalination capacity of 20Ml/d or 30Ml/d.	10.0	KME
Desalination (KME): Isle of Sheppey (20Ml/d)	This option proposes a 20Ml/d desalination plant on the Isle of Sheppey. Locating a desalination plant on the Isle of would meet local demand while significantly reducing the need for transfers along the main from Deans Hill. This option could be enhanced to transfer treated water from the Isle of Sheppey to the wider KME. The most suitable would be the land south of Sheerness Docks, currently used for storage of imported cars. Water treated at this site would then be pumped to Southdown WSR and Kins Borough WSR on the island for distribution to customers.	20.0	KME
Desalination (KME): Isle of Sheppey (20Ml/d) Phase 2	This option proposes a 20Ml/d increase in the capacity of an existing desalination plant on the Isle of Sheppey. Depending on the capacity of the initial plant (10Ml/d or 20M/d), this option could lead to a total desalination capacity of 30Ml/d or 40Ml/d.	20.0	KME
Desalination (KMW) River Medway (10Ml/d)	This option proposes abstraction of brackish water from the tidal River Medway. The most feasible location for the desalination plant would be on or adjacent to Medway WTW, although other locations have merit. The discharge of hyper saline effluent is assumed to be through the existing discharge for Medway WTW.	10.0	KMW
Desalination (KMW) River Medway (10Ml/d) Phase 2	This option proposes increasing the capacity of an existing desalination plant on the River Medway by 10Ml/d. Depending on the capacity of the initial plant (10Ml/d or 20M/d), this option could lead to a total desalination capacity of 20Ml/d or 30Ml/d.	20.0	KMW
Desalination (KMW) River Medway (20Ml/d)	This option proposes abstraction of brackish water from the tidal River Medway. The most feasible location for the desalination plant would be on or adjacent to Medway WTW, although other locations have merit. The discharge of hyper saline effluent is assumed to be through the existing discharge for Medway WTW.	20.0	KMW
Desalination (KMW) River Medway (20Ml/d) Phase 2	This option proposes increasing the capacity of an existing desalination plant on the River Medway by 10Ml/d. Depending on the capacity of the initial plant (10Ml/d or 20M/d), this option could lead to a total desalination capacity of 30Ml/d or 40Ml/d.	20.0	KMW
Desalination (KMW): Thames Estuary (10Ml/d)	This option proposes the development of a desalination plant on the Swanscombe Peninsula, which would produce up to 10Ml/d, and would combine discharge with Swanscombe WTW's existing outfall. Treated water would be transferred to Singlewell WSR for distribution in KMW.	10.0	KMW
Desalination (KMW): Thames Estuary (10Ml/d) Phase 2	This option proposes adding another 10Ml/d capacity to an existing desalination plant on the Thames Estuary. Depending on the capacity of the initial plant (10Ml/d or 20M/d), this option could lead to a total desalination capacity of 20Ml/d or 30Ml/d.	10.0	KMW
Desalination (KMW): Thames Estuary (20Ml/d)	This option proposes the development of a desalination plant on the Swanscombe Peninsula, which would produce up to 20Ml/d, and would combine discharge with Swanscombe WTW's existing outfall. Treated water would be transferred to Singlewell WSR for distribution in KMW.	20.0	KMW
Desalination (KMW): Thames Estuary (20Ml/d) Phase 2	This option proposes adding another 10Ml/d capacity to an existing desalination plant on the Thames Estuary. Depending on the capacity of the initial plant (10Ml/d or 20M/d), this option could lead to a total desalination capacity of 30Ml/d or 40Ml/d.	20.0	KMW
Desalination (KTZ): East Thanet (10Ml/d)	This option would see a 10Ml/d desalination plant constructed near the North Thanet Coast and transfer to Fleete Manstor WSR to supply KTZ.	10.0	KTZ

Option name	Option description	DO benefit (Ml/d)	WRZ
Desalination (KTZ): East Thanet (10Ml/d) Phase 2	This option would add 10Ml/d capacity added to an existing desalination plant. Depending on the capacity of the existing plant (10Ml/d or 20Ml/d), this option would take the total capacity to 20Ml/d or 30Ml/d.	10.0	KTZ
Desalination (KTZ): East Thanet (20Ml/d)	This option would see a 20Ml/d desalination plant constructed near the North Thanet Coast and transfer to Fleete Manstor WSR to supply KTZ.	20.0	KTZ
Desalination (KTZ): East Thanet (20Ml/d) Phase 2	This option would add 10Ml/d capacity added to an existing desalination plant. Depending on the capacity of the existing plant (10Ml/d or 20Ml/d), this option would take the total capacity to 30Ml/d or 40Ml/d.	20.0	KTZ
Desalination (SHZ): Camber near Rye Bay (10Ml/d)	Work done during AMP[4]4/AMP5 identified area in the vicinity of the Camber next to Rye WTW as being suitable for a desalination plant. A new abstraction would be required to supply the works. The existing effluent pipe of Rye WTW may have capacity to receive the discharge. To distribute the treated water to the wider SHZ, a new supply pipeline would need to be constructed to Udimore WSR (ca. 4km) where it is assumed there is sufficient capacity to receive the desalinated water.	10.0	SHZ
Desalination (SHZ): Camber near Rye Bay (5Ml/d)	Work done during AMP4/AMP5 identified area in the vicinity of the Camber next to Rye WTW as being suitable for a desalination plant. A new abstraction would be required to supply the works. The existing effluent pipe of Rye WTW may have capacity to receive the discharge. To distribute the treated water to the wider SHZ, a new supply pipeline would need to be constructed to Udimore WSR (ca. 4km) where it is assumed there is sufficient capacity to receive the desalinated water.	5.0	SHZ
Desalination (SWZ): Tidal River Arun (10Ml/d)	This option proposes a desalination plant to treat estuarine water from the tidal River Arun to supply treated water SWZ. The plant could be built in a modular fashion. This option is for a 10Ml/d plant. There is bi-directional transfer between SWZ and SNZ which means this option could result in additional benefit to SNZ. An AMP4 investigation indicated that land adjacent to Littlehampton WTW showed the greatest potential for a new desalination site because of the existing land use, the availability of services (access roads, power, etc.) and the potential savings if Littlehampton WTW's existing long-sea outfall could be used.	10.0	SWZ
Desalination (SWZ): Tidal River Arun (10Ml/d) Phase 2	This option proposes a desalination plant to treat estuarine water from the tidal River Arun to supply treated water SWZ. The plant could be built in a modular fashion. This option is for increasing the capacity of an existing plant by 10Ml/d. There is bi-directional transfer between SWZ and SNZ which means this option could result in additional benefit to SNZ. An AMP4 investigation indicated that land adjacent to Littlehampton WTW showed the greatest potential for a new desalination site because of the existing land use, the availability of services (access roads, power, etc.) and the potential savings if Littlehampton WTW's existing long-sea outfall could be used.	10.0	SWZ
Desalination (SWZ): Tidal River Arun (20Ml/d)	This option proposes a desalination plant to treat estuarine water from the tidal River Arun to supply treated water SWZ. The plant could be built in a modular fashion. This option is for a 20Ml/d plant. There is bi-directional transfer between SWZ and SNZ which means this option could result in additional benefit to SNZ. An AMP4 investigation indicated that land adjacent to Littlehampton WTW showed the greatest potential for a new desalination site because of the existing land use, the availability of services (access roads, power, etc.) and the potential savings if Littlehampton WTW's existing long-sea outfall could be used.	20.0	SWZ

[4] AMP = Asset Management Programme

Option name	Option description	DO benefit (Ml/d)	WRZ
Desalination (SWZ): Tidal River Arun (20Ml/d) Phase 2	This option proposes a desalination plant to treat estuarine water from the tidal River Arun to supply treated water SWZ. The plant could be built in a modular fashion. This option is for increasing the capacity of an existing plant by 20Ml/d. There is bi-directional transfer between SWZ and SNZ which means this option could result in additional benefit to SNZ. An AMP4 investigation indicated that land adjacent to Littlehampton WTW showed the greatest potential for a new desalination site because of the existing land use, the availability of services (access roads, power, etc.) and the potential savings if Littlehampton WTW's existing long-sea outfall could be used.	20.0	SWZ
Storage (HSE): Convert and extend Test Lake into a surface water storage site (5.7Ml/d)	This option involves purchase of Test Lake for use as additional raw water storage capacity for River Test WSW. It also includes deepening the lake and the construction of embankments for additional storage. The reservoir would be filled by the River Test WSW within the existing licence and would provide additional operational flexibility and resilience during low flow periods.	5.7	HSE
Storage (HSE): Convert Test Lake into a surface water storage site (5.7Ml/d)	This option involves purchase of Test Lake for use as additional raw water storage capacity for River Test WSW. This option keeps the lake at its current capacity. The reservoir would be filled by the River Test WSW within the existing licence and would provide additional operational flexibility and resilience during low flow periods.	5.7	HSE
Storage (SNZ): River Adur Offline Reservoir (19.5Ml/d)	The option involves the construction of an earth embankment reservoir with a proposed storage capacity of up to 4,600Ml. The option will allow treated water to enter the distribution network to supply either the SWZ, SBZ or SNZ. The reservoir will be filled with water pumped from the eastern branch of the River Adur. The abstraction of raw water from the river to the reservoir would have a maximum flow of 30Ml/d.	19.5	SNZ
Treatment capacity (HSW): Upgrade River Test WSW (60Ml/d)	30Ml/d treatment train of surface water, possible augmented with recycled water. This would be a separate process stream from the existing raw water feed through to delivery to the network.	60.0	HSW
Treatment capacity (SNZ): Pulborough winter transfer stage 1 (2Ml/d)	During the winter, there is surplus surface water within the River Rother. This scheme would allow the surplus to be used at Pulborough WSW (within licence constraints) which in turn would allow coastal groundwater sources to be rested. This increase in groundwater can be utilised through new transfer mains from Tenants Hill to Brighton A WSR via Shoreham WSW, providing the additional 2Ml/d of water to SBZ during the summer and autumn of a drought year. This is Phase 1, which is to provide a permanent sludge treatment facility at Pulborough WSW.	2.0	SWZ
Upgrade of treatment capacity at Itchen surface water (30Ml/d)	30Ml/d treatment train of surface water, possible augmented with recycled water. This would be a separate process stream from the existing raw water feed through to delivery to the network.	30.0	HSE
Upgrade of treatment capacity at Itchen surface water (30Ml/d)	60Ml/d treatment train of surface water, possible augmented with recycled water. This would be a separate process stream from the existing raw water feed through to delivery to the network.	60.0	HSE
Upgrade of treatment capacity at River Test (60Ml/d)	30Ml/d treatment train of surface water, possible augmented with recycled water. This would be a separate process stream from the existing raw water feed through to delivery to the network.	30.0	HSW

2.1.4 Reuse of water already abstracted

Option name	Option description	DO benefit (Ml/d)	WRZ
Recycling (HSE): Portsmouth Harbour WTW to Itchen surface water direct (61Ml/d)	This option involves recycling water from Portsmouth Harbour WTW and directly transferring it to Itchen WSW for treatment.	61.0	HSE
Recycling (HSE): Portsmouth Harbour to Itchen surface water direct via environmental buffer (75Ml/d)	This option involves transferring recycled water from Portsmouth Harbour and Fareham WTWs to Itchen WSW through a newly constructed and lined environmental buffer (Itchen surface water lake).	75.0	HSE

Option name	Option description	DO benefit (Ml/d)	WRZ
Recycling (HSE): Portsmouth Harbour to Itchen surface water direct via Havant Thicket (61Ml/d)	This option involves recycling water from Portsmouth Harbour WTW and transferring it to Itchen WSW for treatment via Havant Thicket Reservoir.	61.0	HSE
Recycling (HSE): Portsmouth Harbour to Upper River Itchen via environmental buffer (40Ml/d)	This option involves recycling water from Portsmouth Harbour WTW and transferring it to Itchen WSW for treatment via an environmental buffer.	40.0	HSE
Recycling (HSE): Portsmouth Harboour to Upper River Itchen via environmental buffer (61Ml/d)	This option involves recycling water from Portsmouth Harbour WTW and transferring it to Itchen WSW for treatment via an environmental buffer.	61.0	HSE
Recycling (HSE): Combined Portsmouth Harbour and Fareham to River Itchen (modular phase 2 60-90Ml/d)	This option requires the treatment of wastewater streams at both Portsmouth Harbour and Fareham WTWs with tertiary treatment to a quality suitable to support flows into the River Itchen for increases in abstraction. The recycled water will be pumped in separate pipes from the WTWs to a meeting point then pumped in a single pipe to the discharge immediately upstream of the tidal limit of the River Itchen at Woodmill. This is the second phase from 60 to 90Ml/d	90.0	HSE
Recycling (HSE): Combined Portsmouth Harbour and Fareham to River Itchen (modular phase 1 0-60Ml/d)	This option requires the treatment of wastewater streams at both Portsmouth Harbour WTW and Fareham WTW with tertiary treatment to a quality suitable to support flows into the River Itchen for increases in abstraction. The recycled water will be pumped in separate pipes from the WTWs to a meeting point then pumped in a single pipe to the discharge immediately upstream of the tidal limit of the River Itchen at Woodmill. This is the first phase from 0 to 60Ml/d.	60.0	HSE
Recycling (HSE): Portswood (8.5Ml/d)	This option proposes the transfer of effluent from Portswood WTW to Portsmouth Water's Source A WSW. The recycled water from Source A WSW will be pumped to a discharge location immediately upstream of the tidal limit at Woodmill. This will offset increased abstractions at Source A during scheme operation when sustainability reductions would otherwise restrict abstraction. There are two treatment options available: 1. The abstracted water will be pumped via a new pipeline and pumping station to Itchen WSW for treatment and distribution. 2. The water will be treated at the existing Source A WSW plant. The treated water will be transferred to Southern Water by an existing bulk transfer main from Source A WSW to the Itchen WSW using the existing 15Ml/d spare capacity.	8.1	HSE
Recycling (HSE): Recharge of Havant Thicket with recycled water from Portsmouth Harbour (30Ml/d)	This option involved recharging Havant Thicket Reservoir with recycled water from Portsmouth Harbour WTW.	30.0	Portsmouth Water
Recycling (HSE): Recharge of Havant Thicket with recycled water from Portsmouth Harbour (60Ml/d)	This option involved recharging Havant Thicket Reservoir with recycled water from Portsmouth Harbour WTW.	60.0	Portsmouth Water
Recycling (HSE): Recharge of Havant Thicket with recycled water from Portsmouth Harbour (90Ml/d)	This option involved recharging Havant Thicket Reservoir with recycled water from Portsmouth Harbour WTW.	90.0	Portsmouth Water

Option name	Option description	DO benefit (Ml/d)	WRZ
Recycling (HSE): Woolston and Portswood (12.8Ml/d)	This scheme makes use of the recycled water from Woolston WTW and Portswood WTW. It is proposed that up to the combined DWF[5] of ca. 43Ml/d would be pumped to discharge location just upstream of the tidal limit at Woodmill in order to support abstraction at Portsmouth Water's Source A WSW. Additional treatment plant would need to be sited enroute to Itchen surface water, potentially at Source A WSW.	12.8	HSE
Recycling (IOW): Sandown (8.5Ml/d)	This option proposes the transfer of recycled water from Sandown WTW (currently discharged to sea) to support flows in the eastern River Yar upstream of the Sandown WSW abstraction at Alverstone. Treated water in excess of the local demand will be transferred through a new transfer pipeline to the Alvington High Level WSR, near Newport, for supply to much of the island.	8.5	IOW
Recycling (KMW): Medway (12.8Ml/d)	This option involves the transfer of approx. 18Ml/d of recycled water from Medway WTW to the River Medway upstream of Springfield abstraction. This would be used to supplement flows within the River Medway during low flow periods, thus reducing the releases from Bewl Water and conserving storage.	12.8	KMW
Recycling (KMW): Medway to lake (14Ml/d)	This option involves the transfer of approx. 18Ml/d of recycled water from Medway WTW to the River Medway upstream of Springfield abstraction. This would be used to supplement flows within the River Medway during low flow periods, thus reducing the releases from Bewl Water and conserving storage.	14.0	KMW
Recycling (SHZ): Ashford to Bewl (16.8Ml/d)	This option is a new 16.5Ml/d water recycling plant producing 11.8Ml/d near Ashford WTW and a transfer of recycled water to Bewl Reservoir, which feeds Darwell Reservoir, Bewl WSW and Near Rochester WSW.	16.8	SHZ
Recycling (SHZ): Hastings to Darwell (15.3Ml/d)	This option is a new water recycling plant producing 15.3Ml/d near Hastings WTW, currently being discharged to sea and Pebsham Gap, and a transfer of the recycled water to Darwell Reservoir, which feeds into Rye, Beauport and Hazards Green WSWs.	15.3	SHZ
Recycling (SHZ): Hastings to Darwell (9.5Ml/d)	This option is a new water recycling plant producing 9.5Ml/d near Hastings WTW, currently being discharged to sea and Pebsham Gap, and a transfer of the recycled water to Darwell Reservoir, which feeds into Rye, Beauport and Hazards Green WSWs.	9.5	SHZ
Recycling (SHZ): Tonbridge to Bewl (5.7Ml/d)	This option is a new 8Ml/d water recycling plant producing 5.7Ml/d near Tonbridge WTW and a transfer of the treated water to Bewl Reservoir, which feeds into Darwell Reservoir.	5.7	SHZ
Recycling (SHZ): Tunbridge Wells with Bewl (3.6Ml/d)	This option is a new 5Ml/d water recycling plant producing a DO of 3.6Ml/d near Tunbridge Wells WTW and a transfer of the recycled water to Bewl Reservoir, which feeds Darwell Reservoir, Bewl WSW and Near Rochester WSW.	3.6	SHZ
Recycling (SNZ): Crawley with Weir Wood (25Ml/d)	This option is a new 25.38Ml/d water recycling plant producing 25Ml/d near Crawley WTW and a transfer of the recycled water to Weir Wood Reservoir, which feeds Weir Wood WSW.	25.0	SNZ
Recycling (SNZ): Horsham with storage at Pulborough (6.8Ml/d)	This option is a new 9.5Ml/d water recycling plant producing 6.8Ml/d near Horsham WTW and a transfer of the recycled water to Church Farm Reservoir, which feeds into Pulborough WSW.	6.8	SNZ
Recycling (SNZ): Littlehampton with direct river discharge (15Ml/d)	This scheme proposes the transfer of recycled water from Littlehampton WTW to a new discharge point to the western River Rother upstream of the Pulborough WSW. This would support flows over the Pulborough WSW weir as the MRF[6] is approached and prolong production at Pulborough WSW during a drought. Once abstracted at Pulborough WSW this water would be used to meet demand in SNZ.	15.0	SNZ

[5] DWF = Dry Weather Flow
[6] MRF = Minimum Required Flow

Option name	Option description	DO benefit (Ml/d)	WRZ
Recycling (SNZ): Littlehampton with storage at Pulborough (17.1Ml/d)	This option is a new 24Ml/d water recycling plant producing 17.1Ml/d near Littlehampton WTW and a transfer of recycled water to Church Farm Reservoir, which feeds into Pulborough WSW.	17.1	SNZ

2.2 Efficient use and management of water

2.2.1 Reducing leakage

The table below shows the leakage reduction interventions included in our WRMP24 and the maximum Deployable Output (DO) benefit against each.

Option category	Option name	DO benefit (M/d)	WRZ
Leakage reduction	Digitalisation/Smart Networks - Hampshire Andover	0.1	HAZ
Leakage reduction	Advanced Find and Fix - Hampshire Andover	0.1	HAZ
Leakage reduction	Mains Replacement - Hampshire Andover	0.4	HAZ
Leakage reduction	Advanced Pressure Management - Hampshire Andover	0.1	HAZ
Leakage reduction	Digitalisation/Smart Networks - Hampshire Kingsclere	0.0	HKZ
Leakage reduction	Advanced Find and Fix - Hampshire Kingsclere	0.2	HKZ
Leakage reduction	Mains Replacement - Hampshire Kingsclere	0.4	HKZ
Leakage reduction	Advanced Pressure Management - Hampshire Kingsclere	0.1	HKZ
Leakage reduction	Digitalisation/Smart Networks - Hampshire Rural	0.1	HRZ
Leakage reduction	Advanced Find and Fix - Hampshire Rural	0.4	HRZ
Leakage reduction	Mains Replacement - Hampshire Rural	0.6	HRZ
Leakage reduction	Advanced Pressure Management - Hampshire Rural	0.1	HRZ
Leakage reduction	Digitalisation/Smart Networks - Hampshire Southampton East	0.2	HSE
Leakage reduction	Advanced Find and Fix - Hampshire Southampton East	0.0	HSE
Leakage reduction	Mains Replacement - Hampshire Southampton East	1.0	HSE
Leakage reduction	Advanced Pressure Management - Hampshire Southampton East	0.2	HSE
Leakage reduction	Digitalisation/Smart Networks - Hampshire Southampton West	0.1	HSW
Leakage reduction	Advanced Find and Fix - Hampshire Southampton West	0.0	HSW
Leakage reduction	Mains Replacement - Hampshire Southampton West	0.3	HSW
Leakage reduction	Advanced Pressure Management - Hampshire Southampton West	0.1	HSW
Leakage reduction	Digitalisation/Smart Networks - Hampshire Winchester	0.1	HWZ
Leakage reduction	Advanced Find and Fix - Hampshire Winchester	0.5	HWZ
Leakage reduction	Mains Replacement - Hampshire Winchester	0.9	HWZ
Leakage reduction	Advanced Pressure Management - Hampshire Winchester	0.1	HWZ
Leakage reduction	Digitalisation/Smart Networks - Isle of Wight	0.2	IOW
Leakage reduction	Advanced Find and Fix - Isle of Wight	0.8	IOW
Leakage reduction	Mains Replacement - Isle of Wight	1.4	IOW
Leakage reduction	Advanced Pressure Management - Isle of Wight	0.1	IOW
Leakage reduction	Digitalisation/Smart Networks - Kent Medway East	0.3	KME
Leakage reduction	Advanced Find and Fix - Kent Medway East	1.0	KME
Leakage reduction	Mains Replacement - Kent Medway East	2.3	KME
Leakage reduction	Advanced Pressure Management - Kent Medway East	0.4	KME
Leakage reduction	Digitalisation/Smart Networks - Kent Medway West	0.2	KMW
Leakage reduction	Advanced Find and Fix - Kent Medway West	1.2	KMW
Leakage reduction	Mains Replacement - Kent Medway West	2.0	KMW
Leakage reduction	Advanced Pressure Management - Kent Medway West	0.3	KMW
Leakage reduction	Digitalisation/Smart Networks - Kent Thanet	0.1	KTZ

Option category	Option name	DO benefit (M/d)	WRZ
Leakage reduction	Advanced Find and Fix - Kent Thanet	0.0	KTZ
Leakage reduction	Mains Replacement - Kent Thanet	0.5	KTZ
Leakage reduction	Advanced Pressure Management - Kent Thanet	0.1	KTZ
Leakage reduction	Digitalisation/Smart Networks - Sussex Brighton	0.2	SBZ
Leakage reduction	Advanced Find and Fix - Sussex Brighton	0.5	SBZ
Leakage reduction	Mains Replacement - Sussex Brighton	1.5	SBZ
Leakage reduction	Advanced Pressure Management - Sussex Brighton	0.3	SBZ
Leakage reduction	Digitalisation/Smart Networks - Sussex Hastings	0.1	SHZ
Leakage reduction	Advanced Find and Fix - Sussex Hastings	0.2	SHZ
Leakage reduction	Mains Replacement - Sussex Hastings	0.6	SHZ
Leakage reduction	Advanced Pressure Management - Sussex Hastings	0.1	SHZ
Leakage reduction	Digitalisation/Smart Networks - Sussex North	0.4	SNZ
Leakage reduction	Advanced Find and Fix - Sussex North	0.6	SNZ
Leakage reduction	Mains Replacement - Sussex North	1.7	SNZ
Leakage reduction	Advanced Pressure Management - Sussex North	0.3	SNZ
Leakage reduction	Digitalisation/Smart Networks - Sussex Worthing	0.1	SWZ
Leakage reduction	Advanced Find and Fix - Sussex Worthing	0.1	SWZ
Leakage reduction	Mains Replacement - Sussex Worthing	0.5	SWZ
Leakage reduction	Advanced Pressure Management - Sussex Worthing	0.1	SWZ

2.2.2 Reducing household consumption

The table below shows the initiatives included in our WRMP24 for reducing household consumption and the maximum DO benefit from each under Dry Year Annual Average (DYAA) conditions.

Option category	Option name	DO benefit (M/d)	WRZ
Household demand reduction	Smart Metering - Hampshire Andover	0.4	HAZ
Household demand reduction	Smart Metering Unmeasured Households - Hampshire Andover	0.6	HAZ
Household demand reduction	Comms Pipe Replacement - Hampshire Andover	0.1	HAZ
Household demand reduction	Enabler Activities - Hampshire Andover	0.1	HAZ
Household demand reduction	Home Visits - Hampshire Andover	0.1	HAZ
Household demand reduction	Smart Metering USPL - Hampshire Andover	0.1	HAZ
Household demand reduction	Tariffs - Hampshire Andover	0.2	HAZ
Household demand reduction	Smart Metering - Hampshire Kingsclere	0.1	HKZ
Household demand reduction	Smart Metering Unmeasured Households - Hampshire Kingsclere	0.2	HKZ
Household demand reduction	Comms Pipe Replacement - Hampshire Kingsclere	0.0	HKZ
Household demand reduction	Enabler Activities - Hampshire Kingsclere	0.0	HKZ
Household demand reduction	Home Visits - Hampshire Kingsclere	0.0	HKZ
Household demand reduction	Smart Metering USPL - Hampshire Kingsclere	0.1	HKZ
Household demand reduction	Tariffs - Hampshire Kingsclere	0.0	HKZ
Household demand reduction	Smart Metering - Hampshire Rural	0.1	HRZ
Household demand reduction	Smart Metering Unmeasured Households - Hampshire Rural	0.2	HRZ
Household demand reduction	Comms Pipe Replacement - Hampshire Rural	0.0	HRZ

Option category	Option name	DO benefit (M/d)	WRZ
Household demand reduction	Enabler Activities - Hampshire Rural	0.0	HRZ
Household demand reduction	Home Visits - Hampshire Rural	0.0	HRZ
Household demand reduction	Smart Metering USPL - Hampshire Rural	0.1	HRZ
Household demand reduction	Tariffs - Hampshire Rural	0.1	HRZ
Household demand reduction	Smart Metering - Hampshire Southampton East	2.1	HSE
Household demand reduction	Smart Metering Unmeasured Households - Hampshire Southampton East	3.5	HSE
Household demand reduction	Comms Pipe Replacement - Hampshire Southampton East	0.2	HSE
Household demand reduction	Enabler Activities - Hampshire Southampton East	0.4	HSE
Household demand reduction	Home Visits - Hampshire Southampton East	0.4	HSE
Household demand reduction	Smart Metering USPL - Hampshire Southampton East	0.3	HSE
Household demand reduction	Tariffs - Hampshire Southampton East	1.2	HSE
Household demand reduction	Smart Metering - Hampshire Southampton West	0.8	HSW
Household demand reduction	Smart Metering Unmeasured Households - Hampshire Southampton West	0.4	HSW
Household demand reduction	Comms Pipe Replacement - Hampshire Southampton West	0.1	HSW
Household demand reduction	Enabler Activities - Hampshire Southampton West	0.1	HSW
Household demand reduction	Home Visits - Hampshire Southampton West	0.2	HSW
Household demand reduction	Smart Metering USPL - Hampshire Southampton West	0.1	HSW
Household demand reduction	Tariffs - Hampshire Southampton West	0.5	HSW
Household demand reduction	Smart Metering - Hampshire Winchester	0.4	HWZ
Household demand reduction	Smart Metering Unmeasured Households - Hampshire Winchester	0.6	HWZ
Household demand reduction	Comms Pipe Replacement - Hampshire Winchester	0.1	HWZ
Household demand reduction	Enabler Activities - Hampshire Winchester	0.1	HWZ
Household demand reduction	Home Visits - Hampshire Winchester	0.1	HWZ
Household demand reduction	Smart Metering USPL - Hampshire Winchester	0.1	HWZ
Household demand reduction	Tariffs - Hampshire Winchester	0.2	HWZ
Household demand reduction	Smart Metering - Isle of Wight	0.7	IOW
Household demand reduction	Smart Metering Unmeasured Households - Isle of Wight	0.3	IOW
Household demand reduction	Comms Pipe Replacement - Isle of Wight	0.1	IOW
Household demand reduction	Enabler Activities - Isle of Wight	0.1	IOW
Household demand reduction	Home Visits - Isle of Wight	0.1	IOW
Household demand reduction	Smart Metering USPL - Isle of Wight	0.2	IOW
Household demand reduction	Tariffs - Isle of Wight	0.4	IOW
Household demand reduction	Smart Metering - Kent Medway East	1.6	KME
Household demand reduction	Smart Metering Unmeasured Households - Kent Medway East	2.8	KME
Household demand reduction	Comms Pipe Replacement - Kent Medway East	0.2	KME
Household demand reduction	Enabler Activities - Kent Medway East	0.3	KME
Household demand reduction	Home Visits - Kent Medway East	0.3	KME
Household demand reduction	Smart Metering USPL - Kent Medway East	0.5	KME
Household demand reduction	Tariffs - Kent Medway East	1.0	KME
Household demand reduction	Smart Metering - Kent Medway West	0.9	KMW
Household demand reduction	Smart Metering Unmeasured Households - Kent Medway West	1.6	KMW
Household demand reduction	Comms Pipe Replacement - Kent Medway West	0.1	KMW

Option category	Option name	DO benefit (M/d)	WRZ
Household demand reduction	Enabler Activities - Kent Medway West	0.2	KMW
Household demand reduction	Home Visits - Kent Medway West	0.2	KMW
Household demand reduction	Smart Metering USPL - Kent Medway West	0.3	KMW
Household demand reduction	Tariffs - Kent Medway West	0.6	KMW
Household demand reduction	Smart Metering - Kent Thanet	1.0	KTZ
Household demand reduction	Smart Metering Unmeasured Households - Kent Thanet	2.6	KTZ
Household demand reduction	Comms Pipe Replacement - Kent Thanet	0.1	KTZ
Household demand reduction	Enabler Activities - Kent Thanet	0.2	KTZ
Household demand reduction	Home Visits - Kent Thanet	0.2	KTZ
Household demand reduction	Smart Metering USPL - Kent Thanet	0.2	KTZ
Household demand reduction	Tariffs - Kent Thanet	0.6	KTZ
Household demand reduction	Smart Metering - Sussex Brighton	1.7	SBZ
Household demand reduction	Smart Metering Unmeasured Households - Sussex Brighton	3.2	SBZ
Household demand reduction	Comms Pipe Replacement - Sussex Brighton	0.3	SBZ
Household demand reduction	Enabler Activities - Sussex Brighton	0.3	SBZ
Household demand reduction	Home Visits - Sussex Brighton	0.4	SBZ
Household demand reduction	Smart Metering USPL - Sussex Brighton	0.4	SBZ
Household demand reduction	Tariffs - Sussex Brighton	1.0	SBZ
Household demand reduction	Smart Metering - Sussex Hastings	0.5	SHZ
Household demand reduction	Smart Metering Unmeasured Households - Sussex Hastings	2.0	SHZ
Household demand reduction	Comms Pipe Replacement - Sussex Hastings	0.1	SHZ
Household demand reduction	Enabler Activities - Sussex Hastings	0.1	SHZ
Household demand reduction	Home Visits - Sussex Hastings	0.1	SHZ
Household demand reduction	Smart Metering USPL - Sussex Hastings	0.1	SHZ
Household demand reduction	Tariffs - Sussex Hastings	0.3	SHZ
Household demand reduction	Smart Metering - Sussex North	1.4	SNZ
Household demand reduction	Smart Metering Unmeasured Households - Sussex North	2.1	SNZ
Household demand reduction	Comms Pipe Replacement - Sussex North	0.2	SNZ
Household demand reduction	Enabler Activities - Sussex North	0.2	SNZ
Household demand reduction	Home Visits - Sussex North	0.3	SNZ
Household demand reduction	Smart Metering USPL - Sussex North	0.4	SNZ
Household demand reduction	Tariffs - Sussex North	0.8	SNZ
Household demand reduction	Smart Metering - Sussex Worthing	1.0	SWZ
Household demand reduction	Smart Metering Unmeasured Households - Sussex Worthing	1.5	SWZ
Household demand reduction	Comms Pipe Replacement - Sussex Worthing	0.1	SWZ
Household demand reduction	Enabler Activities - Sussex Worthing	0.2	SWZ
Household demand reduction	Home Visits - Sussex Worthing	0.2	SWZ
Household demand reduction	Smart Metering USPL - Sussex Worthing	0.2	SWZ
Household demand reduction	Tariffs - Sussex Worthing	0.5	SWZ

2.2.3 Reducing non-household consumption

The table below shows the initiatives included in our WRMP24 for reducing non-household consumption and the maximum DO benefit from each under DYAA conditions.

Option category	Option Name	DO benefit (M/d)	WRZ
Non-household water efficiency	NHH Smart Metering - Hampshire Andover	0.1	HAZ
Non-household water efficiency	Enabler Activities (Non households) - Hampshire Andover	0.0	HAZ
Non-household water efficiency	Water Efficiency Partnership Fund - Hampshire Andover	0.0	HAZ
Non-household water efficiency	NHH Tariffs - Hampshire Andover	0.1	HAZ
Non-household water efficiency	Water Audits (Non households) - Hampshire Andover	0.2	HAZ
Non-household water efficiency	NHH Smart Metering - Hampshire Kingsclere	0.0	HKZ
Non-household water efficiency	Enabler Activities (Non households) - Hampshire Kingsclere	0.0	HKZ
Non-household water efficiency	Water Efficiency Partnership Fund - Hampshire Kingsclere	0.0	HKZ
Non-household water efficiency	NHH Tariffs - Hampshire Kingsclere	0.0	HKZ
Non-household water efficiency	Water Audits (Non households) - Hampshire Kingsclere	0.0	HKZ
Non-household water efficiency	NHH Smart Metering - Hampshire Rural	0.0	HRZ
Non-household water efficiency	Enabler Activities (Non households) - Hampshire Rural	0.0	HRZ
Non-household water efficiency	Water Efficiency Partnership Fund - Hampshire Rural	0.0	HRZ
Non-household water efficiency	NHH Tariffs - Hampshire Rural	0.0	HRZ
Non-household water efficiency	Water Audits (Non households) - Hampshire Rural	0.1	HRZ
Non-household water efficiency	NHH Smart Metering - Hampshire Southampton East	0.6	HSE
Non-household water efficiency	Enabler Activities (Non households) - Hampshire Southampton East	0.0	HSE
Non-household water efficiency	Water Efficiency Partnership Fund - Hampshire Southampton East	0.0	HSE
Non-household water efficiency	NHH Tariffs - Hampshire Southampton East	0.4	HSE
Non-household water efficiency	Water Audits (Non households) - Hampshire Southampton East	0.9	HSE
Non-household water efficiency	NHH Smart Metering - Hampshire Southampton West	0.2	HSW
Non-household water efficiency	Enabler Activities (Non households) - Hampshire Southampton West	0.0	HSW
Non-household water efficiency	Water Efficiency Partnership Fund - Hampshire Southampton West	0.0	HSW
Non-household water efficiency	NHH Tariffs - Hampshire Southampton West	0.1	HSW
Non-household water efficiency	Water Audits (Non households) - Hampshire Southampton West	0.3	HSW
Non-household water efficiency	NHH Smart Metering - Hampshire Winchester	0.2	HWZ
Non-household water efficiency	Enabler Activities (Non households) - Hampshire Winchester	0.0	HWZ
Non-household water efficiency	Water Efficiency Partnership Fund - Hampshire Winchester	0.0	HWZ
Non-household water efficiency	NHH Tariffs - Hampshire Winchester	0.1	HWZ
Non-household water efficiency	Water Audits (Non households) - Hampshire Winchester	0.2	HWZ
Non-household water efficiency	NHH Smart Metering - Isle of Wight	0.3	IOW
Non-household water efficiency	Enabler Activities (Non households) - Isle of Wight	0.0	IOW
Non-household water efficiency	Water Efficiency Partnership Fund - Isle of Wight	0.0	IOW
Non-household water efficiency	NHH Tariffs - Isle of Wight	0.1	IOW
Non-household water efficiency	Water Audits (Non households) - Isle of Wight	0.4	IOW
Non-household water efficiency	NHH Smart Metering - Kent Medway East	0.4	KME
Non-household water efficiency	Enabler Activities (Non households) - Kent Medway East	0.0	KME
Non-household water efficiency	Water Efficiency Partnership Fund - Kent Medway East	0.0	KME
Non-household water efficiency	NHH Tariffs - Kent Medway East	0.2	KME

Option category	Option Name	DO benefit (M/d)	WRZ
Non-household water efficiency	Water Audits (Non households) - Kent Medway East	0.5	KME
Non-household water efficiency	NHH Smart Metering - Kent Medway West	0.4	KMW
Non-household water efficiency	Enabler Activities (Non households) - Kent Medway West	0.0	KMW
Non-household water efficiency	Water Efficiency Partnership Fund - Kent Medway West	0.0	KMW
Non-household water efficiency	NHH Tariffs - Kent Medway West	0.2	KMW
Non-household water efficiency	Water Audits (Non households) - Kent Medway West	0.3	KMW
Non-household water efficiency	NHH Smart Metering - Kent Thanet	0.3	KTZ
Non-household water efficiency	Enabler Activities (Non households) - Kent Thanet	0.0	KTZ
Non-household water efficiency	Water Efficiency Partnership Fund - Kent Thanet	0.0	KTZ
Non-household water efficiency	NHH Tariffs - Kent Thanet	0.2	KTZ
Non-household water efficiency	Water Audits (Non households) - Kent Thanet	0.4	KTZ
Non-household water efficiency	NHH Smart Metering - Sussex Brighton	0.5	SBZ
Non-household water efficiency	Enabler Activities (Non households) - Sussex Brighton	0.0	SBZ
Non-household water efficiency	Water Efficiency Partnership Fund - Sussex Brighton	0.0	SBZ
Non-household water efficiency	NHH Tariffs - Sussex Brighton	0.3	SBZ
Non-household water efficiency	Water Audits (Non households) - Sussex Brighton	0.8	SBZ
Non-household water efficiency	NHH Smart Metering - Sussex Hastings	0.2	SHZ
Non-household water efficiency	Enabler Activities (Non households) - Sussex Hastings	0.0	SHZ
Non-household water efficiency	Water Efficiency Partnership Fund - Sussex Hastings	0.0	SHZ
Non-household water efficiency	NHH Tariffs - Sussex Hastings	0.1	SHZ
Non-household water efficiency	Water Audits (Non households) - Sussex Hastings	0.2	SHZ
Non-household water efficiency	NHH Smart Metering - Sussex North	0.4	SNZ
Non-household water efficiency	Enabler Activities (Non households) - Sussex North	0.0	SNZ
Non-household water efficiency	Water Efficiency Partnership Fund - Sussex North	0.0	SNZ
Non-household water efficiency	NHH Tariffs - Sussex North	0.2	SNZ
Non-household water efficiency	Water Audits (Non households) - Sussex North	0.6	SNZ
Non-household water efficiency	NHH Smart Metering - Sussex Worthing	0.2	SWZ
Non-household water efficiency	Enabler Activities (Non households) - Sussex Worthing	0.0	SWZ
Non-household water efficiency	Water Efficiency Partnership Fund - Sussex Worthing	0.0	SWZ
Non-household water efficiency	NHH Tariffs - Sussex Worthing	0.1	SWZ
Non-household water efficiency	Water Audits (Non households) - Sussex Worthing	0.3	SWZ

3 Rejection Register

3.1 Hard infrastructure

3.1.1 Transfers between and within regions

Option name	Option description	Maximum DO (Ml/d)	WRZ	Rejection comment
Asset enhancement (IOW): Bi-directional booster at Near Cowes	Bi-directional booster at Near Cowes to supply back to HSW.	TBC	IOW	Resilience option with no water resource benefit and should therefore be considered for the Business Plan but not WRMP.
Asset enhancement (IOW): Bi-directional booster at Newport	Bi-directional booster (North/South Link) - link with Fishbourne booster (water transmission resilience on IOW).	TBC	IOW	Resilience option with no water resource benefit and should therefore be considered for the Business Plan but not WRMP.
Asset enhancement (KTZ): Duplicate trunk main to release locked-in DO (11.8Ml/d)	This option looks to install approximately 10km of new main (incl. booster pumping station) between the existing main at Beacon Lane Sandwich WSW and Faversham4 Manston1 WSR. The aim is to release DO from the groundwater sources in KTZ whose combined DO far exceeds demand by approximately 12Ml/d. Transfer of this excess supply is currently restricted by pressure constraints in the KTZ mains network. Total DO benefit is estimated to be 11.8Ml/d based on 5Ml/d from North Deal WSW and 6.82Ml/d from West Langdon WSW.	11.8	KTZ	Limited yield and uncertain long term DO benefit. The DO is likely to reduce further with time due to climate change impacts and reductions to abstraction licences through the Environmental Destination.
Asset enhancement (KTZ): Duplicate trunk main to release locked-in DO (11.8Ml/d)	This option looks to install approximately 10km of new main (incl. booster pumping station) between the existing main at Beacon Lane Sandwich WSW and Faversham4 Manston1 WSR. The aim is to release DO from the groundwater sources in KTZ whose combined DO far exceeds demand by approximately 12Ml/d. Transfer of this excess supply is currently restricted by pressure constraints in the KTZ mains network. Total DO benefit is estimated to be 11.8Ml/d based on 5Ml/d from North Deal WSW and 6.82Ml/d from West Langdon WSW.	11.8	KTZ	Limited yield and uncertain long term DO benefit. The DO is likely to reduce further with time due to climate change impacts and reductions in availability of from the KTZ sources through the Environmental Destination.
Buk export (SNZ): Terminate SEW supply from Weir Wood (5.4Ml/d)	Terminating Weir Wood Reservoir bulk supply to South East Water would save 5.9Ml/d of water, which would then be available to SNZ.	5.4	SNZ	All bulk supply options in WRMP24 are included as options beyond their current contractual terms. The utilisation of the bulk transfers going forward is then determined by the WRSE investment model.
Bulk export (HSW): Reduce industrial supply to large industrial user	A reduction in supply to the large industrial user in Hampshire to release water to be supplied in HSW.		HSW	The contractual volume has been reduced and this reduction will be included in the network configuration for the 2025 baseline.
Bulk export (KME): Bewl to SEW RZ7 (20Ml/d)	An additional 10Ml/d transfer dependent on new capacity at Bewl WSW.	20.0	KME	The option requires further work to identify confirm availability of the source of water for the transfer. It will be reconsidered for WRMP29.

Option name	Option description	Maximum DO (Ml/d)	WRZ	Rejection comment
Bulk export (KME): Bewl Water to Bewl Bridge (14.6Ml/d)	Selected in WRSE modelling in Jan 2013 and agreed between companies in discussions in Feb/March 2013. Further discussion between Southern Water and South East Water required. PDO[7] 14.60Ml/d ADO[8]/MDO[9] 12.76Ml/d	14.6	KME	The option results in a reduction of DO to Southern Water and requires further work to establish if this can be sustained.
Bulk export (KME): Bulk export from Faversham4-Faversham4 main to Blean (5Ml/d)	5Ml/d transfer from South East Water's Blean WSR to connect to Test Valley Bypass break pressure tank along the Faversham4-Faversham4 main. Bulk supply from Southern Water via the Sheldwich main at Hartlip (Near Rochester to South East Water's Hartlip).	5.0	KME	The option requires further work with South East Water to identify and confirm the source of water for the transfer. It will be reconsidered for WRMP29.
Bulk export (KME): KME to SEW RZ8 (3Ml/d)	Bulk supplies from KME to South East Water's RZ8. Various routes proposed in WRSE 2012-13. Original proposed route was Near Rochester to South East Water's Aldington RZ8 or Radfall Reservoir (via Faversham4-Faversham4 main). This was then replaced by transfers from Hartlip to South East Water at Detling (RZ6) to Blean (RZ8) to Aldington (RZ8).	3.0	KME	The option requires further work with South East Water to identify and confirm the source of water for the transfer. It will be reconsidered for WRMP29.
Bulk export (KME): Near Rochester to SEW RZ6 (10Ml/d)	10Ml/d transfer. No longer dependent on Honour Oak transfer. Constrained by Near Rochester WSW capacity. Proposed route Near Rochester to South East Water's Blean RZ8 (via Faversham4-Faversham4 main).	10.0	KME	The option requires further work to identify the source of water for the transfer. It will be reconsidered for WRMP29.
Bulk export (KME): Near Rochester to SEW RZ6 (14.6Ml/d)	14.6Ml/d transfer from Near Rochester WSW to South East Water's RZ6. No longer dependent on Honour Oak transfer.	14.6	KME	The option requires further work to identify the source of water for the transfer. It will be reconsidered for WRMP29.
Bulk export (KME): Terminate Sheldwich supply to SEW (7.78Ml/d)	Southern Water currently has an agreement to supply South East Water's with water from a group of boreholes in the Sheldwich area, known as the Sheldwich scheme. The agreement is for a transfer of approximately 22% of the yield of three sources. Terminating the bulk supply to South East Water's allows more water to be abstracted from the Sheldwich boreholes for use within KME.	7.8	KME	All bulk supply options in WRMP24 are included as options beyond their current contractual terms. The utilisation of the bulk transfers going forward is then determined by the WRSE investment model.
Bulk export (KTZ): Termination of supply to AFW (4Ml/d)	Terminating the bulk supply to Affinity Water from Southern Water's Deal WSR would provide an additional 4Ml/d for KTZ at peak and 3Ml/d under average operating between 1st September to 31st December annually. This may potentially reduce the reliance on the Faversham4-Faversham4 main.	4.0	KTZ	The contract was not renewed. The supply is therefore already terminated.

[7] PDO = Peak Deployable Output
[8] ADO = Average Deployable Output
[9] MDO = Minimum Deployable Output

Option name	Option description	Maximum DO (Ml/d)	WRZ	Rejection comment
Bulk export (SBZ): Swan to Barcombe (4Ml/d)	Bi-directional transfer between existing South East Water's Barcombe WSR (RZ2) and Swan WSR.	4.0	SBZ	The option requires further work with South East Water to identify and confirm the source of water for the transfer. It will be reconsidered for WRMP29.
Bulk export (SHZ): Darwell to Eastbourne (8Ml/d)	8Ml/d additional bulk supply from Darwell Reservoir to South East Water's Eastbourne (RZ3) Folkington service reservoir.	8.0	SHZ	The option requires further work with South East Water to identify and confirm the source of water for the transfer. It will be reconsidered for WRMP29.
Bulk export (SNZ): Bi-directional transfer between Gatwick and Crawley (0.05Ml/d)	Bi-direcational transfer with SES Water involving joint operation of Pulborough WSW and Bough Beech WSW using the major infrastructure that already exists in each company (Sussex Coast to Pulborough WSW to Crawley/Horsham and Bough Beech to Horley) which could have significant conjunctive use benefits. A new transfer link would be required between the Horley area to Crawley/Horsham.	0.05	SNZ	The option offers insignificant water resource benefit and requires further work with SES Water to identify and confirm the source of water for the transfer.
Bulk import (HKZ): Kennet Valley to HKZ	Transfer from Thames Water's Kennet Valley area to HKZ. Transfer reliant on the development of the Abingdon Reservoir.		HKZ	This option has been refined and replaced by the T2ST which provides a similar transfer from Thames Water .
Bulk import (HSE): Construction of Abingdon-Basingstoke-Itchen surface water pipeline	Construct a pipeline from Abingdon Reservoir proposed by Thames Water to Basingstoke and then another pipeline from Basingstoke to Itchen WSW for treatment and distribution in Hampshire.		HSE	This option has been refined and replaced by T2ST which provides a similar transfer from Thames Water .
Bulk import (HSE): From SESRO to Itchen WSW (30Ml/d)	This option involves a bulk transfer from Thames Water to Itchen WSW from the proposed South East Strategic Reservoir Option (SESRO). The two sub options are for a 30Ml/d and an 80Ml/d transfer to allow potable water transfer into HAZ and HKZ and avoid the need for additional treatment at Itchen WSW.	30.0	HSE	This option has been refined and replaced by the T2ST which provides a similar, but larger. transfer from Thames Water .
Bulk import (HSE): From SESRO to Itchen WSW (80Ml/d)	This option involves a bulk transfer from Thames Water to Itchen WSW from the proposed SESRO. The two sub options are for a 30Ml/d and an 80Ml/d transfer to allow potable water transfer into HAZ and HKZ and avoid the need for additional treatment at Itchen WSW.	80.0	HSE	This option has been refined and replaced by the T2ST which provides a similar, but larger, transfer from Thames Water
Bulk import (HSE): Havant Thicket Reservoir to Itchen WSW direct (61Ml/d)	This option involves a 61Ml/d raw water bulk transfer between Havant Thicket Reservoir and Itchen WSW	61.0	HSE	This option has been replaced by the Hampshire Water Transfer and Water Recycling Project (HWTWRP) as part of the Strategic Resource Option programme.
Bulk import (HSE): Havant Thicket to Itchen surface water pipeline - first section (120Ml/d)	This option involves a new raw water transfer (pipe and break tank) between Havant Thicket Reservoir and Itchen WSW to transfer up to 120Ml/d. This is the first section from Havant Thicket Reservoir to the mid-point with spur off to Portsmouth Water.	120.0	HSE	The maximum design capacity of the pipeline has been limited to 90Ml/d following consideration of the water available for transfer.
Bulk import (HSE): Havant Thicket to Itchen surface water pipeline - first section (150Ml/d)	This option involves a new raw water transfer (pipe and break tank) between Havant Thicket Reservoir and Itchen WSW to transfer up to 150Ml/d. This is the first section from Havant Thicket Reservoir to the mid-point with spur off to Portsmouth Water.	150.0	HSE	The maximum design capacity of the pipeline has been limited to 90Ml/d following consideration of the water available for transfer.
Bulk import (HSE): Havant Thicket to Itchen surface water pipeline - first section (190Ml/d)	This option involves a new raw water transfer (pipe and break tank) between Havant Thicket Reservoir and Itchen WSW to transfer up to 190Ml/d. This is the first section from Havant Thicket Reservoir to the mid-point with spur off to Portsmouth Water.	190.0	HSE	The maximum design capacity of the pipeline has been limited to 90Ml/d following consideration of the water available for transfer.

Option name	Option description	Maximum DO (Ml/d)	WRZ	Rejection comment
Bulk import (HSE): Havant Thicket to Itchen surface water pipeline - second section (120Ml/d)	This option involves a new raw water transfer (pipe and break tank) between Havant Thicket Reservoir and Itchen WSW to transfer up to 120Ml/d. This is the first section from Havant Thicket Reservoir to the mid-point with spur off to Portsmouth Water.	120.0	HSE	The maximum design capacity of the pipeline has been limited to 90Ml/d following consideration of the water available for transfer.
Bulk import (HSE): Havant Thicket to Itchen surface water pipeline - second section (150Ml/d)	This option involves a new raw water transfer (pipe and break tank) between Havant Thicket Reservoir and Itchen WSW to transfer up to 150Ml/d. This is the first section from Havant Thicket Reservoir to the mid-point with spur off to Portsmouth Water.	150.0	HSE	The maximum design capacity of the pipeline has been limited to 90Ml/d following consideration of the water available for transfer.
Bulk import (HSE): Havant Thicket to Itchen surface water pipeline - second section (190Ml/d)	This option involves a new raw water transfer (pipe and break tank) between Havant Thicket Reservoir and Itchen WSW to transfer up to 190Ml/d. This is the first section from Havant Thicket Reservoir to the mid-point with spur off to Portsmouth Water.	190.0	HSE	The maximum design capacity of the pipeline has been limited to 90Ml/d following consideration of the water available for transfer.
Bulk import (HSE): PWC Source A to Itchen WSW additional (9Ml/d)	Additional 9Ml/d bulk import (treated) from Portsmouth Water's Source A to Itchen WSW distribution network using spare capacity of existing 30Ml/d main. The option is dependent on resource development by Portsmouth Water.	9.0	HSE	The test boreholes Portsmouth Water drilled to facilitate this transfer did not provide the required yield. This option is therefore no longer available.
Bulk import (HSE): SEW Source A to Itchen WSW (10Ml/d)	This option involves the construction of a new bulk transfer from South East Water's source at Bray to Itchen WSW via Whitedown TR3 WSR. Transfer reliant on the development of the Abingdon Reservoir by Thames Water.	10.0	HSE	This option has been refined and replaced by the T2ST which provides a similar transfer from Thames Water .
Bulk import (HSE): T2ST to Yew Hill WSW to Itchen WSW (50Ml/d)	This is bulk import of up to 50Ml/d as part of T2ST to HSE via Yew Hill WSW in HWZ.	50.0	HSE	Following consideration of the demand in the Hampshire area, this pipeline is now being designed to 120Ml/d capacity.
Bulk import (HSE): T2ST to Yew Hill WSW to Itchen WSW (80Ml/d)	This is bulk import from Thames Water of up to 80Ml/d as part of T2ST to HSE via Yew Hill WSW in HWZ.	80.0	HSE	Following consideration of the demand in the Hampshire area, this pipeline is now being designed to 120Ml/d capacity.
Bulk import (HSE): WSX to Hants South	Construction of a new bulk transfer from Wessex Water to either HSE or HSW.	TBC	HSE/HSW	Reliant on Blashford Lakes which are at sustainability reduction risk.
Bulk import (HSW): Bulk import from SWW (30Ml/d)	This option is linked to providing demineralised desalinated water to large industrial user. This would then free up the 30Ml/d that large industrial user currently gets from South West Water to be transferred to HSW.	30.0	HSW	The 40Ml/d demineralised supply to large industrial user was ruled out during the SRO[10] assessment process as the commercial risk to Southern Water was considered to be unacceptably high.[11]

[10] SRO = Strategic Resource Option
[11] Southern Water, 2021, Strategic Solution Interim Update Options Appraisal Process, https://www.southernwater.co.uk/media/zywp0eua/wflh_6_interim-update_options-appraisal-process.pdf

Option name	Option description	Maximum DO (Ml/d)	WRZ	Rejection comment
Bulk import (HSW): Cheddar Reservoir to River Test WSW	This scheme comprises construction of a second reservoir at Cheddar in Bristol Water's area and/or utilisation of a Wessex Water/Bristol Water interconnection near Bath together with a transmission system across Wessex Waters area to Southern Water.	65	HSW	This was considered as an SRO as part of the RAPID[12] gated process. However, options for transferring water from Cheddar to Southampton were considered not to be technically feasible or sustainable and delivery timescales were considered to be prolonged, when compared with other available options. Therefore they were not processed further.
Bulk import (HSW): Mendip quarry to River Test WSW	A quarry has been identified in the Mendip Hills suitable to be re-purposed, once decommissioned, as a reservoir. The reservoir would be fed by a combination of groundwater and surface water from an enhanced River Avon abstraction licence, providing a water resource benefit of up to 87Ml/d. Four transfer options have been proposed that could provide benefits to West Country Water Resources (WCWR) companies (via raw water transfer to Bristol Water, Wessex Water and South West Water or via treated water transfer to Wessex Water) and benefits to South East water companies (via raw water transfer to the River Thames to Thames Water, South East Water and Affinity Water or a treated water transfer to Southern Water).		HSW	The quarry will not be decommissioned until the 2040s and so the scheme could not meet all the project objectives of being technically feasible and sustainable and delivery timescales were considered to be prolonged when compared with other available options so this option was not progressed further.
Bulk import (HSW): SWW (20Ml/d)	This option proposes a treated water transfer from South West Water's source on the River Avon to River Test WSW. The pipeline route has been selected to avoid designated areas and the New Forest National Park as much as possible.	20.0	HSW	South West Water has informed that it is unable to provide the supply owing to potential environmental flow targets on the River Avon SAC[13].
Bulk import (HSW): SWW and large industrial user (40Ml/d)	A reduced South West Water supply to large industrial user would allow a larger bulk supply to Southern Water. South West Water currently supplies around 40Ml/d to the large industrial user. It may be possible for a desalination plant to be built at the industrial site to supply water at peak periods while water at average periods continues to be supplied by whichever water company wins the contract. This would mean that there would be around 40Ml/d of additional water available to South West Water at peak periods, some of which may be available to transfer to Southern Water's Western area.	40.0	HSW	This is a high risk option as the water is fed directly into a large industrial user process and Southern Water carries huge liability in case the desalinated water causes issues with the industrial process of the industrial user or if the supply is otherwise disrupted.[14]

[12] RAPID = The Regulators' Alliance for Progression of Infrastructure Development
[13] SAC = Special Area of Conservation
[14] Southern Water, 2021, Strategic Solution Interim Update Options Appraisal Process, https://www.southernwater.co.uk/media/zywp0eua/wflh_6_interim-update_options-appraisal-process.pdf

Option name	Option description	Maximum DO (Ml/d)	WRZ	Rejection comment
Bulk import (HSW): SWW in lieu of supply to large industrial user (30Ml/d)	South West Water currently supplies up to 30Ml/d of potable water to a large industrial user in HSW. This option proposes providing non-potable supply to the industrial user from a newly developed Southern Water scheme. The bulk import from South West Water can then be used by Southern Water.	30	HSW	Southern Water has not been able to progress a scheme that would replace the existing South West Water supply to the industrial user. This was considered as part of our SROs and is no longer being progressed as, after further technical work, significant risks around the feasibility and deliverability of this option were identified.[15]
Bulk import (HSW): Upper Thames Reservoir to River Test WSW (10Ml/d)	Transfer from Upper Thames Reservoir to River Test WSW. The transfer would involve a ca. 95km long pipeline and transfer between 10-80Ml/d.	10.0	HSW	This option has been refined and replaced by the T2ST which provides a similar transfer from Thames Water .
Bulk import (KME): Bulk import from South East Water's RZ8 (10Ml/d)	10Ml/d transfer from South East Water's Blean WSR to connect to Near Broughton Bypass break pressure tank along the Faversham4-Faversham4 main.	10.0	KME	The option requires further work with South East Water to identify and confirm the source of water for the transfer. It will be reconsidered for WRMP29.
Bulk import (KMW): Thames Water to SWS[16] via SES	This option involves transfer from Thames Water to Southern Water via the SES Water distribution system. SES Water shares boundaries with both Thames Water and Southern Water. Reducing the supply of potable water from SES Water's Bough Beech Reservoir to their North Deal WRZ and replacing this with a dedicated supply from Thames Water to the North Deal WRZ at the Cheam WTW will allow release from Bough Beech Reservoir into the River Eden, which feeds into the River Medway. Water would then be available for abstraction at Near Rochester WSW. This would reduce releases required from Bewl Water to support the abstraction at Springfield. Another option would be to build a pipeline to transfer treated water from Bough Beech Reservoir to Near Rochester WSW. This would provide slightly increased output, as there would not be an environmental loss associated with the scheme (20% more water must be released than abstracted). However, this would involve a significant distance, and various motorway and railway crossings. Therefore, pipeline transfer is not considered, as a 'free' transfer using the river is clearly preferable to the costs (both capital and pumping / maintenance costs) and environmental impact associated with the construction of a pipeline.		KMW	This option has been replaced options to import water from Thames Water and SES Water separately.

[15] Southern Water, 2021, Strategic Solution Interim Update Options Appraisal Process, https://www.southernwater.co.uk/media/zywp0eua/wflh_6_interim-update_options-appraisal-process.pdf
[16] SWS = Southern Water

Option name	Option description	Maximum DO (Ml/d)	WRZ	Rejection comment
Bulk import (SBZ): SEW to Rottingdean (25Ml/d)	This option is for a pipeline to transfer 25Ml/d from South East Water's Barcombe WSW to Southern Water's Rottingdean WSR. This option is dependent on the development of Brighton WTW recycling option by South East Water.	25.0	SBZ	This option has been replaced by the 10Ml/d variant of the same option.
Bulk import (SBZ): SEW to Rottingdean (30Ml/d)	This option is for a pipeline to transfer 30Ml/d from South East Water's Barcombe WSW to Southern Water's Rottingdean WSR. This option is dependent on the development of Brighton WTW recycling option by South East Water.	30.0	SBZ	This option has been replaced by the 20Ml/d variant of the same option
Bulk import (SBZ): Swan to Barcombe (4Ml/d)	Bi-directional transfer between existing South East Water's Barcombe WSR (RZ2) and Swan WSR.	4.0	SBZ	The option requires further work with South East Water to identify and confirm the source of water for the transfer. It will be reconsidered for WRMP29.
Bulk import (SHZ): SEW Waller's Haven to SHZ	This option represents a transfer of water from South East Water's Waller's Haven abstraction to Darwell Reservoir.		SHZ	The option provides a regional benefit and therefore needs agreement with other water companies on who will progress the option. Increased water resource sharing is desired but further discussions with our neighbouring water companies are needed to identify potential sources for additional transfer options. We will be carrying out this exercise for WRMP29.
Bulk import (SNZ): Guildford to SNZ	This option involves transfer form Thames Water's Guildford area to SNZ.	TBC	SNZ	This option requires further discussions with Thames Water to see if there is surplus water to export to SNZ and will be reassessed for WRMP29.
Bulk import (SNZ): Havant Thicket Reservoir to Pulborough (100Ml/d)	This is a bi-directional transfer between Havant Thicket Reservoir and Pulborough WSW for up to 100Ml/d. This is part of the bi-directional bulk transfers proposed by WRSE for WRMP24. It is dependent on surplus water being identified by the donor company.	100.0	SNZ	This option has been excluded as Havant Thicket Reservoir is unlikely to have the surplus volume required for this import.
Bulk import (SNZ): Havant Thicket Reservoir to Pulborough (200Ml/d)	This is a bi-directional transfer between Havant Thicket Reservoir and Pulborough WSW for up to 200Ml/d. This is part of the bi-directional bulk transfers proposed by WRSE for WRMP24. It is dependent on surplus water being identified by the donor company.	200.0	SNZ	This option has been excluded as Havant Thicket Reservoir is unlikely to have the surplus volume required for this import.
Bulk import (SNZ): Increase connectivity Ardingly and Weir Wood	This option is to increase connectivity between Ardingly Reservoir (South East Water) and Weir Wood Reservoir to allow transfer of raw water at a capacity of 10Ml/d to 20Ml/day. The option to increase the connectivity between the reservoirs and does not involve extension of the capacity of either reservoir or the WTW. Rather, this option aims to increase the volume of water held at the start of a drought event based on past hydrological experience.	20.0	SNZ	The option definition, environmental impact, water resource benefit, regulatory requirements, consideration of deliverability/planning issues, and technical design are not sufficiently developed for inclusion in WRMP24. Option should be progressed and included in the WRMP29 assessment.
Bulk import (SNZ): Increase connectivity between Bough Beech and Weir Wood (10Ml/d)	Transfer of raw water from SES Water's Bough Beech Reservoir (to an outlet into Weir Wood Reservoir. The transfer would most likely be of raw water from Bough Beech Reservoir but it is also possible that water would first be treated at Bough Beech Reservoir WSW.	10.0	SNZ	The option requires further work with South East Water to identify and confirm the source of water for the transfer. It will be reconsidered for WRMP29.
Bulk import (SNZ): Increase the existing PWC transfer to Pulborough (15Ml/d).	Upgrades to Portsmouth Water-Pulborough WSW transfer infrastructure by 15Ml/d to a total 90Ml/d (i.e. from 75Ml/d to 90Ml/d). These upgrades include improvements to the pumping station at Pulborough WSW.	15.0	SNZ	This option has been replaced by an alternative transfer from Havant Thicket Reservoir via Portsmouth Water to SNZ.

Option name	Option description	Maximum DO (Ml/d)	WRZ	Rejection comment
Bulk import (SNZ): PWC near Arundel or Chichester groundwater to Pulborough via Whiteways Lodge (15Ml/d)	Duplication of the existing transfer between Portsmouth Water's Eastgate Source and Pulborough WSW. New pipeline follows the route of the existing main in order to take advantage of existing easement.	15.0	SNZ	The option requires further work with Portsmouth Water to confirm the availability of the source of water for the transfer. It will be reconsidered for WRMP29.
Bulk import (SNZ): SES to SNZ (200Ml/d)	This is bulk import between SES Water's Outwood sources and Southern Water's Turners Hill WSR for up to 200Ml/d. This is part of the bi-directional bulk transfers proposed by WRSE for WRMP24. It is dependent on surplus water being identified by the donor company.	200.0	SNZ	This option has been excluded as SES Water is unlikely to have the required surplus water for this transfer.
Bulk import (SNZ): SES to SNZ (50Ml/d)	This is bulk import between SES Water's Outwood sources and Southern Water's Turners Hill WSR for up to 100Ml/d. This is part of the bi-directional bulk transfers proposed by WRSE for WRMP24. It is dependent on surplus water being identified by the donor company.	100.0	SNZ	This option has been excluded as SES Water is unlikely to have the required surplus water for this transfer.
Bulk import (SNZ): SEW RZ5 to Pulborough (80Ml/d)	This is a bi-directional transfer between South East Water's RZ5 and Pulborough WSW for up to 80Ml/d. This is part of the bi-directional bulk transfers proposed by WRSE for WRMP24. It is dependent on surplus water being identified by the donor company.	80.0	SNZ	This option has been excluded as SES Water is unlikely to have the required surplus water for this transfer.
Bulk import (SNZ): Transfer via Wey and Arun canals	This option involves transfer using the Wey and Arun canals. The Thames region Environment Agency indicated that there was probably insufficient water available in either the River Wey, or in groundwater supplies, to run the canal, let alone provide additional water to Sussex. Any water would therefore have to be taken via a transfer pipeline from the River Thames or existing Thames Water groundwater sources, which will only be available if Thames Water builds the Abingdon Reservoir.	0.0	SNZ	Requires development of the Abingdon Reservoir and the refurbishment of the canal. Excluded due to technical feasibility, practicality and reliability. The Environment Agency and Natural England have stated that the reinstatement of the full length of the canal would be unlikely in the foreseeable future. There are also water quality issues related to cross catchment transfer.
Bulk import (SWS): Bulk import from Craig Goch Reservoir	The idea behind the scheme is to supplement flow in the River Severn from Craig Goch Reservoir, allowing increased abstraction downstream, with a relatively small pipeline transfer from the Severn to the headwaters of the River Thames. Supplementary flow in the River Thames could allow greater abstractions downstream, and it would be these additional abstraction volumes that would be used to increase water available to Southern Water.	TBC	Multiple locations	Excluded as an alternative option involving transfer from Thames Water to Southern Water (T2ST) is being developed.
Bulk import (SWS): Bulk transfer from Kielder Reservoir	Construction of a new bulk transfer network from Kielder Reservoir near the border of Scotland (Northumbrian Water) to Thames Water for onward transfer to Southern Water.	TBC	Multiple locations	Excluded due to practicality, deliverability, environmental impact, costs and technical feasibility associated with the infrastructure required.
Bulk import (SWS): National water grid	Construction of a UK water grid using pipelines and canals to transfer water over long distances.		Multiple locations	The feasibility of a national grid was considered by the House of Lords Select Committee (2006), which found 'a national water grid is not currently feasible because it would require huge amounts of energy and would cost too much'. Due to the great uncertainties involved, the concerns regarding the practicality and reliability of the scheme, and the potential for significant environmental impacts, this option has been excluded.

Option name	Option description	Maximum DO (Ml/d)	WRZ	Rejection comment
Bulk import (SWZ): North Arundel to Littlehampton main (15Ml/d)	The scheme will be a duplication of the main from Portsmouth Water's near Arundel or Chichester groundwater WSW to North Arundel WSW with 15Ml/d of new pump capacity at near Arundel or Chichester groundwater. The existing transfer is currently restricted by the North Arundel constraint. This option considers a new 15Ml/d main (9.25km long) between North Arundel WSW and the Littlehampton mains, where it will tee in and use existing capacity in the mains network to enter supply. It is assumed that this transfer will only be used in times of deficit within the SWZ area, when there is spare capacity in the mains. Improvements to North Arundel infrastructure would be required.	15.0	SWZ	The option requires further work with Portsmouth Water to confirm the availability of the source of water for the transfer. It will be reconsidered for WRMP29.
Drought option - supply side (HAZ): Terminate supply to WSX (0.3Ml/d)	In the event of a drought, Southern Water would hold discussions with Wessex Water with regards to the resources position and look to terminate this supply.	0.3	HAZ	This scheme offers an insignificant DO saving.
Drought option - supply side (HSW): Sea tankering from Norway (80Ml/d)	This option has been submitted by a third party supplier and involves shipping of water from the outlet of a hydroelectric plant in Norway to Southampton docks for onward transfer to River Test WSW via temporary pipeline. This option is to be used during extreme droughts only.	45.0	Multiple locations	According to the supplier no more than 45Ml/d can be offloaded from a tanker within a 24 hour period using a single berthing location. There is insufficient treatment capacity at River Test WSW to treat this volume of water along with water that may be available from other Southern Water sources.
Interzonal transfer (HAZ-HWZ): Winchester to Andover (20Ml/d)	This option involves the construction of a pipeline between Winchester WSR in HWZ and Andover WSR in HAZ. The scheme includes a short spur off the main pipeline to feed Chilbolton WSR. The Andover WSR would also be connected to the WSRs at Whitchurch and Overton (to the East of Andover) via new pipelines. This scheme will allow the transfer of 4Ml/d to HAZ. The pipeline has also been sized to allow the transfer of up to 20Ml/d in HAZ area in the event of catastrophic failure of Andover WSW.	20.0	HAZ	Excluded as an alternative variant is currently being delivered as part of the Hampshire Grid.
Interzonal transfer (HSE-HSW): Itchen WSW to River Test lakes - raw (30Ml/d)	30Ml/d raw water transfer (pipe and break tank) between Itchen WSW and River Test WSW. This would discharge into River Test lakes (400Ml) and utilise the existing raw water abstraction pumps and system at River Test.	30.0	HSW	This option has now been replaced the option to transfer water between HSE and HSW via Yew Hill in HWZ.
Interzonal transfer (HSE-HSW): Itchen WSW to River Test lakes - raw (60Ml/d)	60Ml/d raw water transfer (pipe and break tank) between Itchen WSW and River Test WSW. This would discharge into River Test lakes (400Ml) and utilise the existing raw water abstraction pumps and system at River Test.	60.0	HSW	This option has now been replaced the option to transfer water between HSE and HSW via Yew Hill in HWZ.
Interzonal transfer (HSE-SNZ): Itchen surface water to Pulborough (20Ml/d)	The proposal is to transfer 20Ml/d (during peak and average conditions) from Itchen WSW to Pulborough WSW. This pipeline would be operated during critical summer periods and would then be drained over the winter when supply from the River Rother is adequate.	20.0	SNZ	Licence changes to our River Itchen sources in 2018 have removed availability of any water to supply this transfer.
Interzonal transfer (HSW-HSE): Raw water transfer between Itchen surface water and River Test lakes (60Ml/d)	This option involves 60Ml/d raw water transfer (pipe and break tank) between Itchen WSW and River Test WSW. The water would discharge into River Test lakes (400Ml) and utilise the existing raw water abstraction pumps and system at River Test WSW.	60.0	HSW	This option has been superseded by the option to transfer water between HSE and HSW via Yew Hill in HWZ.

Option name	Option description	Maximum DO (Ml/d)	WRZ	Rejection comment
Interzonal transfer (HSW-HSE): River Test to Itchen surface water (30Ml/d)	This option involves developing a treated water transfer from River Test WSW to the areas served by Itchen WSW as part of improving connectivity in Hampshire.	30.0	HSW	This option has been superseded by the option to transfer water between HSE and HSW via Yew Hill in HWZ.
Interzonal transfer (HSW-HSE): River Test to Itchen surface water (90Ml/d)	The scheme is a potable 90Ml/d bi-directional transfer from River Test WSW to Itchen WSW.	90.0	HSW	This option has been superseded by the option to transfer water between HSE and HSW via Yew Hill in HWZ.
Interzonal transfer (HSW-IOW): Cross Solent main (20Ml/d)	This option incorporates the additional assets required to utilise the spare capacity of the two most recent 300mm diameter cross-Solent mains. The new mains have been constructed between the Lepe on the Hampshire coast and Gurnard on the IOW to replace two slightly smaller mains that had reached the end of their design life. The scheme includes refurbishment or replacement of Broadfield and Newport pumps along with a new 450mm main between near Cowes and High Alvington WSR. The capacity of High Alvington WSR would also be increased with an additional 10Ml service reservoir to accommodate the increased transfer.	8.0	IOW	Blackfield and near Cowes pumping station capacities have been increased and the pipeline restriction will be removed as part of the option to triplicate cross-Solent main.
Interzonal transfer (HSW-IOW): Increase main capacity to large industrial user to 60Ml/d	This option was developed to consider an increase in transfer capacity from River Test WSW to the IOW via the main to a large industrial user to the Blackfield booster.		HSW	This option has been superseded by the SRO process which is considering recycling options in HSE, HSW and IOW.
Interzonal transfer (HSW-IOW): River Test to Blackfield (15Ml/d)	This option increases the transfer capacity from River Test WSW to the IOW via the Blackfield booster pumping station. The 11Ml/d capacity of the cross-Solent main that transfers treated water from Blackfield to the IOW has been replaced by a new cross Solent main with a capacity of 20Ml/d. At present there is an existing industrial main from River Test WSW to Blackfield and a large industrial user in HSW. Blackfield feeds the cross-Solent transfer. For Southern Water to increase its supply to the industrial user to meet its entire 45Ml/d demand as well as meeting the 20Ml/d demand for the cross Solent transfer, a new 35Ml/d pipeline is required from River Test WSW to Blackfield. This option also involves the construction of a new high-lift pumping station at River Test WSW. A new pipeline from River Test WSW to Blackfield could provide an additional 15Ml/d for transfer to the IOW and increase the supply to the large industrial user, assuming that additional capacity is provided at River Test WSW.	15.0	IOW	An additional transfer to Blackfield booster pumping station would enable additional onward transfer to the IOW. However, the scheme would not provide additional resources for Southern Water but would provide greater security of supplies to an industrial user. Southern Water's contracted volume to the industrial user has been significantly reduced and South West Water may have surplus capacity, so this option is no longer applicable.
Interzonal transfer (IOW): Sandown to High Alvington (2.5Ml/d)	This is proposed 2.5Ml/d transfer from Sandown WSW to High Alvington WSR and construction of a new WSR at High Alvington. Likely to be used in conjunction with Sandown desalination option. This would involve installing high-lift pumping station at Sandown WSW and a transfer pipeline to the High Alvington WSR above Newport.	2.5	IOW	Not required as a stand-alone option and is included in the Sandown desalination option.

Option name	Option description	Maximum DO (Ml/d)	WRZ	Rejection comment
Interzonal transfer (IOW): Sandown to High Alvington (20Ml/d)	This is proposed 20Ml/d transfer from Sandown WSW to High Alvington WSR and construction of a new WSR at High Alvington. Likely to be used in conjunction with Sandown desalination option. This would involve installing high-lift pumping station at Sandown WSW and a transfer pipeline to the High Alvington WSR above Newport.	20.0	IOW	Not required as a stand-alone option and is included in the Sandown desalination option.
Interzonal transfer (IOW): Sandown to High Alvington (5Ml/d)	This is proposed 5Ml/d transfer from Sandown WSW to High Alvington WSR and construction of a new WSR at High Alvington. Likely to be used in conjunction with Sandown desalination option. This would involve installing high-lift pumping station at Sandown WSW and a transfer pipeline to the High Alvington WSR above Newport.	5.0	IOW	Not required as a stand-alone option and is included in the Sandown desalination option.
Interzonal transfer (KME): Reconfigure trunk mains / transfer to Woolmans Wood and Westfield Sole WSRs	This option seeks to reconfigure trunk mains/transfer to address water quality issues in Medway (Woolmans Wood and Westfield Sole WSRs).	TBC	KME	No water resource benefit currently identified. The option may be required to support other options.
Interzonal transfer (KME-KMW): Borstal to Colewood	Transfer from Borstal WSR to Colewood WSR.	TBC	KME / KMW	Intrazonal transfer option that does not provide a water resource benefit as a stand-alone option. The transfer option or elements of this option may be required to support other options.
Interzonal transfer (KME-KMW): Reinforce cross Swale transfer main	Reinforce cross Swale transfer main.	TBC	KME / KMW	Intrazonal transfer option that does not provide a water resource benefit as a stand-alone option. The transfer option or elements of this option may be required to support other options.
Interzonal transfer (KME-KTZ): Increase Faversham4-Fleete main transfer capacity (10Ml/d)	The KME to KTZ transfer scheme option proposes to increase the existing transfer capacity by 10Ml/d between the Sheldwich boreholes and Faversham4 WSR. This would be achieved by duplicating the existing transfer main and a new pumping station at Faversham4. Main elements of scheme are: • modification of borehole pumps at Sheldwich to allow additional 10Ml/d to be pumped to Faversham4 through the new main, • pumping main from Sheldwich to Faversham4 (ca. 6.5km), • booster pumping station at Faversham4 and a disinfection unit, • break pressure tank at Test Valley Bypass • gravity main from Test Valley Bypass to Faversham4 Reservoir (ca.31.5km of main), and • phosphate dosing at Faversham4 Reservoir for 10Ml/d.	10.0	KTZ	Concerns raised by Natural England about the environmental impact upon Blean Wood SSSI[17]/SAC complex. Adverse impacts upon these sites would increase risk of planning consent not being granted.

[17] SSSI = Site of Specific Scientific Interest

Option name	Option description	Maximum DO (Ml/d)	WRZ	Rejection comment
Interzonal transfer (KME-SHZ): Enhance Bewl transfer to 45Ml/d (10Ml/d)	The Bewl to Beauport WSW transfer scheme option proposes to increase the existing transfer capacity between the Bewl Reservoir and Beauport WSW with the construction of a new raw water transfer main. This effectively allows increased transfer from KME to SHZ. The option originally considered an increase in transfer capacity between Bewl and Darwell Reservoirs (35Ml/d to 45Ml/d). However, this has since been removed following consultation with the Environment Agency (25/09/12) due to concerns regarding invasive species (white clawed crayfish). The concerns regarding invasive species have led to a requirement for the water from Bewl Reservoir to bypass Darwell Reservoir and be transferred directly to Beauport WSW. After treatment, the flows will enter supply using the existing network. The Stage 2 report (April 2003) detailed assessment noted that an enhanced Bewl transfer is only feasible once the capacity of Bewl Reservoir is raised to 40,000Ml.	10.0	SHZ	This option is no longer feasible due to the transfer of invasive species.
Interzonal transfer (KMW): Increased capacity of the Maidstone to Bewl main	The River Medway is of a 'flashy' nature, with high flows following rainfall events, even during 'dry' conditions. In order to maximise the potential abstraction, Southern Water recently built a pipeline between Maidstone and Bewl Water with a capacity of 250Ml/d. The existing pipeline is of 1200mm diameter with a length of 19.9km. This proposed option duplicates the existing pipeline, including the construction of a new pumping station and rising main. This would also require a new abstraction licence from the Environment Agency, which would be expected to be above the existing MRF plus abstraction capacity (i.e. above 500Ml/d). In summary, the option would require: • New intake and pumping station • Power supply, surge protection and other works • New rising main, 1200mm diameter 19.9km long, together with air valves, washouts and thrust blocks • One railway crossing, and two major rail crossings • Outfall structure for delivery of water to the reservoir. The option would increase the yield of the River Medway Scheme, by increasing the capacity to refill the reservoir during high flow events.		KMW	Similar benefit could be achieved by varying the existing licence and avoid the need to construct an additional asset.
Interzonal transfer (KMW): Singlewell WSR to Cobham WSR	Dedicated Singlewell WSR to Cobham WSR transfer main.	TBC	KMW	Intrazonal transfer option that does not provide a water resource benefit as a stand-alone option. The transfer option or elements of this option may be required to support other options.
Interzonal transfer (KTZ): Reinforce Near Canterbury to Faversham4 main	Reinforce Near Canterbury to Faversham4 main.	TBC	KTZ	Intrazonal transfer option that does not provide a water resource benefit as a stand-alone option. The transfer option or elements of this option may be required to support other options.
Interzonal transfer (SHZ): Baldslow to Fairlight	Dedicated Baldslow WSR to Fairlight WSR trunk main.	TBC	SHZ	Intrazonal transfer option that does not provide a water resource benefit as a stand-alone option. The transfer option or elements of this option may be required to support other options.

Option name	Option description	Maximum DO (Ml/d)	WRZ	Rejection comment
Interzonal transfer (SHZ): Connect Powdermill and Darwell (10Ml/d)	This option would see the construction of a new raw water transfer main between Darwell and Powdermill reservoirs. The proposed transfer route would have a length of approximately 8.2km. The main would be pumped to a high point of around 80mAOD[18] north of Sedlescombe from where it would continue under gravity to Powdermill Reservoir. The pipeline is designed with a maximum capacity of 10Ml/d. This option would allow an increase in yield where Darwell Reservoir fills but Powdermill Reservoir does not, or provide additional support to Powdermill Reservoir as levels reduce.	10.0	SHZ	Limited water resource benefit as the gains would primarily be resilience but which has disproportionate costs. Both reservoirs can directly supply into SHZ and already operate conjunctively
Interzonal transfer (SHZ): Darwell to Beauport	Darwell to Beauport raw water main reinforcement.		SHZ	Resilience option with no water resource benefit and should therefore be considered for the Business Plan but not WRMP.
Interzonal transfer (SHZ): Darwell to Rye aqueduct reinforcement	Darwell to Rye aqueduct reinforcement.		SHZ	Resilience option with no water resource benefit and should therefore be considered for the Business Plan but not WRMP.
Interzonal transfer (SHZ): Optimise River Medway to River Rother transfer	This option is to use the existing Bewl-Darwell transfer main to transfer water from Darwell Reservoir to Bewl Reservoir. This would reuse the existing pipeline but would require a new pumping station, together with by-pass valves on the existing main and potentially additional air valves or other infrastructure along the pipeline route. There is no clear relationship between flow in the River Medway and the Eastern Rother. However, there is the potential that Darwell Reservoir may fill more quickly than Bewl Reservoir in certain drought events. This option allows water to be transferred to Bewl Reservoir, thus increasing storage when it otherwise may not fill.	TBC	SHZ	Limited water resource benefit and disproportionate costs. Recent WINEP[19] investigations have highlighted a potential Invasive species risk for the transfer between Darwell Reservoir and River Test. The preferred option has been confirmed to relocate the existing raw water transfer between Bewl Water and Darwell Reservoir so that the transfer from Bewl instead directly supplies Southern Water's Beauport WSW. This will allow SHZ to continue to be supported by transfers from Bewl as and when required, but the direct raw water transfer between the two reservoirs will be removed, thus removing the main risk of invasive species transfer between the two catchments
Interzonal transfer (SHZ): Reverse Robertsbridge to refill Bewl	Reverse Robertsbridge to refill Bewl Reservoir.	TBC	SHZ	Intrazonal transfer option that does not provide a water resource benefit as a stand-alone option. The transfer option or elements of this option may be required to support other options.

[18] mAOD = meters above ordnance datum
[19] WINEP = Water Industry National Environment Programme

Option name	Option description	Maximum DO (Ml/d)	WRZ	Rejection comment
Interzonal transfer (SHZ): Rye to Beauport	New raw water transfer from Rye to Beauport	TBC	SHZ	Intrazonal transfer option that does not provide a water resource benefit as a stand-alone option. The transfer option or elements of this option may be required to support other options.
Interzonal transfer (SHZ-SNZ): Bewl to Weir Wood (20Ml/d)	Transfer of 10Ml/d raw water from Bewl Reservoir to Weir Wood Reservoir via a pumping station at Bewl with additional treatment and mains at Weir Wood to permit 20Ml/d into supply at peak and maximum drought periods.	20.0	SNZ	The option would require a large scale water resource development at Bewl and would provide a regional benefit and therefore needs agreement with other water companies on who will progress the option. Options passed on to WRSE for further consideration.
Storage (SHZ): New WSR in Hastings	New 'middle service' WSR in Hastings at the Halton site to replace Newgate and Maze Hill WSRs.	TBC	SHZ	Intrazonal transfer option that does not provide a water resource benefit as a stand-alone option. The transfer option or elements of this option may be required to support other options.

3.1.2 Increase raw water abstractions

Option name	Option description	Maximum DO (Ml/d)	WRZ	Rejection comment
Asset enhancement (KME): Newington	Move raw water for treatment from Newingtone WSW to Sittingbourne1 or Harlip Hill; it's an alternative, possibly cheaper way of removing constraint	0	KME	Resilience option with no water resource benefit and should therefore be considered for the Business Plan but not WRMP.
Asset enhancement (KME): Newington WSW and WSR	Remove constraints that inhibit the amount of water that can be obtained out of this network. Retain WSW and reconfigure network to remove constraints allowing increase in DO	0	KME	Resilience option with no water resource benefit and should therefore be considered for the Business Plan but not WRMP.

Option name	Option description	Maximum DO (Ml/d)	WRZ	Rejection comment
Bewl Operational Control	Bewl Water fills from three sources: 1. Its own small natural catchment; 2. Water from the River Teise catchment pumped from intake at Smallbridge; and 3. Water from the River Medway catchment pumped from intake at Maidstone Currently, the Smallbridge intake is used preferentially for filling the reservoir. The Maidstone intake is only used when the reservoir falls to defined critical levels. There are operational control curves in place which are used to determine the operation of both of these supplies to the reservoir. There is a balance between increasing the DO during worst-case drought events by raising the Maidstone control curve, and incurring additional year-on-year operational expenditure through increased use of the Maidstone abstraction to fill Bewl. This option would entail investigating these operational control rules to explore the relationships between security of supplies and operational expenditure. Initial investigations will explore a limited number of alternative control rules. If the option is taken forward, more complex optimisation routines are available to select the best control curve. If found to be of benefit, the implementation of the scheme would be through the use of different operational control rules.	TBC	KME	Operational changes to the control rules are already included in the DO assessment.
Bulk import (KMW): Bough Beech via River Medway	A change to the MRF licence condition for SES Water's Bough Beech Reservoir of 10Ml/d.	10.0	KMW	The option provides a regional benefit and therefore needs agreement with other water companies on who will progress the option. Increased water resource sharing is desired but further discussions with our neighbouring water companies are needed to identify potential sources for additional transfer options. We will be carrying out this exercise for WRMP29.
Groundwater (Central area): West Sussex new groundwater sources	Develop new groundwater sources in the Central area.	TBC	SNZ / SWZ / SBZ	The aquifers within this area are assessed as over abstracted or 'no water available'.
Groundwater (HSE): Twyford Moors (new borehole	Twyford Moors borehole site needs a standby borehole for resilience. Currently a highly critical single borehole on site. Option of drilling a new standby borehole, or potential to recommission an out of service borehole on site.	TBC	HSE	Resilience option with no water resource benefit and should therefore be considered for the Business Plan but not WRMP.
Groundwater (KMW): Optimise seasonal management at Bapchild and Beacon Hill	Optimise the seasonal management of the North Kent chalk aquifer block at Bapchild and Beacon Hill.	TBC	KMW	The Bapchild option has already been largely investigated and implemented as far as possible. The Beacon Hill licence has been removed.
Groundwater (SBZ): Purchase groundwater licences (2.5Ml/d)	This option involves purchasing existing licences from other abstractors within the Worthing or Brighton blocks in Sussex, where it is believed that there is significant excess capacity in the licence for the summer period. AMP4 Phase 2 investigations indicated the following output: PDO 2.5Ml/d, MDO 2.5Ml/d, ADO 2.4Ml/d.	2.5	SBZ	No specific locations/licences have been identified that would be suitable for Southern Water to purchase.

Option name	Option description	Maximum DO (Ml/d)	WRZ	Rejection comment
Groundwater (SNZ): Ashdown Beds ASR	Ashdown Beds ASR scheme	TBC	SNZ	The option definition, environmental impact, water resource benefit, regulatory requirements, consideration of deliverability/planning issues, and technical design have not been progressed in enough detail for inclusion in WRMP24 and the aquifer has historically not been considered physically or environmentally technically appropriate for ASR. Option should be progressed and included in the WRMP29 assessment.
Groundwater (SNZ): Hythe Beds ASR (5Ml/d)	Hythe Beds ASR scheme	5.0	SNZ	The option definition, environmental impact, water resource benefit, regulatory requirements, consideration of deliverability/planning issues, and technical design are not sufficiently developed for inclusion in WRMP24 and the aquifer has historically not been considered technically appropriate for ASR. Option should be progressed and included in the WRMP29 assessment.
Groundwater (SNZ): Pulborough groundwater licence variation (20Ml/d)	Decouple Pulborough WSW groundwater licence form surface water MRF	20.0	SNZ	The option is now embedded in a commitment to review the Pulborough WSW groundwater licence by 2025. The outcome of the review in terms of DO benefit/loss is at this stage unknown.
Groundwater (SNZ): Targeted licence trading	Option to purchase abstraction licences upstream of Southern Water abstraction sites.	TBC	SNZ	No suitable specific schemes have been identified.
Groundwater (SWS): Deep groundwater	Abstraction of deeply confined aquifers with poor water quality is carried out in conjunction with desalination technology.	TBC	Multiple locations	The cost of investigating the potential for deep groundwater exploitation would be prohibitive for the expected maximum yields. This type of scheme could be reconsidered in the future if furthers studies completed by third parties reveal potential locations where deep groundwaters could be economically and sustainably exploited. Option should be progressed and included in the WRMP29 assessment.
Groundwater (SWS): Development of a new groundwater abstraction	Investigation to identify possibility of the development of new groundwater abstractions from the Chalk aquifer.	TBC	Multiple locations	The CAMS[20] identifies Chalk aquifers as being under stress from abstractions as there are over licensed. The current licensing strategy is that there is a 'presumption against' the granting of licences for abstraction from the Chalk for consumptive use. The current policy is also to seek to secure reductions in existing licences at renewal time.

[20] CAMS = Catchment Abstraction Management Strategy

Option name	Option description	Maximum DO (Ml/d)	WRZ	Rejection comment
Groundwater (SWS): Enhancing natural recharge	Expansion of area of chalk grassland in North Downs to enhance aquifer recharge. Needs some investigation first, but could provide positive environmental benefits. Done through agreements with land owners or land purchase. Potential benefit to chalk aquifer blocks and local groundwater dominated abstractions	TBC	Multiple locations	No specific locations/DO benefit have been identified. The option definition including environmental impact, water resource benefit, regulatory requirements, consideration of deliverability/planning issues, and technical design are not sufficiently developed for inclusion in WRMP24. Option should be progressed and included in the WRMP29 assessment.
Groundwater (SWZ): North Worthing borehole	New groundwater Source A t North Worthing.	TBC	SWZ	The aquifers within this area are assessed as 'over abstracted' or 'no water available'.
Groundwater (SWZ): Purchase groundwater licences (2.5Ml/d)	This option involves purchasing existing licences from other abstractors within the Worthing or Brighton blocks, where it is believed that there is significant excess capacity in the licence for the summer period. AMP4 Phase 2 investigations indicated the following output: PDO 2.5Ml/d, MDO 2.5Ml/d, ADO 2.4Ml/d.	2.5	SWZ	No specific locations/licences have been identified that would be suitable for Southern Water to purchase.
New source (SNZ): Purchase of Portsmouth Water's near Arundel or Chichester groundwater source	Purchase of Portsmouth Water's near Arundel or Chichester groundwater source and transfer of water to SNZ.	TBC	SNZ	The option provides a regional benefit and therefore needs agreement with other water companies on who will progress the option. Increased connectivity between Portsmouth Water and Southern Water is desired but no options have currently been identified that would benefit from this connectivity. Options passed on to WRSE for further consideration. Further discussions with neighbouring companies to take place before WRMP29.
Groundwater (HKZ): New Lower Greensand borehole source(s) near Kingsclere (5Ml/d)	This option looks at the possibility of new groundwater sources in HKZ.	5.0	HKZ	The option definition, environmental impact, water resource benefit, regulatory requirements, consideration of deliverability/planning issues, and technical design are not sufficiently developed for inclusion in WRMP24. Option should be progressed and included in the WRMP29 assessment.
Groundwater (HRZ): Recommission Broughton (4.5Ml/d)	This option involves the recommissioning of the unused Broughton WSW in HRZ. Broughton WSW was abandoned for environmental purposes. However, in severe drought conditions and with the Itchen sustainability reductions in place, the source could be considered for temporary re-introduction. Could also be considered as a drought option	4.5	HRZ	The site is no longer licenced and there is no infrastructure.
Groundwater (HSE): Bagshot Beds ASR	Bagshot Beds ASR scheme.	TBC	HSE	Previous ASR review suggested the aquifer is semi-confined with poorly consolidated fine sands which are likely to result in severe well construction/clogging problems. The aquifer was assessed as having very low ASR potential.
Groundwater (HSE): Chalk ASR	Chalk ASR scheme.	TBC	HSE	Previous ASR review suggested the aquifer is largely unconfined. Where confined, permeabilities are too low. The aquifer was assessed as having very low ASR potential.
Groundwater (HSE): Greensands ASR	Greensands ASR scheme.	TBC	HSE	The option is highly unlikely to justify a revision to the license due to the limited environmental benefit.

Option name	Option description	Maximum DO (Ml/d)	WRZ	Rejection comment
Groundwater (HSE): Relocation of Source A abstraction to saline limit (30Ml/d)	Relocating Portsmouth Water's Source A river intake downstream to Woodmill would mean that water would be kept in the River Itchen for longer (approximately 1.4km until the tidal limit) thereby the benefits to the river flora and fauna would be in excess of those achieved by the sustainability reductions from Itchen WSW and Source A alone. To minimise the loss of DO this option initially considered a 75Ml/d surface water abstraction just upstream of Woodmill. This would allow Portsmouth Water to continue to supply 45Ml/d from Source A and also allow Southern Water to utilise the maximum capacity of the Eastleigh WSR with an additional 30Ml/d bulk supply from Source A WSW. 30Ml/d abstraction plus potential for a further 30Ml/d bulk transfer from Portsmouth Water (60Ml/d).	30.0	HSE	The option definition, environmental impact, water resource benefit, regulatory requirements, consideration of deliverability/planning issues, and technical design are not sufficiently developed for inclusion in WRMP24. The option will be progressed further for inclusion in the WRMP29 assessment, pending development of options associated with the Portsmouth Water's Source A abstraction.
Groundwater (HSW): Bagshot Beds ASR	Bagshot Beds ASR scheme.	TBC	HSE	Previous ASR review suggested the aquifer is semi-confined with poorly consolidated fine sands which are likely to result in severe well construction/clogging problems. The aquifer was assessed as having very low ASR potential.
Groundwater (HSW): Chalk ASR	Chalk ASR scheme.	TBC	HSW	Previous ASR review suggested the aquifer is largely unconfined. Where confined, permeabilities are too low. The aquifer was assessed as having very low ASR potential.
Groundwater (HSW): Greensands ASR	Greensands ASR scheme.	TBC	HSW	The option is highly unlikely to justify a revision to the license due to the limited environmental benefit.
Groundwater (IOW): Ashey (0.4Ml/d)	Ashey is a disused groundwater source located on the east side of the IOW near Sandown. The option would involve bringing this source back online. This scheme consists of two sub-options, one involves marginal treatment onsite and the other is to pump the raw water from Ashey borehole through a new dedicated raw water pipe to Newchurch WSW for treatment. Ashey borehole has an average DO of 0.3Ml/d with a peak output of 0.4Ml/d. The Ashey source can operate under licence 12/101/2/G/10 (annual average 0.55, daily 0.70 and hourly 1.08). Potential DO to be confirmed by further modelling.	0.4	IOW	Negligible additional DO and disproportionate costs due to the additional water treatment required due to high Cryptosporisium risk. Potential risk of deterioration under the WFD
Groundwater (IOW): Bagshot Beds ASR	Bagshot Beds ASR scheme.	TBC	IOW	Previous ASR review suggested the confined areas are too close to outcrop, otherwise likely hydraulically connected to the sea. The aquifer was assessed as having very low ASR potential.
Groundwater (IOW): Bembridge Marls and Limestones ASR	Bembridge Marls and Limestones ASR scheme.	TBC	IOW	Previous ASR review suggested the aquifer has low hydraulic conductivity The aquifer was assessed as having very low ASR potential.
Groundwater (IOW): Chalk ASR	Chalk ASR scheme.	TBC	IOW	Previous ASR review suggested the Chalk is largely unconfined here, and where confined, permeabilities are too low. The aquifer was assessed as having very low ASR potential.

Option name	Option description	Maximum DO (Ml/d)	WRZ	Rejection comment
Groundwater (IOW): Lower Greensand augmentation wells	New boreholes with new control philosophy and re-optimise (link into Newchurch B/Sandown reuse).	TBC	IOW	The option definition, environmental impact, water resource benefit, regulatory requirements, consideration of deliverability/planning issues, and technical design are not sufficiently developed for inclusion in WRMP24. Option should be progressed and included in the WRMP29 assessment.
Groundwater (IOW): Modify Rookley MRF constraint (0.5Ml/d)	Reduce or remove the MRF which controls the abstraction from this source.	0.5	IOW	Report by Entec 2006 concluded little benefit in this option. Increase in abstraction will have an almost immediate impact on the highly visible Sheat Stream and exceed the medium to long term well capacity (due to dewatering the adit system). Estimated gain of 0.5Ml/d for 1 to 2 days only.
Groundwater (IOW): Newport (improve resilience)	There are two operational boreholes on the Newport site, but no working standby borehole. The third borehole on the site is non-operational due to construction and condition issues. This option proposes drilling a standby borehole to the south of the operational boreholes to increase resilience.	0	IOW	Resilience option with no water resource benefit and should therefore be considered for the Business Plan but not WRMP.
Groundwater (IOW): River Yar augmentation boreholes (4Ml/d)	On the IOW there is an existing scheme where the river Eastern Yar is augmented with flows from groundwater sources within the same catchment, as well as ground and surface water from an adjacent catchment. The scheme is to improve the effectiveness of this augmentation. Detailed modelling would be required to verify the hydrogeological assumptions and to calculate what gains in river flow might be possible. Preliminary model runs indicate that an additional 4Ml/d, during the period of augmentation, could be obtained just by moving the outfalls downstream.	4.0	IOW	The option definition, environmental impact, water resource benefit, regulatory requirements, consideration of deliverability/planning issues, and technical design are not sufficiently developed for inclusion in WRMP24. Option should be progressed and included in the WRMP29 assessment.
Groundwater (IOW): Upper Greensand ASR	Upper Greensand ASR scheme.	TBC	IOW	Previous ASR review suggested the aquifer is in continuity with the Chalk. Where confined, it is too close to outcrop and too steeply dipping. The aquifer was assessed as having very low ASR potential.
Groundwater (Kent): Develop new 'leakage sources' to capture groundwater flowing into tidal sites	This option reviews the potential for capturing groundwater flow into tidal sites in Kent WRZs. This is predominantly considered as an operational efficiency measure, in a similar manner to 'spread load' boreholes in that it would permit key groundwater sources to be rested.	TBC	KME / KMW	Generic source enhancement/operational efficiency. The process of capturing groundwater flowing into tidal sites will be considered in individual groundwater options. It will be reconsidered for WRMP29 once the North Kent WINEP environmental investigations and groundwater modelling has concluded.
Groundwater (KME): Chalk ASR	Kent Medway Chalk ASR scheme.	TBC	KME	Previous ASR review suggested the aquifer is in connectivity with the Thanet Sands. Where confined, transmissivities are low. The aquifer was assessed as having very low ASR potential.
Groundwater (KME): Thanet Sands ASR	Kent Medway - Thanet Sands ASR scheme.	TBC	KME	Previous ASR review suggested the Thanet Sands are in connectivity with the Chalk and have a limited extent of confined formation. The aquifer was assessed as having very low ASR potential.

Option name	Option description	Maximum DO (Ml/d)	WRZ	Rejection comment
Groundwater (KMW): Chalk ASR	Kent Medway Chalk ASR scheme.	TBC	KMW	Previous ASR review suggested the aquifer is in connectivity with the Thanet Sands. Where confined, transmissivities are low. The aquifer was assessed as having very low ASR potential.
Groundwater (KMW): Recommission Luddesdown (1.3Ml/d)	This option involves the recommissioning of the Luddesdown Greensand borehole 3 which is currently out of service	1.3	KMW	Not supported by Operations and Water Asset Strategy due to disproportionate costs and requirement to operate the source continuously.
Groundwater (KMW): Thanet Sands ASR	Thanet Sands ASR scheme.	TBC	KMW	Previous ASR review suggested the Thanet Sands are in connectivity with the Chalk and have a limited extent of confined formation. The aquifer was assessed as having very low ASR potential.
Groundwater (KTZ) Stourmouth conjunctive use with Near Canterbury	Stourmouth WSW conjunctive use with Near Canterbury groundwater.		KTZ	Our Stourmouth source has been decommissioned owing to poor raw water quality and its abstraction licence has been revoked. No conjunctive use benefits are possible.
Groundwater (KTZ): Chalk ASR	Chalk ASR scheme.	TBC	KTZ	Previous ASR review suggested the Chalk is in connectivity with the Thanet Sands and has a limited extent of confined formation. The aquifer was assessed as having very low ASR potential.
Groundwater (KTZ): Jurassic Limestones ASR	KTZ - Jurassic Limestones ASR scheme.	TBC	KTZ	Previous ASR review suggested this aquifer is very thin. The aquifer was assessed as having very low ASR potential.
Groundwater (KTZ): Lower Greensand ASR	Lower Greensand ASR scheme.	TBC	KTZ	Previous ASR review suggested this aquifer is very thin and of limited extent in this area. The aquifer was assessed as having low ASR potential.
Groundwater (KTZ): Re-commission Broadstairs (0.9Ml/d)	This options involves the re-commissioning of unused Broadstairs source. The existing source has not been used since 1989 when the source was contaminated with cyclohexane. Rehabilitation was done over multiple years but the licence has now been revoked.	0.9	KTZ	Excluded due to water quality issues as re-commissioning can induce re-mobilisation of cyclohexane pollution.
Groundwater (KTZ): Stourmouth (10Ml/d)	The scheme involves the construction of a new 10Ml/d Stourmouth WSW and 20Ml covered storage facility for 2 days of backup supply. This will increase the capacity within KTZ.	10.0	KTZ	No longer technically feasible due to potential bird strikes affecting Kent international airport. The licence for Stourmouth source has been revoked.
Groundwater (KTZ): Stourmouth WSW (25Ml/d)	The scheme involves the construction of a new 10Ml/d Stourmouth WSW and 20Ml covered storage facility for 2 days of backup supply. This will increase the capacity within KTZ.	25.0	KTZ	No longer technically feasible due to potential bird strikes affecting Kent international airport. The licence for Stourmouth source has been revoked.
Groundwater (KTZ): Thanet Sands ASR	Thanet Sands ASR scheme.	TBC	KTZ	Previous ASR review suggested the Chalk is in connectivity with the Thanet Sands and has a limited extent of confined formation. The aquifer was assessed as having very low ASR potential.
Groundwater (KTZ): Upper Coal Measures Sandstone Division ASR	KTZ - Upper Coal Measures Sandstone Division ASR scheme.	TBC	KTZ	Previous ASR review suggested the aquifer is likely to have been impacted by mining, resulting in impacts from saline and acidic groundwater as well as impacted flow regime. The aquifer was assessed as having low ASR potential.
Groundwater (SBZ): Offshore drilling	Drilling offshore to abstract from freshwater aquifer with underwater pipeline to Shoreham docks for treatment.	TBC	SBZ	Disproportionately expensive and water quality and WFD risks of saline intrusion into the Chalk aquifer.

Option name	Option description	Maximum DO (Ml/d)	WRZ	Rejection comment
Groundwater (SHZ): Ashdown Beds ASR	Ashdown Beds ASR scheme.	TBC	SHZ	Previous ASR review suggested high permeabilities in this aquifer are limited in extent and it is of limited thickness especially where well confined. The aquifer is also significantly faulted limiting its storage potential. The aquifer was assessed as having very low ASR potential.
Groundwater (SHZ): New borehole at Rye (8.7Ml/d)	There is an existing source at Rye. This source is currently used and has a DO of 2.26Ml/d (average) and 3.8Ml/d (peak). There are at least 3 boreholes at the site, linked by a series of adits. This option aims to increase the DO at the site to the licensed value. The current licence is for 2.26Ml/d (average) and 8.73Ml/d (peak). Hence it is only possible to increase the peak licence at this source.	8.7	SHZ	Replaced by an alternative option
Groundwater (SHZ): Portland Sandstone ASR	Portland Sandstone ASR scheme.	TBC	SHZ	Previous ASR review suggested clogging may be a problem. The aquifer is heterogeneous and limited information is available. The aquifer was assessed as having very low ASR potential.
Groundwater (SHZ): Recommission Cadborough Rye source	Replace boreholes to increase yield. Improves redundancy of the source. This option considers refurbishment or replacement of Cadborough borehole source. It includes the drilling of new boreholes, construction of new treatment and provision of a connection to the existing distribution system. The source would be expected to pump water to the Rye Tower Reservoir.	TBC	SHZ	The yield of this option is currently considered to be both small and unreliable. Additionally, the option definition, environmental impact, water resource benefit, regulatory requirements, consideration of deliverability/planning issues, and technical design are not sufficiently developed for inclusion in WRMP24. Option should be progressed and included in the WRMP29 assessment.
Groundwater (SHZ): Tunbridge Wells Sands ASR	Tunbridge Wells Sands ASR scheme.	TBC	SHZ	Previous ASR review suggested the aquifer has low permeabilities except the Ardingly Sandstone, which is heterogeneous. Significantly faulted. Abstraction boreholes have siltation problems. The aquifer was assessed as having very low ASR potential.
Groundwater (SNZ): Midhurst borehole 3	Replacement and new boreholes to increase redundancy (currently single point of failure).	TBC	SNZ	The option definition, environmental impact, water resource benefit, regulatory requirements, consideration of deliverability/planning issues, and technical design are not sufficiently developed for inclusion in WRMP24. Option should be progressed and included in the WRMP29 assessment.
Groundwater (SNZ): Midhurst licence increase	Increase the licence capacity of the Midhurst abstraction.	TBC	SNZ	Negligible increase and no scope for additional abstraction. Potential risk of deterioration under the WFD.
Groundwater (SNZ): Portland Sandstone ASR	Portland Sandstone ASR scheme.		SNZ	Previous ASR review suggested clogging may be a problem. The aquifer is heterogeneous and limited information is available. The aquifer was assessed as having Low ASR potential.

Option name	Option description	Maximum DO (Ml/d)	WRZ	Rejection comment
Groundwater (SNZ): Pulborough artificial recharge (10Ml/d)	Artificial recharge and increased abstraction from the Pulborough WSW basin Folkestone Beds aquifer.	10.0	SNZ	Operation of this this scheme is not vialbe due to increased impacts on the Pulborough basin aquifer and the River Arun SPA[21] wetlands during the summer/autumn conditions. May be reconsidered for future plans once the Pulborough Groundwater sustainability investigations have concluded.
Groundwater (SNZ): South Arundel A licence amendment (2Ml/d)	South Arundel A borehole - investigation and licence amendment (link to South Arundel and increase licence at South Arundel A and reduce South Arundel ~ 2Ml/d).	2.0	SNZ	The option definition, environmental impact, water resource benefit, regulatory requirements, consideration of deliverability/planning issues, and technical design are not sufficiently developed l for inclusion in WRMP24. Option should be progressed and included in the WRMP29 assessment.
Groundwater (SNZ): Tunbridge Wells Sands ASR	Tunbridge Wells Sands ASR scheme.		SNZ	Previous ASR review suggested the aquifer has low permeabilities except the Ardingly Sandstone, which is heterogeneous. Significantly faulted. Abstraction boreholes have siltation problems. The aquifer was assessed as having very low ASR potential.
Groundwater (SWZ) Sussex Coast Greensand ASR (4Ml/d)	Two alternative scheme have been assessed under this option; a 4Ml/d output using two boreholes (scheme 1) and a 8Ml/d output using four boreholes (scheme 2). The option will take potable mains water and inject it into the aquifer within the Lower Greensands formation during winter and abstract it over the summer months. The abstracted water is then treated and then sent into supply via Tenants Hill WSR.	4.0	SWZ	This aquifer is considered to have a high potential for ASR operation. It was selected as a preferred WRMP14 and WRMP19 scheme but is presently considered undeliverable as there have been considerable difficulties with developing scheme due to land access issues. Option should be reviewed and reconsidered for the WRMP29 assessment.
Groundwater (SWZ) Sussex Coast Greensand ASR (8Ml/d)	Two alternative scheme have been assessed under this option; a 4Ml/d output using two boreholes (scheme 1) and a 8Ml/d output using four boreholes (scheme 2). The option will take potable mains water and inject it into the aquifer within the Lower Greensands formation during winter and abstract it over the summer months. The abstracted water is then treated and then sent into supply via Tenants Hill WSR.	8.0	SWZ	This aquifer is considered to have a high potential for ASR operation. It was selected as a preferred WRMP14 and WRMP19 scheme but is presently considered undeliverable as there have been considerable difficulties with developing scheme due to land access issues. Option should be reviewed and reconsidered for the WRMP29 assessment.
Groundwater (SWZ): Arundel licence increase	Increase in licence	TBC	SWZ	The Environment Agency has ruled out allowing increased abstraction from sources around Arundel.
Groundwater (SWZ): Ashdown Beds ASR	Sussex Coast - Ashdown Beds ASR scheme.	TBC	SWZ	Previous ASR review suggested the aquifer is at significant depth with no information available. The aquifer was assessed as having low ASR potential.

[21] SPA = Special Protection Area

Option name	Option description	Maximum DO (Ml/d)	WRZ	Rejection comment
Groundwater (SWZ): East Worthing alternative site and treatment capacity	Scheme to improve DO through additional treatment for East Worthing scheme.	TBC	SWZ	The option has been replaced by licence variation option as source is currently licence constrained.
Groundwater (SWZ): Tunbridge Wells Sands ASR	Tunbridge Wells Sands ASR scheme.	TBC	SWZ	Previous ASR review suggested the aquifer is at significant depth with no information available. The aquifer was assessed as having low ASR potential.
Groundwater (SWZ): Upper Greensand ASR	Sussex Coast - Upper Greensand ASR scheme.	TBC	SWZ	Previous ASR review suggested the aquifer is in continuity with the Chalk. Confined areas are too close to outcrop and too steeply dipping. The aquifer was assessed as having very low ASR potential.
Licence trading (KTZ): Non-potable supply to a garden centre in Thanet (provide non potable water supply for horticultural use	A garden centre in Thanet is in an area of high nitrate sources in Thanet that require blending with lower nitrate water for potable use. This option would provide a non-treated feed to agricultural/horticultural customers to reduce demand of potable water on the Faversham4-Faversham4 network; 2.5Ml/d currently, increasing to 4Ml/d.	TBC	KTZ	The option definition, environmental impact, water resource benefit, regulatory requirements, consideration of deliverability/planning issues, and technical design are not sufficiently developed for inclusion in WRMP24. Option should be progressed and included in the WRMP29 assessment.
Surface water (HSE): Woodmill abstraction (45Ml/d)	This option involves the relocation of an existing surface water abstraction for Itchen WSW to a new abstraction further downstream, closer to the tidal limit at Woodmill. It is assumed that the new abstraction would meet the imposed sustainability reductions at Itchen WSW as the scheme would lead to increased flow volumes along the length of the River Itchen between the two sites. The new abstraction would replace the entire surface water abstraction at Itchen WSW (45Ml/d) plus 11Ml/d to compensate for the sustainability reductions imposed on Portsmouth Water. With the provision of additional water treatment infrastructure to account for a comparative reduction in raw water quality, flows may be treated by the existing supply works at Itchen surface water, or alternatively, at Portsmouth Water's Source A following expansion of the existing source. 45Ml/d Southern Water allocated abstraction, plus up to 30Ml/d bulk transfer from Portsmouth Water.	45.0	HSE	The option definition, environmental impact, water resource benefit, regulatory requirements, consideration of deliverability/planning issues, and technical design are not sufficiently developed for inclusion in WRMP24. The option will be progressed further for inclusion in the WRMP29 assessment, pending development of options associated with the Portsmouth Water's Source A abstraction.

Option name	Option description	Maximum DO (Ml/d)	WRZ	Rejection comment
Surface water (HSE): Woodmill abstraction (74Ml/d)	This option involves the relocation of an existing surface water abstraction for Itchen WSW to a new abstraction further downstream, closer to the tidal limit at Woodmill. It is assumed that the new abstraction would meet the imposed sustainability reductions at Otternbourne as the scheme would lead to increased flow volumes along the length of the River Itchen between the two sites. The new abstraction would replace the entire surface water abstraction at Itchen WSW (45Ml/d) plus 11Ml/d to compensate for the sustainability reductions imposed on Portsmouth Water. With the provision of additional water treatment infrastructure to account for a comparative reduction in raw water quality, flows may be treated by the existing supply works at Itchen surface water, or alternatively, at Portsmouth Water's Source A following expansion of the existing works. 74Ml/d Southern Water allocated abstraction, plus up to 30Ml/d bulk transfer from Portsmouth Water	74.0	HSE	The option definition, environmental impact, water resource benefit, regulatory requirements, consideration of deliverability/planning issues, and technical design are not sufficiently developed for inclusion in WRMP24. The option will be progressed further for inclusion in the WRMP29 assessment, pending development of options associated with the Portsmouth Water's Source A abstraction.
Surface water (HSW): New abstraction from the Basingstoke Canal	Abstraction from the Basingstoke Canal, owned by Hampshire and Surrey County Councils and managed by the Basingstoke Canal Authority.	TBC	HSW	Not technically feasible as any abstraction from the canal is likely to affect navigation along the watercourse.
Surface water (SBZ): River Ouse abstraction	New river abstraction on River Ouse	TBC	SBZ	Unacceptable social and environmental impacts and CAMS assessment stated, 'no water available'.
Surface water (SHZ): New abstraction from the River Rye and transfer to Powdermill (0.9Ml/d)	This option would require the construction of a river abstraction on the River Rye close to the existing abstraction, from where the water would be pumped through a new transfer main to Powdermill Reservoir.	0.9	SHZ	The option definition, environmental impact, water resource benefit, regulatory requirements, consideration of deliverability/planning issues, and technical design are not sufficiently developed for inclusion in WRMP24. Option should be progressed and included in the WRMP29 assessment.
Surface Water (SNZ): Pulborough MRF seasonal variation	Work carried out during drought permit applications in the 2005 and 2006 drought indicated that the MRF could potentially be reduced by 10Ml/d without unacceptable environmental impacts, particularly if this is done outside of the summer critical period when river temperatures are at their highest. Currently the licence at Pulborough WSW is 75Ml/d (combined surface and groundwater), but surface water abstraction is constrained by a requirement that the flow over Pulborough WSW weir should be no less than 63.64Ml/d (daily average). River restoration measures have been included to compensate for any environmental / ecological damage that may otherwise been caused as a result of increased abstraction.	10.0	SNZ	Replaced by the Pulborough WSW winter transfer option.

Option name	Option description	Maximum DO (Ml/d)	WRZ	Rejection comment
Surface water (SWZ): River Adur abstraction (5Ml/d)	Direct abstraction from the River Adur at Wineham all year round without associated storage. The eastern branch of the Adur is potentially suitable for abstraction due to the very low flow rates in the western branch. Abstracted water from the river would be treated directly and then supplied up to a rate of up to 5Ml/d. This is considered to be the maximum realistic upper limit, as flows within this branch of the Adur regularly fall as low as 12Ml/d during low flow years (the majority of which is formed from artificial discharges). There are two options; one is to send the water into supply at the Coltstaple WSR, the alternative is to send the water into supply via the Rock Road transfer main. This option would be able to provide 5Ml/d output for most of the year, although turbidity issues could compromise outputs during high flows. Further modelling would be required to confirm DO.	5.0	SWZ	Unacceptable environmental impact on dissolved oxygen levels, fish and macro invertebrates in the river Adur at low flows.
Treatment capacity (KMW): Replacement/enhancement of treatment processes at Near Rochester	Option to improve efficiency at Near Rochester WSW. Replacement/enhancement of treatment processes (clarification) at Near Rochester to enable faster response to changes in flows/demand and greater capacity.	TBC	KMW	Option would improve operational performance of the site, but may not provide a water resource benefit. The option definition, environmental impact, water resource benefit, regulatory requirements, consideration of deliverability/planning issues, and technical design are not sufficiently developed for inclusion in WRMP24. Option should be progressed and included in the WRMP29 assessment.
Treatment capacity (SHZ): Additional GAC[22] at Beauport	Additional GAC at Beauport WSW to increase output/treatment capacity back to 30Ml/d.	TBC	SHZ	The option definition, environmental impact, water resource benefit, regulatory requirements, consideration of deliverability/planning issues, and technical design are not sufficiently developed for inclusion in WRMP24. Option should be progressed and included in the WRMP29 assessment.
Sittingbourne licence trade with another abstraction licence holder (2)	Sittingbourne licence trade	TBC	KMW	No further discussions have occurred between Southern Water and the other (second) abstraction licence holder. There is significant uncertainty on cost, availability of water and other key determining factors. This option can be reconsidered in WRMP29 following further discussions with this company. Potential risk of deterioration under the WFD.

[22] GAC = Granular Activated Carbon

Option name	Option description	Maximum DO (Ml/d)	WRZ	Rejection comment
Sittingbourne licence trade: with another abstraction licence holder (1) (19.7Ml/d)	Another company holds 6 abstraction licenses within Southern Water's supply area. This option would involve discussions with the company to determine whether they are willing to trade some or all of their licence with Southern Water. The maximum daily abstraction from each of the six locations are as follows. TQ62767459: Max daily: 1.31 TQ62777412: Max daily: 1.31 TQ62267375: Max daily: 19.66 TQ62417366: Max daily: 19.66 TQ62457366: Max daily: 19.66 TQ62987426: Max daily: 19.66	19.7	KMW	No further discussions have occurred between Southern Water and the company therefore there is significant uncertainty on cost, availability of water and other key determining factors. This option can be reconsidered in WRMP29 following further discussions with the company. Potential risk of deterioration under the WFD.
Water trading (SWS): Explore licence trading with large abstraction licence holders	Obtain data on holders of abstraction licences >1Ml/d for Southern Water to contact to establish whether these 3rd parties were willing to trade some or all of their licence.	TBC	Multiple locations	No locations or suitable large abstractors of water identified. Option should be progressed and included in the WRMP29 assessment. Potential risk of deterioration under the WFD.

3.1.3 New resources and storage

Option name	Option description	Maximum DO (Ml/d)	WRZ	Rejection comment
Asset enhancement (IOW): Ashey	Ashey WSW is a disused groundwater near Sandown. Option involves bring source back online.	TBC	IOW	Resilience option with no water resource benefit and should therefore be considered for the Business Plan but not WRMP.
Asset enhancement (IOW): Cooks Castle	Rebuild new storage options (including network enhancement) away from Cooks Castle to move asset away from deteriorating geohazard	TBC	IOW	Resilience option with no water resource benefit and should therefore be considered for the Business Plan but not WRMP.
Asset enhancement (KTZ): Re-drill borehole D at West Sandwich	Optimise existing source.	TBC	KTZ	No water resource benefit currently identified. The option may be required to support other options.
Asset enhancement (KTZ): Re-drill borehole E at West Sandwich	Optimise existing sources. Chalk quarry adjacent to borehole E is a risk to supply.	TBC	KTZ	No water resource benefit currently identified. The option may be required to support other options.
Bulk import (SNZ): Clay Hill Reservoir	South East Water's development of a new reservoir at Clay Hill, may enable a transfer to SHZ. It might also enable South East Water to reduce their current dependency on Weir Wood Reservoir, freeing additional water for Southern Water.		SHZ	Clay Hill Reservoir has not been included in South East Water's WRMP19 and has been shown to damage historic landscapes and diverse wildlife habitats.
Desalination (HSE): Gosport and Lee-on-the-Solent	This option is to build a desalination plant along the coast of Gosport and Lee-on-the-Solent (outside Southern Water supply area). The coastline from Lee-on-the-Solent to Hill Head consists of a shingle beach and does not have any European designations. Residential dwellings and secondary homes cover most of the coast.	TBC	HSE	Inappropriate location and environmental impacts. Construction in a mainly residential area, discharges to environmentally designated area of coast and other options to meet demand in the area mean this option will not be looked at further.

Option name	Option description	Maximum DO (Ml/d)	WRZ	Rejection comment
Desalination (HSE): Millbrook (200Ml/d)	This option proposes installation of a desalination plant at Southampton Water, capable of producing up to 200Ml/d. It is envisaged that it would be located within the existing Millbrook WTW site and would be connected into supply via the trunk main close to the site. If the plant produces 25Ml/d or less, the water can be pumped into the trunk main (18" diameter) parallel to the railway line just north of the site. If the plant capacity is 30Ml/d a connection is required into the 24" diameter trunk main 200m further west. Further distribution enhancements are anticipated to be required to produce more than 30Ml/d.	200.0	HSE	Unacceptable environmental impact of the hyper-saline dispersion plume. Significant engineering issues associated with transfer and distribution pipelines. Locating a desalination plant in the Millbrook area would require constructing new transfer and distribution pipelines beside railways, motorways and protected areas. Potential planning risks. The desalination option selection has been superseded by the SRO process.
Desalination (HSE): Millbrook (25Ml/d)	This option proposes installation of a desalination plant at Southampton Water, capable of producing up to 200Ml/d. It is envisaged that it would be located within the existing Millbrook WTW site and would be connected into supply via the trunk main close to the site. If the plant produces 25Ml/d or less, the water can be pumped into the trunk main (18" diameter) parallel to the railway line just north of the site. If the plant capacity is 30Ml/d a connection is required into the 24" diameter trunk main 200m further west. Further distribution enhancements are anticipated to be required to produce more than 30Ml/d.	25.0	HSE	Unacceptable environmental impact of the hyper-saline dispersion plume. Significant engineering issues associated with transfer and distribution pipelines. Locating a desalination plant in the Millbrook area would require constructing new transfer and distribution pipelines beside railways, motorways and protected areas. Potential planning risks. The desalination option selection has been superseded by the SRO process.
Desalination (HSE): Millbrook (30Ml/d)	This option proposes installation of a desalination plant at Southampton Water, capable of producing up to 200Ml/d. It is envisaged that it would be located within the existing Millbrook WTW site and would be connected into supply via the trunk main close to the site. If the plant produces 25Ml/d or less, the water can be pumped into the trunk main (18" diameter) parallel to the railway line just north of the site. If the plant capacity is 30Ml/d a connection is required into the 24" diameter trunk main 200m further west. Further distribution enhancements are anticipated to be required to produce more than 30Ml/d.	30.0	HSE	Unacceptable environmental impact of the hyper-saline dispersion plume. Significant engineering issues associated with transfer and distribution pipelines. Locating a desalination plant in the Millbrook area would require constructing new transfer and distribution pipelines beside railways, motorways and protected areas. Potential planning risks. The desalination option selection has been superseded by the SRO process.
Desalination (HSE): Sholling	This option would see a desalination plant constructed to the east of Southampton near Sholling and would supply potable desalinated water to Southampton.	TBC	HSE	The environmental risk of discharging to Southampton Water is considered too great compared to other large desalination schemes that can provide the same volume of water while discharging to the Solent. The desalination option selection has been superseded by the SRO process.
Desalination (HSW): Southampton West (150Ml/d)	This option proposes a 150Ml/d desalination plant on a suitable site along West Southampton Coast with transfer to River Test WSW.	150.0	HSW	This option was excluded due to the potential environmental impacts following reassessment as part of the RAPID gated process.
Desalination (HSW): Southampton West (200Ml/d)	This option proposes a 200Ml/d desalination plant on a suitable along West Southampton Coast with transfer to River Test WSW.	200.0	HSW	This option was excluded due to the potential environmental impacts following reassessment as part of the RAPID gated process.

Option name	Option description	Maximum DO (Ml/d)	WRZ	Rejection comment
Desalination (HSW): Southampton West (200Ml/d) modular phase 1 (0-100Ml/d)	This option proposes a 200Ml/d desalination plant on a suitable location along West Southampton Coast. The plant is to be built in a modular fashion. This is the first phase of the option 0-100Ml/d.	100.0	HSW	This option was excluded due to the potential environmental impacts following reassessment as part of the RAPID gated process.
Desalination (HSW): Southampton West (200Ml/d) modular phase 2 (100-200Ml/d)	This option proposes a 200Ml/d desalination plant on a suitable location along West Southampton Coast. The plant is to be built in a modular fashion. This is the second phase of the option 100-200Ml/d.	100.0	HSW	This option was excluded due to the potential environmental impacts following reassessment as part of the RAPID gated process.
Desalination (HSW): Southampton West (40Ml/d)	This option involves construction of a 40Ml/d desalination plant on a suitable location along West Southampton Coast. The water will be transferred directly to River Test WSW for treatment.	40.0	HSW	This option was excluded due to the potential environmental impacts following reassessment as part of the RAPID gated process.
Desalination (HSW): Southampton West (61Ml/d)	This option involves construction of a 61Ml/d desalination plant on a suitable location along West Southampton Coast. The water will be transferred directly to River Test WSW for treatment.	61.0	HSW	This option was excluded due to the potential environmental impacts following reassessment as part of the RAPID gated process.
Desalination (HSW): Southampton West (75Ml/d)	This option involves construction of a 61Ml/d desalination plant on a suitable location along West Southampton Coast. The water will be transferred directly to River Test WSW for treatment.	75.0	HSW	This option was excluded due to the potential environmental impacts following reassessment as part of the RAPID gated process.
Desalination (HSW): Southampton West - 150Ml/d) modular phase 1 (0-75Ml/d)	This option proposes a 150Ml/d desalination plant on a suitable site along West Southampton Coast with transfer to River Test WSW. The plant is to be built in a modular fashion. This is the first phase of the option 0-75Ml/d.	75.0	HSW	This option was excluded due to the potential environmental impacts following reassessment as part of the RAPID gated process.
Desalination (HSW): Southampton West - 150Ml/d) modular phase 2 (75-150Ml/d)	This option proposes a 150Ml/d desalination plant on a suitable site along West Southampton Coast. The plant is to be built in a modular fashion. This is the second phase of the option 75-150Ml/d.	75.0	HSW	This option was excluded due to the potential environmental impacts following reassessment as part of the RAPID gated process.

Option name	Option description	Maximum DO (Ml/d)	WRZ	Rejection comment
Desalination (HSW): Test Estuary (10Ml/d)	Construction of a 10Ml/d or 20Ml/d desalination plant within Test Estuary Park. Depending on the capacity, the water could be pumped into supply at either the main at Normandy Way (10Ml/d) or the larger main at Test Estuary bypass (20Ml/d). Both connections would supply water to River Test WSW. Further mains enhancements could allow supply of treated water to River Test WSW for onward distribution to the wider WRZ. There is also potential to supply the large industrial user in HSW between 10Ml/d and 36Ml/d depending on negotiations. Test Estuary area is located on the west bank of the tidal part of River Test about 3.5km upstream of its confluence with the tidal part of the River Itchen and Southampton Water. There is an aggregates wharf, a Marine Operations Centre and the Slowhill Copse WTW nearby.	10.0	HSW	Desalination option selection for HSW has been superseded by the SRO process.[23]
Desalination (HSW): Test Estuary (20Ml/d)	Construction of a 10Ml/d or 20Ml/d desalination plant within Test Estuary Park. Depending on the capacity, the water could be pumped into supply at either the main at Normandy Way (10Ml/d) or the larger main at Test Estuary bypass (20Ml/d). Both connections would supply water to River Test WSW. Further mains enhancements could allow supply of treated water to River Test WSW for onward distribution to the wider WRZ. There is also potential to supply the large industrial user in HSW between 10Ml/d and 36Ml/d depending on negotiations. Test Estuary area is located on the west bank of the tidal part of River Test about 3.5km upstream of its confluence with the tidal part of the River Itchen and Southampton Water. There is an aggregates wharf, a Marine Operations Centre and the Test Estuary WTW nearby.	20.0	HSW	Desalination option selection for HSW has been superseded by the SRO process.
Desalination (HSW): Test Estuary with Southampton Water discharge (10Ml/d)	This option also involves desalination plant within the Test Estuary Park. However, it differs in that the hyper-saline waste flow would be discharged at the north end of Southampton Water, while in the other variants, the discharge would be pumped to the Solent for discharge.	10.0	HSW	The West Southampton Coast discharge option provides the same amount of water without having as great an impact on salinity levels in Southampton Water. Therefore, this option would be less acceptable on environmental grounds. Desalination option selection has been superseded by the SRO process.

[23] Southern Water, 2021, Strategic Solution Interim Update Options Appraisal Process, https://www.southernwater.co.uk/media/zywp0eua/wflh_6_interim-update_options-appraisal-process.pdf

Option name	Option description	Maximum DO (Ml/d)	WRZ	Rejection comment
Desalination (HSW): Test Estuary with Southampton Water discharge (20Ml/d)	This option also involves desalination plant within the Test Estuary Park. However, it differs in that the hyper-saline waste flow would be discharged at the north end of Southampton Water, while in the other variants, the discharge would be pumped to the Solent for discharge.	20.0	HSW	The West Southampton Coast discharge option provides the same amount of water without having as great an impact on salinity levels in Southampton Water. Therefore, it is considered that this option would be less acceptable on environmental grounds. Desalination option selection has been superseded by the SRO process.
Desalination (HSW): Test Estuary with Southampton Water discharge (50Ml/d)	This option also involves desalination plant within the Test Estuary Park. However, it differs in that the hyper-saline waste flow would be discharged at the north end of Southampton Water, while in the other variants, the discharge would be pumped to the Solent for discharge.	50.0	HSW	The West Southampton Coast discharge option provides the same amount of water without having as great an impact on salinity levels in Southampton Water. Therefore, it is considered that this option would be less acceptable on environmental grounds. Desalination option selection has been superseded by the SRO process.
Desalination (HSW): Test Estuary with Southampton Water discharge (100Ml/d)	This option also involves desalination plant within the Test Estuary Park. However, it differs in that the hyper-saline waste flow would be discharged at the north end of Southampton Water, while in the other variants, the discharge would be pumped to the Solent for discharge.	100.0	HSW	The West Southampton Coast discharge option provides the same amount of water without having as great an impact on salinity levels in Southampton Water. Therefore, it is considered that this option would be less acceptable on environmental grounds. Desalination option selection has been superseded by the SRO process.
Desalination (HSW): Test Estuary with Southampton Water discharge (150Ml/d)	This option also involves desalination plant within the Test Estuary Park. However, it differs in that the hyper-saline waste flow would be discharged at the north end of Southampton Water, while in the other variants, the discharge would be pumped to the Solent for discharge.	150.0	HSW	The West Southampton Coast discharge option provides the same amount of water without having as great an impact on salinity levels in Southampton Water. Therefore, it is considered that this option would be less acceptable on environmental grounds. Desalination option selection has been superseded by the SRO process.
Desalination (HSW): Test Estuary with Southampton Water discharge (200Ml/d)	This option also involves desalination plant within the Test Estuary Park. However, it differs in that the hyper-saline waste flow would be discharged at the north end of Southampton Water, while in the other variants, the discharge would be pumped to the Solent for discharge.	200.0	HSW	The West Southampton Coast discharge option provides the same amount of water without having as great an impact on salinity levels in Southampton Water. Therefore, it is considered that this option would be less acceptable on environmental grounds. Desalination option selection has been superseded by the SRO process.
Desalination (IOW): Sandown (100Ml/d)	This option requires construction of a new desalination plant on land adjacent to Sandown WTW. The new plant will supply between 8.5 and 200Ml/d of desalinated water into the IOW and mainland distribution networks.	100.0	IOW	Large scale desalination on the IOW was considered as part of Water for Life Hampshire programme and was not considered feasible due to greater environmental impacts and logistical challenges in both constructing and running the plant (materials as well as power supply) compared to the mainland.
Desalination (IOW): Sandown (125Ml/d)	This option requires construction of a new desalination plant on land adjacent to Sandown WTW. The new plant will supply between 8.5 and 200Ml/d of desalinated water into the IOW and mainland distribution networks.	125.0	IOW	Large scale desalination on the IOW was considered as part of Water for Life Hampshire programme and was not considered feasible due to greater environmental impacts and logistical challenges in both constructing and running the plant (materials as well as power supply) compared to the mainland.
Desalination (IOW): Sandown (150Ml/d)	This option requires construction of a new desalination plant on land adjacent to Sandown WTW. The new plant will supply between 8.5 and 200Ml/d of desalinated water into the IOW and mainland distribution networks.	150.0	IOW	Large scale desalination on the IOW was considered as part of Water for Life Hampshire programme and was not considered feasible due to greater environmental impacts and logistical challenges in both constructing and running the plant (materials as well as power supply) compared to the mainland.

Option name	Option description	Maximum DO (Ml/d)	WRZ	Rejection comment
Desalination (IOW): Sandown (175Ml/d)	This option requires construction of a new desalination plant on land adjacent to Sandown WTW. The new plant will supply between 8.5 and 200Ml/d of desalinated water into the IOW and mainland distribution networks.	175.0	IOW	Large scale desalination on the IOW was considered as part of Water for Life Hampshire programme and was not considered feasible due to greater environmental impacts and logistical challenges in both constructing and running the plant (materials as well as power supply) compared to the mainland.
Desalination (IOW): Sandown (200Ml/d)	This option requires construction of a new desalination plant on land adjacent to Sandown WTW. The new plant will supply between 8.5 and 200Ml/d of desalinated water into the IOW and mainland distribution networks.	200.0	IOW	Large scale desalination on the IOW was considered as part of Water for Life Hampshire programme and was not considered feasible due to greater environmental impacts and logistical challenges in both constructing and running the plant (materials as well as power supply) compared to the mainland.
Desalination (IOW): Sandown (20Ml/d)	This option requires construction of a new desalination plant on land adjacent to Sandown WTW. The new plant will supply between 8.5 and 200Ml/d of desalinated water into the IOW and mainland distribution networks.	20.0	IOW	Large scale desalination on the IOW was considered as part of Water for Life Hampshire programme and was not considered feasible due to greater environmental impacts and logistical challenges in both constructing and running the plant (materials as well as power supply) compared to the mainland.
Desalination (IOW): Sandown (25Ml/d)	This option requires construction of a new desalination plant on land adjacent to Sandown WTW. The new plant will supply between 8.5 and 200Ml/d of desalinated water into the IOW and mainland distribution networks.	25.0	IOW	Large scale desalination on the IOW was considered as part of Water for Life Hampshire programme and was not considered feasible due to greater environmental impacts and logistical challenges in both constructing and running the plant (materials as well as power supply) compared to the mainland.
Desalination (IOW): Sandown (50Ml/d)	This option requires construction of a new desalination plant on land adjacent to Sandown WTW. The new plant will supply between 8.5 and 200Ml/d of desalinated water into the IOW and mainland distribution networks.	50.0	IOW	Large scale desalination on the IOW was considered as part of Water for Life Hampshire programme and was not considered feasible due to greater environmental impacts and logistical challenges in both constructing and running the plant (materials as well as power supply) compared to the mainland.
Desalination (IOW): Sandown (75Ml/d)	This option requires construction of a new desalination plant on land adjacent to Sandown WTW. The new plant will supply between 8.5 and 200Ml/d of desalinated water into the IOW and mainland distribution networks.	75.0	IOW	Large scale desalination on the IOW was considered as part of Water for Life Hampshire programme and was not considered feasible due to greater environmental impacts and logistical challenges in both constructing and running the plant (materials as well as power supply) compared to the mainland.
Desalination (IOW): Sandown (8.5Ml/d)	This option requires construction of a new desalination plant on land adjacent to Sandown WTW. The new plant will supply between 8.5 and 200Ml/d of desalinated water into the IOW and mainland distribution networks.	8.5	IOW	This option is replaced by the 8.5Ml/d recycling option on the IOW.
Desalination (IOW): Tidal River Medina and Eastern Yar	Out of the three potential options (Cowes power station, West Medina Mills, Grain store/ aggregate sites), the site adjacent to the Cowes power station is preferred as the planning allocation leaves the best opportunity for a desalination plant.	TBC	IOW	Excluded due to issues with dispersion, river navigation and distribution limitations.

Option name	Option description	Maximum DO (Ml/d)	WRZ	Rejection comment
Desalination (IOW): Western Yar	This option would see a desalination plant constructed on in the west of the IOW and would supply potable desalinated water to the IOW.		IOW	Unacceptable planning and environmental risks of its location within a SINC[24] and area of Ancient Woodland. The pipelines are routed through the AONB[25] and the abstraction and discharge pipes are within an SAC. The desalination option selection has been superseded by the SRO process.
Desalination (KTZ): River Stour (20Ml/d)	This option would abstract brackish water from the tidal River Stour. Much of the River Stour is subject to environmental designations; however two location for a desalination plant have been identified: at land next to Sandwich WTW and land next to Minster WSW. In either case, an abstraction structure and raw water pipeline would be required from the River Stour, with possible hyper-saline discharge through the existing long-sea outfall that serves Sandwich WTW. Treated water would then be transferred to Faversham4 Manston1 WSR for distribution to KTZ.	20.0	KTZ	Option considered to have too great an environmental impact from dispersion of hyper-saline waste to the designated reach of the River Stour compared to less environmentally sensitive options available in the WRZ.
Desalination (KTZ): Sandwich and Kingsdown	The stretch of coastline between Sandwich and Kingdowns on the East Kent coast was investigated for potential locations for a desalination plant. This stretch of coastline has been discounted as it subject to several designations (e.g. SSSI, Ramsar[26] sites, SAC and SPA, Special Landscape area) and is either undeveloped or residential in nature.	TBC	KTZ	Site is unsuitable for desalination proposals due to planning/environmental constraints. This area is either undeveloped or residential in nature and is subject to several designations e.g. SSSI, Ramsar sites, SAC and SPA, Special Landscape area.
Desalination (SBZ): Sussex Coast (20Ml/d)	A site in Sussex Coast was identified as a the most feasible location for a coastal desalination plant that could supply the Central area WRZs. The initial plan was to construct a new desalination plant within the site of an existing power station and make use of its abstraction and discharge structures. The treated water would be supplied to the Sussex WRZs distribution network. Alternative locations will also be explored.	20.0	SBZ	This option has been excluded as the site originally identified for the desalination plant is no longer available and an alternative site has not been identified.
Desalination (SBZ): Sussex Coast (40Ml/d)	A site in Sussex Coast was identified as a the most feasible location for a coastal desalination plant that could supply the Central area WRZs. The initial plan was to construct a new desalination plant within the site of an existing power station and make use of its abstraction and discharge structures. The treated water would be supplied to the Sussex WRZs distribution network. Alternative locations will also be explored.	40.0	SBZ	This option has been excluded as the site originally identified for the desalination plant is no longer available and an alternative site has not been identified.

[24] SINC = Sites of Importance for Nature Conservation
[25] AONB = Area of Outstanding Natural Beauty
[26] The Ramsar Convention on Wetlands of International Importance

Option name	Option description	Maximum DO (Ml/d)	WRZ	Rejection comment
Desalination (SBZ): Sussex Coast (modular 0-10Ml/d)	A site in Sussex Coast was identified as a the most feasible location for a coastal desalination plant that could supply the Central area WRZs. The initial plan was to construct a new desalination plant within the site of an existing power station and make use of its abstraction and discharge structures. The treated water would be supplied to the Sussex WRZs distribution network. Alternative locations will also be explored.	10.0	SBZ	This option has been excluded as the site originally identified for the desalination plant is no longer available and an alternative site has not been identified.
Desalination (SBZ): Sussex Coast (modular 10-20Ml/d)	A site in Sussex Coast was identified as a the most feasible location for a coastal desalination plant that could supply the Central area WRZs. The initial plan was to construct a new desalination plant within the site of an existing power station and make use of its abstraction and discharge structures. The treated water would be supplied to the Sussex WRZs distribution network. Alternative locations will also be explored.	10.0	SBZ	This option has been excluded as the site originally identified for the desalination plant is no longer available and an alternative site has not been identified.
Desalination (SBZ): Tidal River Ouse	The option has the potential for brackish water desalination. Areas we are considering for construction of a desalination plant include an industrial location in Newhaven or, if there is sufficient space, on our own landholdings in Newhaven. The treated water would then be transferred to a nearby service reservoir for distribution to SBZ. Discharge of hyper-saline waste would be through Newhaven East WTW's existing long sea outfall	TBC	SBZ	Significant engineering issues associated with distribution. Disproportionate costs and negligible DO benefit.
Desalination (SHZ): River Rye	This option would include construction of a desalination plant along the tidal River Rye on the approach to the Rye where it joins the Rother. The River Rye is only tidal for 800m and has low density residential dwellings. Any treated water would be used to supply SHZ.	TBC	SHZ	Replaced by Camber desalination option.
Desalination (SWS): Coastal aquifers	Investigation into desalination from coastal aquifers	TBC	Multiple locations	The option definition, environmental impact, water resource benefit, regulatory requirements, consideration of deliverability/planning issues, and technical design are not sufficiently developed for inclusion in WRMP24. Option should be progressed and included in the WRMP29 assessment.
Desalination (SWZ): Tidal River Adur desalination	This option proposes a desalination plant abstracting from the Tidal River Adur.	TBC	SWZ	Unacceptable planning and environmental risks. Most of the tidal stretch of the river is internationally designated. The Adur runs through the Sussex Downs AONB and is designated as a SSSI on entering Shoreham Harbour. Adur Estuary SSSI site also forms part of an RSPB[27] reserve which supports a large number of wading birds and saltmarsh plants.

[27] RSPB = Royal Society for the Protection of Birds

Option name	Option description	Maximum DO (Ml/d)	WRZ	Rejection comment
Emergency desalination (SWS) (5Ml/d)	Investigation will be required into how to operate the scheme without negative water quality impacts (e.g. increased pipe corrosion) caused by mixing desalinated potable water into the existing distribution network. Investigation will also be required for the effect on customers noticing a change in taste and odour and on users sensitive to water quality changes (e.g. hospitals and food manufactures). 5Ml/d output capacity has been assumed at this stage. Additional increments of supply capacity up to 10Ml/d could be provided if required.	5.0	Multiple locations	Ruled out by Southern Water Technical Steering Group as being impractical as drought option. Should also be removed from the next drought plan.
Offshore desalination (SWS)	Desalination from a ship or platform. Either option would require a pipeline connection into supply from a suitable berth, power connection, delivery and storage of consumables on land or the ship/platform, and purchase or lease of an appropriate vessel along with mooring fees. In addition, recirculation of brine may become an issue at high production rates unless either the offtake or discharge is located at some distance from the ship/platform.	TBC	Multiple locations	No significant advantage over land based alternatives with increased cost, complexity, and risk for producing the required quantities of potable water.
Recycling (SWS): Agricultural water recycling	To recycle water from WTW by farmers and agriculture uses	TBC	Multiple locations	No specific locations identified. Option should be progressed and included in the WRMP29 assessment.
Solar desalination (SWS)	The use of solar cells to drive evaporation distillation and standard desalination powered by photovoltaic solar panels. Both these process might be more efficient during a drought when in theory there would be more sun light hours.	TBC	Multiple locations	Solar power in the UK is not reliable enough to be the sole power source for a desalination plant. It would require a large land take and would also result in a hyper saline discharge. Any new build option should consider renewable power sources. It may be possible to include solar panels in the design and operation of a desalination plants covered in other options.
Storage (HSE): New surface water storage at Colden Common (2Ml/d)	This option consists of constructing a new surface water storage reservoir near Colden Common. The reservoir would be largely pump filled from a new abstraction on the River Itchen. A previous study indicated that a maximum storage capacity of approximately 1400Ml would be dependent on a 10m high embankment as well as two small impoundments on the upstream side of the reservoir to prevent flooding of roads and housing. However the impoundments would not be feasible as they would block the rivers from entering the reservoirs and so the capacity of the reservoir is reduced to 700Ml. The reservoir does also have a catchment of approximately 28km^2. The reservoir would be used as storage to supply additional water for treatment at Itchen WSW, approximately 3km away. The estimated DO benefit is 1.5Ml/d under ADO and 2Ml/d under PDO scenario.	2.0	HSE	Very significant environmental impacts due to the destruction and disruption to various designated sites including an AONB and SNCIs, with disproportionate costs and limited DO.
Storage (HSW): River Test WSW Lakes (conjunctive use with local WTW (28Ml/d)	New Resource	28.0	HSW	This option has been superseded by the SRO process.

Option name	Option description	Maximum DO (Ml/d)	WRZ	Rejection comment
Storage (IOW): Impounding reservoir at Newchurch (10Ml/d)	New resource.	10.0	IOW	The option definition, environmental impact, water resource benefit, regulatory requirements, consideration of deliverability/planning issues, and technical design are not sufficiently developed for inclusion in WRMP24. Option should be progressed and included in the WRMP29 assessment.
Storage (IOW): Rookley Reservoir (5.6Ml/d)	This option involves the construction of an impounding reservoir across the River Medina near Rookley with a capacity of 1500Ml. Water would be treated at a new WSW, constructed just downstream of the proposed site, and then pumped to the Alvington High Level WSR to enter distribution. Estimated to provide 5.6Ml/d under PDO and 4.3Ml/d under ADO conditions.	5.6	IOW	The scheme has very significant environmental impacts. These would also make planning difficult to get which would either stop implementation or increase the costs so they become disproportionate.
Storage (KME): Bankside storage at Maidstone (2.6Ml/d)	This option proposes bankside storage of 250Ml capacity at Maidstone, which would capture and store water from the River Medway at high flow events. This would allow the existing Maidstone - Bewl pipeline, which only operates during high flow events, to transfer water over an extended time period i.e. when river levels have fallen below the normal cut off level.	2.6	KME	Significant environmental impacts and water quality issues. The DO of the scheme does not justify the disproportionate financial cost and environmental impacts.
Storage (KME): SEW Canterbury Reservoir, alternative use (22Ml/d)	New reservoir to be constructed at SEW Canterbury.	22.0	RZ8 / KME / KMW / KTZ	The option definition, environmental impact, water resource benefit, regulatory requirements, consideration of deliverability/planning issues, and technical design are not sufficiently developed for inclusion in WRMP24. Option should be progressed and included in the WRMP29 assessment.
Storage (KME): Tidal barrage on Medway estuary	This option proposes to put in place a tidal barrage in the Medway Estuary downstream of Allington Lock. Flood water to be stored in this estuarine area for abstraction to Eccles Lake during drought periods.	TBC	KME	Unacceptable due to the environmental impact as it is likely to breach the WFD requirement of 'No Deterioration' of the water habitat.
Storage (KMW): Leigh Barrier flood storage reservoir	The Leigh Barrier is an impounding flood storage reservoir, which is used to attenuate peak flows in the Upper Medway catchment and hence reduce the risk of flooding downstream. The barrier is currently 6m high and has a storage capacity of approximately 5,500Ml although the Environment Agency may be increasing the capacity.	TBC	KMW	Not technically feasible as analysis has revealed that water would not be available at the barrier for the years when Bewl Water reservoir fails to fill.
Storage (KMW): Raise Bewl Water 3000mm plus licence variation	Bewl water fills from 3 sources: its own small natural catchment, River Teise catchment (pumped) and the River Medway catchment (pumped). There are operational control curves in place to determine the operation of both pumped supplies to the reservoir. The Teise is used preferentially with the Medway only used when the reservoir falls to critical levels. To increase DO during drought events the Valding control curve could be raised depending on the relationship between security of supplies and operational expenditure. This will be explored in 5 sub-options all of which include major works: investigate operational rules; raise the dam crest and build new wave wall; raise overflow and valve chamber shafts; and many ancillary works around the perimeter of the reservoir. For sub-option 5 this will also include licence variation M10. The sub-options involve raising Bewl water by: 0.4m,1m, 2m and 3m.		KME	Limited water resource benefit and disproportionate costs.

Option name	Option description	Maximum DO (Ml/d)	WRZ	Rejection comment
Storage (KMW): Raise Bewl Water by 1000mm	The scheme involves raising Bewl Reservoir by 1.0m to increase storage in the reservoir and thus provide additional releases to the River Medway catchment in order to support the downstream abstractions at Springfield. The increased water level will not impact on private properties, but parts of the path around the reservoir would have to be altered/moved. The option includes an allowance for up to 16km of raised embankment to avoid impacting on the Ancient Woodland. The raised embankment will include imported cohesive material and a steel piled core.	TBC	KMW	Unacceptable planning and environmental risks due to the flooding of some areas of ancient woodland.
Storage (KMW): Raise Bewl Water by 2000mm (10.7Ml/d)	The scheme involves raising Bewl Reservoir by 3m to increase storage in the reservoir and thus provide additional releases to the River Medway catchment in order to support the downstream abstractions at Springfield. The increased water level will not impact on private properties, but parts of the path around the reservoir would have to be altered/moved. The option includes an allowance for up to 16km of raised embankment to avoid impacting on the Ancient Woodland. The raised embankment will include imported cohesive material and a steel piled core. Estimated to provide 10.65Ml/d under MDO scenario.	10.7	KMW	Unacceptable planning and environmental risks due to the flooding of some areas of ancient woodland.
Storage (KMW): Raise Bewl Water by 2000mm (9.2Ml/d)	The scheme involves raising Bewl Reservoir by 2m to increase storage in the reservoir and thus provide additional releases to the River Medway catchment in order to support the downstream abstractions at Springfield. The increased water level will not impact on private properties, but parts of the path around the reservoir would have to be altered/moved. The option includes an allowance for up to 16km of raised embankment to avoid impacting on the Ancient Woodland. The raised embankment will include imported cohesive material and a steel piled core. Can provide 9.15Ml/d under the MDO scenario.	9.2	KMW	Unacceptable planning and environmental risks due to the flooding of some areas of ancient woodland.
Storage (KTZ): Thanet and Lyden - Stour IDB	Retain higher levels (and water volume) in winter for subsequent pumping to treatment and supply. Utilise existing water level control structures. Water currently going to waste. Could purchase farming land for storage and purchase abstraction rights. May allow resting of groundwater sources		KTZ	The option definition, environmental impact, water resource benefit, regulatory requirements, consideration of deliverability/planning issues, and technical design are not sufficiently developed for inclusion in WRMP24. Option should be progressed and included in the WRMP29 assessment.
Storage (SBZ): Clayhill Reservoir (18Ml/d)	New reservoir to be constructed to the East of Barcombe Reservoir, just South of Plashett Wood.	18.0	RZ2 / SBZ	This option has not been included in South East Water's WRMP19 plan. The option has been shown to damage historic landscape and diverse wildlife habitat.
Storage (SBZ): Clayhill Reservoir, alternative use (18Ml/d)	New reservoir to be constructed to the East of Barcombe Reservoir, just South of Plashett Wood.	18.0	RZ2 / SBZ	This option has not been included in South East Water's WRMP19 and has been shown to damage historic landscapes and diverse wildlife habitats.
Storage (SBZ): New Arlington Reservoir, alternative use (19Ml/d)	Extension of the existing Arlington Reservoir to the South, to create New Arlington Reservoir.	19.0	RZ2 / SWZ / SBZ / SNZ	The option definition, environmental impact, water resource benefit, regulatory requirements, consideration of deliverability/planning issues, and technical design are not sufficiently developed by South East Water for inclusion in WRMP24. Option should be progressed and included in the WRMP29 assessment.

Option name	Option description	Maximum DO (Ml/d)	WRZ	Rejection comment
Storage (SNZ): New reservoir at Burton Mill Pond	Construction of new reservoir at Burton Mill Pond with a capacity of between 1000 and 3000Ml (enlargement of current waterbody).	TBC	SNZ	Significant environmental impacts and water quality issues. The DO of the scheme does not justify the disproportionate financial cost and environmental impacts, and would be unlikely to get planning permission within an AONB.
Storage (SNZ): New reservoir at Coneyhurst	Construction of new reservoir at Coneyhurst. Involving an embankment dam across the River Adur. The capacity of the reservoir would be 1500Ml.	TBC	SNZ	The scheme is not suitable for further evaluation due to environmental, cost and practical issues.
Storage (SNZ): New reservoir at Cornerhouse	Construction of new embankment dam reservoir at Cornerhouse with a capacity of 2000Ml.	TBC	SNZ	Although the scheme is technically feasible, the impoundment required may not be acceptable to the Environment Agency. It was excluded in AMP4 due to practicability and reliability issues and in AMP5 due to environmental risks.
Storage (SNZ): New reservoir at Dunsfold	Construction of new reservoir at Dunsfold with a capacity of 5000Ml.	TBC	SNZ	The scheme is not considered for further investigations due to limited refill capacity and high costs of infrastructure.
Storage (SNZ): New reservoir at Goose Green	Construction of new bankside storage reservoir at Goose Green with a capacity of 4500Ml.	TBC	SNZ	There is low refill potential and so a probable low DO and disproportionate costs.
Storage (SNZ): New reservoir at Habin	Construction of new embankment dam reservoir at Habin with a capacity of between 1000 and 3000Ml.	TBC	SNZ	The scheme has adverse environmental impacts including to a Trout Fishery, it is also unlikely to be given permission unless it can be proved to be an exceptional circumstance.
Storage (SNZ): New reservoir at Hammer Pond	Construction of new reservoir at Hammer Pond with a capacity of between 1000 and 3000Ml (enlargement of existing waterbody).	TBC	SNZ	Significant environmental impacts and water quality issues. The DO of the scheme does not justify the disproportionate financial cost and environmental impacts and would be unlikely to get planning permission within an AONB.
Storage (SNZ): New reservoir at Hawkins Pond	Construction of new reservoir at Hawkins Pond with a capacity of between 1000 and 3000Ml (enlargement of existing waterbody).	TBC	SNZ	Significant environmental impacts and water quality issues. The DO of the scheme does not justify the disproportionate financial cost and environmental impacts and would be unlikely to get planning permission within an AONB.
Storage (SNZ): New reservoir at Ingrams Green	Construction of new embankment dam reservoir at Ingrams Green with a capacity of between 1000 and 3000Ml.	TBC	SNZ	Significant environmental impacts and water quality issues. The DO of the scheme does not justify the disproportionate financial cost and environmental impacts and would be unlikely to get planning permission within an AONB/National Park.
Storage (SNZ): New reservoir at Kirdford	Construction of new embankment dam reservoir at Kirdford between 1000 and 3000Ml.	TBC	SNZ	Significant environmental impacts and water quality issues. The DO of the scheme does not justify the disproportionate financial cost and environmental impacts.
Storage (SNZ): New reservoir at Kneppmill Pond	Construction of new reservoir at Kneppmill Pond with a capacity of between 1000 and 3000Ml (enlargement of current waterbody).	TBC	SNZ	Significant environmental impacts and water quality issues. The DO of the scheme does not justify the disproportionate financial cost and environmental impacts and would be unlikely to get planning permission within an AONB.
Storage (SNZ): New reservoir at Mill Pond	Construction of new reservoir at Mill Pond with a capacity of between 1000 and 3000Ml (enlargement of existing waterbody).	TBC	SNZ	Significant environmental impacts and water quality issues. The DO of the scheme does not justify the disproportionate financial cost and environmental impacts, and would be unlikely to get planning permission within an AONB.
Storage (SNZ): New reservoir at New Pond	Enlargement of an existing online reservoir at New Pond to a capacity of between 1000 and 3000Ml.	TBC	SNZ	Significant environmental impacts and water quality issues. The DO of the scheme does not justify the disproportionate financial cost and environmental impacts.

Option name	Option description	Maximum DO (Ml/d)	WRZ	Rejection comment
Storage (SNZ): New reservoir at Nyewood	Construction of new bankside storage reservoir at Nyewood with a capacity of between 1000 and 3000Ml.	TBC	SNZ	There would be high environmental impacts by either option. Also it is unlikely that development within an AONB/National Park will be given permission. Therefore there cannot be acceptable confidence in the implementation.
Storage (SNZ): New reservoir at Petersfield	Construction of new bankside storage reservoir at Petersfield with a capacity of between 1000 and 3000Ml.	TBC	SNZ	There would be high environmental impacts by either option. Also it is unlikely that development within an AONB/National Park will be given permission. Therefore there cannot be acceptable confidence in the implementation.
Storage (SNZ): New reservoir at Pulborough	Construction of new bankside storage reservoir at Pulborough with a capacity of 4000Ml.	TBC	SNZ	This option is not considered for further evaluation as it is not considered to be technically feasible with disproportionate costs and environmental impacts.
Storage (SNZ): New reservoir at Rotherbridge	Construction of new reservoir at Rotherbridge with a capacity of 1000Ml to 3000Ml.	TBC	SNZ	There are risks to the habitats within the AONB, including aquatic ones, as part of it will be permanently destroyed/submerged. It is unlikely that development within an AONB will be given permission except under exceptional circumstances. It is unlikely the Environment Agency would find it environmentally acceptable.
Storage (SNZ): New reservoir at Slinfold	Construction of new embankment dam reservoir at Slinfold with a capacity of 2500Ml.	TBC	SNZ	Significant environmental impacts and water quality issues. The DO of the scheme does not justify the disproportionate financial cost and environmental impacts, and would be unlikely to get planning permission within an AONB.
Storage (SNZ): New reservoir at Trotton,	Construction of new embankment dam reservoir at Trotton with a capacity of between 1000 and 3000Ml.	TBC	SNZ	The scheme has adverse environmental impacts including to a Trout Fishery, it is also unlikely to be given permission unless it can be proved to be an exceptional circumstance.
Storage (SNZ): New reservoir at Vachery Pond	Construction of new reservoir at Vachery Pond with a capacity of 2000Ml (enlargement of an existing structure).	TBC	SNZ	Significant environmental impacts. The DO of the scheme does not justify the disproportionate financial cost and environmental impacts.
Storage (SNZ): Reservoir at Pulborough (26Ml/d)	3,500Ml bankside surface storage reservoir at Pulborough WSW with Rother and Arun abstractions of 30Ml/d and 20Ml/d respectively to provide additional resources to Pulborough WSW when the flow in the Rother is low. The DO would be between 9Ml/d and 26Ml/d although confirmation is required through further DO modelling.	26.0	SNZ	Potential WFD risks and associated impacts of reservoir construction.
Storage (SNZ): Storrington Sand Pits	Develop storage in Storrington Sand Pits..		SNZ	The option is now being used as a construction waste landfill and so is not available for use as a reservoir.
Storage (SNZ): Weir Wood winter refill (Medway)	This option involves refill of Weir Wood Reservoir by abstraction downstream in the Medway during dry winters, significantly increasing the catchment size for the reservoir). This option does not involve extension of the capacity of Weir Wood Reservoir or the WSW. It increases the volume of water held at the start of a drought event based on past hydrological experience. The abstraction will need to be sufficiently far downstream of Weir Wood for the flows to be high enough for abstraction, without adversely impacting on the hydrology and ecology of the river.	TBC	SNZ	There are significant doubts over resource benefits under severe drought conditions.

Option name	Option description	Maximum DO (Ml/d)	WRZ	Rejection comment
Storage (SWS): Community scale small surface water reservoirs	Small scale reservoirs that take surplus run off and rainfall in small scale catchment - could be linked to rainwater harvesting	TBC	Multiple locations	Practicality, reliability and deliverability issues, but may form part of a catchment management approach.
Storage (SWS): Flood storage / wetland creation	Slow down run off into rivers and provide storage of water to be released later on	TBC	Multiple locations	No specific locations/DO benefit have been identified. The option definition including environmental impact, water resource benefit, regulatory requirements, consideration of deliverability/planning issues, and technical design are not sufficiently developed for inclusion in WRMP24. Option should be progressed and included in the WRMP29 assessment.
Storage (SWS): Mine working storage	This option represents the storage of raw water in disused mine workings. Involves abstracting the water from existing licences during winter periods and then storing it in the mines for re-abstraction during dry periods.	TBC	Multiple locations	Water quality issues requiring advanced water treatment. The DO of this type of scheme does not justify the disproportionate financial cost and environmental impacts.
Storage (SWZ): New reservoir at Woodgate (10Ml/d)	The option would involve the construction of an earth embankment reservoir and associated treatment works that would allow up to 10Ml/d of treated water to enter the distribution mains and supply the Sussex Coastal block. The reservoir would be filled with water pumped from the river Arun at Houghton, which could only realistically be pumped during low tides and may be constrained to periods of relatively low flow during the winter because of turbidity constraints during higher flows. Accordingly, the treatment works has been sized at a relatively low capacity (10Ml/d). Approximate reservoir storage would be around 3,500Ml.	10.0	SWZ	Significant local opposition expected from this scheme. The topography of the site does not allow for the reservoir to be partially cut into the slope. As a result all the bunds would have to be fully constructed from onsite material. New treatment works would be required to treat for turbidity, nitrates, pesticides and algae. There would be a risk that a reverse osmosis plant would be required.
Surface water (KTZ): New abstraction and WTW on the North and South streams, Hacklinge	The aim of this option is to develop the water resources in the North and South Streams area. The North and South Streams are two streams that run parallel to each other in the Hacklinge WRMU[28] of the Stour catchment.	TBC	KTZ	On the basis of the current environmentally poor condition, the limited resource availability and the environmental designations, it is unlikely that any increased abstraction from this area will be possible
Tidal River Itchen	This option proposes the construction a desalination plant at the River Itchen Industrial Estate north of the Itchen Bridge on the eastern side of the estuary. The industrial area consists of densely packed large warehouse buildings and there are small pockets of undeveloped land. Up to 200Ml/d could be achieved.	200.0	HSE	Unacceptable environmental impact of the hyper-saline dispersion plume due to poor mixing and environmental designations. Technical issues associated with distribution enhancements in an urban area. The desalination option selection has been superseded by the SRO process.

[28] WRMU = Water Resources Management Unit

Option name	Option description	Maximum DO (Ml/d)	WRZ	Rejection comment
Treatment capacity (SHZ): Upgrade Rye WSW	Treatment works can act as strategic constraints within the supply system. They do not provide additional water, but can make water available from options if they act as a constraint within the network. The current capacity of Rye WSW is 15Ml/d. Network constraints and their impact on any schemes to increase DO within SHZ will be looked at.		SHZ	Technically unfeasible as no capacity constraint has been identified.
Treatment capacity (SWZ): Increase turbidity capability at South Arundel	The South Arundel groundwater supplies regularly experience increased turbidity during spring tides. The introduction of a more sophisticated treatment works would enable the sources to pump through the peak turbidity periods, allowing the sources to produce and additional 5Ml/d.	5.0	SWZ	No water resource benefit as this option does not increase the DO above the daily abstraction licence limit.
Water from air	New technology which extracts water from the air using a wind turbine to drive a heat exchanger to cool and condense water	TBC	Multiple locations	Initial desktop studies revealed that this option would be prohibitively expensive to run on a large scale. Academic literature suggests that operating costs for this technology are much higher than for desalination which itself is already considered an energy intensive technology. Using wind powered turbines as the cooling mechanism would reduce the energy requirements considerably; however, the volume of water produced by this type of device is low, and it would be cost prohibitive to install enough devices, treat the water and distribute to customers. This type of approach is much more suited to small communities in extremely arid water scarce environments and is not suitable for the UK.

3.1.4 Reuse of water already abstracted

Option name	Option description	Maximum DO (Ml/d)	WRZ	Rejection comment
Interzonal transfer (HKZ): Andover Reservoir to Beacon Hill Reservoir (5Ml/d)	This scheme is dependent upon Winchester Reservoir to Andover Reservoir transfer. The transfer pipeline for this scheme branches off the Andover to Whitchurch pipeline. The scheme involves the construction of a pipeline to transfer from the Andover - Whitchurch pipeline (at Chapmansford Farm) to Beacon Hill WSR. In addition, it needs a further pipeline to Kingsclere WSW for distribution on to Cottington Hill, Kingsclere and Bishops Green WSRs.	5.0	HKZ	This option is now covered in the improvements to the Hampshire grid as part of WRMP19 delivery.
Recycling (HSE): Portsmouth Harbour WTW (85Ml/d)	There is significant wastewater resource at Portsmouth Harbour WTW that could be treated for reuse, up to 85Ml/d DWF. This option looks at tertiary treatment at Portsmouth Harbour WTW then pumping to Ambersham 30km away for downstream abstraction by Pulborough.	85.0	SNZ	This option has been superseded by the SRO process.

Option name	Option description	Maximum DO (Ml/d)	WRZ	Rejection comment
Recycling (HSE): Portsmouth Harbour direct recycling Farlington.(50Ml/d)	Effluent pipeline from Portsmouth Harbour WTW to Farlington WSW. Additional tertiary treatment will be required at Portsmouth Harbour WTW, which will require land purchase.	50.0	HSE	Public perception issues with direct reuse. Direct reuse currently not supported by the DWI[29]. Review option in as part of WRMP29 assessment.
Recycling (HSE): Portsmouth Harbour direct recycling Itchen surface water (76Ml/d)	Effluent pipeline from Portsmouth Harbour WTW to Itchen WSW. Additional tertiary treatment will be required at Portsmouth Harbour WTW, which will require land purchase.	76.0	HSE	Public perception issues with direct reuse. Direct reuse currently not supported by the DWI. Review option in as part of WRMP29 assessment.
Recycling (HSE): Portsmouth Harbour WTW to River Itchen (40Ml/d)	Recycled water from Portsmouth Harbour WTW that can be discharged into the River Itchen to support abstractions at Portsmouth Water's Source A for treatment at Itchen WSW. The proposed discharge on the River Itchen is upstream of the tidal limit at Woodmill. The discharge will augment flows on the River Itchen and allow for increased abstractions near Source A. A section of the proposed pipeline crosses the River Itchen SAC, SSSI.	40.0	HSE	Excluded as RAPID is not supportive of any discharges to the Itchen.
Recycling (HSE): Portsmouth Harbour WTW to River Itchen (60Ml/d)	Recycled water from Portsmouth Harbour WTW that can be discharged into the River Itchen to support abstractions at Portsmouth Water's Source A for treatment at Itchen WSW. The proposed discharge on the River Itchen is upstream of the tidal limit at Woodmill. The discharge will augment flows on the River Itchen and allow for increased abstractions near Source A. A section of the proposed pipeline crosses the River Itchen SAC and SSSI.	60.0	HSE	Excluded as RAPID is not supportive of any discharges to the Itchen.
Recycling (HSE): Chickenhall (30Ml/d)	This options transfers 30Ml/d of recycled water to immediately downstream of Itchen WSW abstraction. When sustainability reductions are imposed on Itchen WSW abstractions, the recycled water will be used offset the abstraction restrictions. No further treatment capacity at Itchen WSW is required to enable this scheme.	30.0	HSE	The Chickenhall WTW discharge supports the Portsmouth Water abstraction as part of the Source A abstraction licence, therefore the discharge cannot be reduced. This option could be revisited if some form of sharing agreement could be reached with Portsmouth Water.

[29] DWI = Drinking Water Inspectorate

Option name	Option description	Maximum DO (Ml/d)	WRZ	Rejection comment
Recycling (HSE): Combine Portsmouth Harbour WTW and Fareham to River Itchen (90Ml/d)	Recycled water from Portsmouth Harbour WTW and Fareham WTW can be discharged into the River Itchen to support abstractions at Portsmouth Water's Source A for treatment at Itchen WSW. The proposed discharge is upstream of the tidal limit at Woodmill. The discharge will augment flows on the River Itchen and allow for increased abstractions near Source A to supply Itchen WSW. A section of the proposed pipelines crosses River Itchen SAC and SSSI.	90.0	HSE	Exclude from options list as RAPID is not supportive of any discharges to the River Itchen.
Recycling (HSE): Medway (10Ml/d)	This option will supply up to 18Ml/d of highly recycled water for discharge to the River Medway. Two discharge locations are under consideration at East Barming (new discharge) and Wateringbury WTW (existing discharge but may require upgrading). The discharge locations on the River Medway, upstream of the Springfield abstraction supplying Near Rochester WSW, would be used to augment flows in the river during low flow periods. This would support abstraction at Springfield and reduce required releases from Bewl Water conserving storage and reducing refill pumping costs.	10.0	KMW	Excluded as 14Ml/d option is the one taken forward.
Recycling (HSE): Woolston industrial reuse -15Ml/d)	Woolston WTW is on the opposite side of Southampton Water to West Southampton Coast desalination but has the advantage that tertiary treatment in the form of MBR[30] is already being implemented. As such, this option does not include the cost of tertiary treatment installation and operation, but requires the construction of a pipeline beneath Southampton Water. The DWF of Woolston WTW is circa 15Ml/d and this flow could be used to either provide the back-up supply to a large industrial user in HSW or be substituted for some of the South West Water supply.	15.0	HSE	Unacceptable risks due to the technical issues associated with tunnelling and the disproportionate costs associated with tunnelling. Water recycling option selection has been superseded by the SRO process.
Recycling (HSW): Ashlett Creek industrial reuse (3Ml/d)	Recycled water from Ashlett Creek WTW could be used to reduce demand in a planned housing development or to supply a large industrial user in HSW.	3.0	HSW	The low output of this scheme would make it uneconomic to implement.

[30] MBR = Membrane Bio-Reactor

Option name	Option description	Maximum DO (Ml/d)	WRZ	Rejection comment
Recycling (HSW): Millbrook (40Ml/d)	This option involves the transfer of up to 40Ml/d of recycled water from Millbrook WTW to upstream of River Test WSW abstraction. This would be used to supplement flows within the Test during low flow periods, thus maintaining abstraction during periods of low flow.	40.0	HSW	Significant engineering/planning issues associated with constructing a transfer pipeline through/alongside a motorway and dual carriageway. Significant environmental issues associated with CSMG[31] requirements bring high level of uncertainty and risks to deliverability.
Recycling (IOW): Sandown (2.5Ml/d)	This option proposes the transfer of recycled water from Sandown WTW (currently discharged to sea) to support flows in the eastern River Yar upstream of the Sandown WSW abstraction at Alverstone. Treated water in excess of the local demand will be transferred through a new transfer pipeline to the Alvington High Level WSR, near Newport, for supply to much of the island.	2.5	IOW	A larger (8.5Ml/d) capacity variant of this option is being progressed for delivery. This option is therefore no longer relevant.
Recycling (IOW): Sandown (5.2Ml/d)	This option proposes the transfer of recycled water from Sandown WTW (currently discharged to sea) to support flows in the eastern River Yar upstream of the Sandown WSW abstraction at Alverstone. Treated water in excess of the local demand will be transferred through a new transfer pipeline to the Alvington High Level WSR, near Newport, for supply to much of the island.	5.2	IOW	A larger (8.5Ml/d) capacity variant of this option is being progressed for delivery. This option is therefore no longer relevant.
Recycling (KME): Canterbury direct recycling to Near Rochester (14Ml/d)	Effluent pipeline from Canterbury WTW to Near Rochester WSW. Additional tertiary treatment will be required at Canterbury, which will require land purchase.	14.0	KME	Public perception issues with direct reuse. Direct reuse currently not supported by the DWI. Review option in as part of WRMP29 assessment.
Recycling (KME): Medway Estuary conjunctive use with SEW Canterbury Reservoir (53Ml/d)	Effluent pipeline from Medway Estuary WTW to the new SEW Canterbury Reservoir. Additional tertiary treatment required at Medway Estuary WTW, with potential to extend the existing site to facilitate this.	53.0	KME	The option definition, environmental impact, water resource benefit, regulatory requirements, consideration of deliverability/planning issues, and technical design are not sufficiently developed for inclusion in WRMP24. Option should be progressed and included in the WRMP29 assessment.
Recycling (KME): Medway Estuary direct recycling to Near Rochester (31Ml/d)	Effluent pipeline from Medway Estuary WTW to Near Rochester WSW. Additional tertiary treatment will be required at Medway Estuary, which will require land purchase.	31.0	KME	Public perception issues with direct reuse. Direct reuse currently not supported by the DWI. Review option in as part of WRMP29 assessment.
Recycling (KMW): Effluent reuse and transfer from the Sevenoaks area	Sewage within the Sevenoaks area is collected by Thames Water and transported to their Crossness WTW. This represents water 'lost' from the Medway catchment. This option relates to the use of any increased discharge as a result of expansion in the Sevenoaks area, by a transfer to the headwaters of the River Medway.	TBC	KMW	Acceptability of this option is dependent on approval from the Environment Agency regarding the reduction in DWF from inland WTWs. There is insufficient time to further explore this option for WRMP24. It should be progressed and included in the WRMP29 assessment. Earlier work has suggested disproportionate costs for uncertain DO benefit.

[31] CSMG = Common Standards Monitoring Guideline

Option name	Option description	Maximum DO (Ml/d)	WRZ	Rejection comment
Recycling (KMW): Medway Estuary (37Ml/d)	Up to 37Ml/d wastewater from Medway Estuary WTW is currently discharged to the sea. It may be possible to discharge the water on tributaries on the River Len to discharge the recycled water. The preferred pipeline route travels approximately 1.5km through an urban area along a road adjacent to Vinters Valley Park Local Nature Reserve. The route also passes through a SSSI immediately after leaving the WTW. Appropriate construction methods would be used to limit the impact on the SSSI.	37.0	KMW	The receiving water courses and tributaries of the River Medway are considered too small for the 37Ml/d option resulting in unacceptable technical risks concerning hydraulic capacity and insufficient dilution.
Recycling (KMW): Medway to Maidstone and onwards to Bewl	This scheme involves tertiary treatment of wastewater effluent at Medway WTW, and pumping through a new discharge pipeline to the River Medway upstream of the Maidstone abstraction. The extra water would then be re-abstracted at Maidstone and pumped up to Bewl Reservoir for storage. A raw water supply pipe would be constructed directly from Bewl Reservoir to Near Rochester WSW to be used when there would be a risk of Metaldehyde contamination by releasing water to the River Medway.	18.0	KMW	This option is among a number that increase supply to Near Rochester WSW using treated wastewater from Medway WTW. This variation includes constructing at least three times as much pipeline as the other variations, resulting in disproportionate costs, with little or no gain in additional DO. It would enable the direct supply of metaldehyde-free water from Bewl to Near Rochester when metaldehyde would otherwise be a risk.
Recycling (KTZ): Canterbury recycling conjunctive use with SEW Canterbury Reservoir (36Ml/d)	Effluent pipeline from Canterbury WTW to the new SEW Canterbury Reservoir. Additional tertiary treatment processes will be required at Canterbury WTW and there is a possibility to extend the existing site. Could also be considered as a drought option.	36.0	KTZ	The option definition, environmental impact, water resource benefit, regulatory requirements, consideration of deliverability/planning issues, and technical design are not sufficiently developed for inclusion in WRMP24. Option should be progressed and included in the WRMP29 assessment.
Recycling (KTZ): Sandwich (10Ml/d)	The preferred location has been chosen based on the availability of wastewater for reuse at Sandwich WTW. The proposed discharge point on the River Stour is upstream of the existing Stourmouth WSW abstraction. The discharge will augment flows on the River Stour and allow for increase abstractions to supply a new Stourmouth WSW. The proposed pipeline connecting Sandwich WSW and the proposed discharge point has been chosen to minimize length and cost and avoid nearby environmentally designated areas. This option would require the construction of a new water supply works approximately 2km from the existing Stourmouth WSW. As part of the new WSW a raw water storage reservoir will be constructed. This needs to be covered to prevent birds nesting which could cause problems for the nearby airport i.e. bird strikes (while the airport has been closed it is understood that there are proposals to re-open it. Covered storage proposed as a precautionary measure).	10.0	KTZ	No longer an option as Sandwich WTW is to be decommissioned.

Option name	Option description	Maximum DO (Ml/d)	WRZ	Rejection comment
Recycling (KTZ): Sandwich (20Ml/d)	The preferred location has been chosen based on the availability of wastewater for reuse at Sandwich WSW. The proposed discharge point on the River Stour is upstream of the existing Stourmouth WSW abstraction. The discharge will augment flows on the River Stour and allow for increase abstractions to supply a new Stourmouth WSW. The proposed pipeline connecting Sandwich WSW and the proposed discharge point has been chosen to minimize length and cost and avoid nearby environmentally designated areas. This option would require the construction of a new water supply works approximately 2km from the existing Stourmouth WSW. As part of the new WSW a raw water storage reservoir will be constructed. This needs to be covered to prevent birds nesting which could cause problems for the nearby airport i.e. bird strikes (while the airport has been closed it is understood that there are proposals to re-open it. Covered storage proposed as a precautionary measure).	20.0	KTZ	No longer an option as Sandwich WTW is to be decommissioned.
Recycling (SBZ): Hastings direct recycling with Hazards Green (23Ml/d)	Effluent pipeline from Hastings WTW to Hazards Green WSW. Additional tertiary treatment will be required at Hastings WTW, which will require land purchase.	23.0	SBZ	Public perception issues with direct reuse. Direct reuse currently not supported by the DWI. Review option in as part of WRMP29 assessment.
Recycling (SBZ): Eastbourne conjunctive use with New Arlington Reservoir (38Ml/d)	Effluent pipeline from Eastbourne WTW to Arlington Reservoir, feeding into Arlington WSW. Additional tertiary treatment processes required at Eastbourne WTW - land purchase likely required.	38.0	SBZ	The option definition, environmental impact, water resource benefit, regulatory requirements, consideration of deliverability/planning issues, and technical design are not sufficiently developed for inclusion in WRMP24. Option should be progressed and included in the WRMP29 assessment.
Recycling (SBZ): Eastbourne direct recycling to Barcombe (24Ml/d)	Effluent pipeline from Eastbourne WTW to Barcombe WSW. Additional tertiary treatment will be required at Eastbourne, which will require land purchase.	24.0	SBZ	Public perception issues with direct reuse. Direct reuse currently not supported by the DWI. Review option in as part of WRMP29 assessment.
Recycling (SBZ): Eastbourne direct recycling to Beauport (24Ml/d)	Effluent pipeline from Eastbourne WTW to Beauport WSW. Additional tertiary treatment will be required at Eastbourne, which will require land purchase.	24.0	SBZ	Public perception issues with direct reuse. Direct reuse currently not supported by the DWI. Review option in as part of WRMP29 assessment.
Recycling (SBZ): Eastbourne direct recycling to Hazards Green (24Ml/d)	Effluent pipeline from Eastbourne WTW to Hazards Green WSW. Additional tertiary treatment will be required at Eastbourne, which will require land purchase.	24.0	SBZ	Public perception issues with direct reuse. Direct reuse currently not supported by the DWI. Review option in as part of WRMP29 assessment.
Recycling (SBZ): Littlehampton Direct Recyling to South Arundel (13Ml/d)	Effluent pipeline from Littlehampton WTW to South Arundel WSW. Additional tertiary treatment will be required at Littlehampton WTW, which will require land purchase.	13.0	SBZ	Public perception issues with direct reuse. Direct reuse currently not supported by the DWI. Review option in as part of WRMP29 assessment.
Recycling (SBZ): Goddards Green direct recycling to Barcombe (7Ml/d)	Effluent pipeline from Goddards Green WTW to Barcombe WSW. Additional tertiary treatment will be required at Goddards Green, which will require land purchase.	7.0	SBZ	Public perception issues with direct reuse. Direct reuse currently not supported by the DWI. Review option in as part of WRMP29 assessment.
Recycling (SBZ): Hailsham direct water recycling to Beauport (5Ml/d)	Effluent pipeline from Hailsham WTW to Beauport WSW. Additional tertiary treatment will be required at Hailsham WTW, which will require land purchase.	5.0	SBZ	Public perception issues with direct reuse. Direct reuse currently not supported by the DWI. Review option in as part of WRMP29 assessment.

Option name	Option description	Maximum DO (Ml/d)	WRZ	Rejection comment
Recycling (SBZ): Hailsham direct water recycling to Hazards Green (5Ml/d)	Effluent pipeline from Hailsham WTW to Hazards Green WSW. Additional tertiary treatment will be required at Hailsham WTW, which will require land purchase.	5.0	SBZ	Public perception issues with direct reuse. Direct reuse currently not supported by the DWI. Review option in as part of WRMP29 assessment.
Recycling (SBZ): Brighton WTW (25Ml/d)	Recycle effluent from Brighton WTW. The most appropriate reuse scheme would be to the non-tidal River Ouse (ca. 16km inland). This could be used to is to support South East Water's Barcombe WSW abstraction with recycled wastewater from Brighton WTW. This would essentially be a transfer of raw water to South East Water. The new tertiary treatment plant could be constructed at either Peacehaven or Barcombe. If the discharge is upstream of the Barcombe abstraction then upgrades may be required to the Barcombe WSW treatment process.	25.0	SBZ	This option is replaced by 2 options. 1. A water recycling plant at Brighton WTW and a pipeline to Barcombe Lake, supplying Barcombe WSW. This option is being developed by South East Water. 2. A bulk supply from Barcombe WSW bulk supply to Southern Water Rottingdean WSR in SBZ. Recycling and desalination options are generally not considered to be suitable for intermittent use only i.e. during periods of peak demand or droughts only.
Recycling (SBZ): Brighton WTW (50Ml/d)	Recycle effluent from Brighton WTW. The most appropriate reuse scheme would be to the non-tidal River Ouse (ca. 16km inland). This could be used to is to support South East Water's Barcombe WSW abstraction with recycled wastewater from Brighton WTW. This would essentially be a transfer of raw water to South East Water. The new tertiary treatment plant could be constructed at either Brighton WTW or Barcombe. If the discharge is upstream of the Barcombe abstraction then upgrades may be required to the Barcombe WSW treatment process.	50.0	SBZ	This option is replaced by 2 options. 1. A water recycling plant at Brighton WTW and a pipeline to Barcombe Lake, supplying Barcombe WSW. This option is being developed by South East Waters. 2. A bulk supply from Barcombe WSW bulk supply to Southern Water Rottingdean WSR in SBZ. Recycling and desalination options are generally not considered to be suitable for intermittent use only i.e. during periods of peak demand or droughts only.
Recycling (SBZ): Brighton WTW conjunctive use with Arlington reservoirs (38Ml/d)	Effluent pipeline from Brighton WTW to Arlington Reservoir, feeding into Arlington WSW. Additional tertiary treatment works required for Brighton WTW - land purchase required.	38.0	SBZ	A water recycling plant at Brighton WTW and a pipeline to Barcombe Lake, supplying Barcombe WSW. This option is being developed by South East Water with discussion initiated with Lewes District Council and Southern Water.
Recycling (SBZ): Brighton WTW conjunctive use with Barcombe Lake (20Ml/d)	Effluent pipeline (19,527m of pipeline with a 500mm diameter) from Brighton WTW to Barcombe Lake, feeding into Barcombe WSW. Brighton WTW would require additional tertiary treatment - land puchase required. 210kW pump required. Pipe could benefit from throttling towards the latter lengths of the pipe to reduce the discharge head.	20.0	SBZ	This option is replaced by 2 options. 1. A water recycling plant at Brighton WTW and a pipeline to Barcombe Lake, supplying Barcombe WSW. This option is being developed by South East Water. 2. A bulk supply from Barcombe WSW bulk supply to Southern Water Rottingdean WSR in SBZ. Recycling and desalination options are generally not considered to be suitable for intermittent use only i.e. during periods of peak demand or droughts only.
Recycling (SBZ): Brighton WTW conjunctive use with Bevern Stream Reservoir (71Ml/d)	Effluent pipeline from Brighton WTW to Bevern Stream Reservoir. Additional tertiary treatment at Brighton WTW - land purchase required. This could also be considered as a drought option.	71.0	SBZ	This option is replaced by 2 options. 1. A water recycling plant at Brighton WTW and a pipeline to Barcombe Lake, supplying Barcombe WSW. This option is being developed by South East Water. 2. A bulk supply from Barcombe WSW bulk supply to Southern Water Rottingdean WSR in SBZ. Recycling and desalination options are generally not considered to be suitable for intermittent use only i.e. during periods of peak demand or droughts only.

Option name	Option description	Maximum DO (Ml/d)	WRZ	Rejection comment
Recycling (SBZ): Brighton WTW conjunctive use with Clayhill Reservoir (72Ml/d)	Effluent pipeline from Brighton WTW to new Clay Hill Reservoir. Additional tertiary treatment at Brighton WTW - land purchase required. This could also be considered as a drought option.	72.0	SBZ	Clay Hill Reservoir has not been included in South East Water's WRMP19 and has been shown to damage historic landscapes and diverse wildlife habitats. It is therefore not considered to be a feasible option.
Recycling (SBZ): Brighton WTW conjunctive use with New Arlington Reservoirs (38Ml/d)	Effluent pipeline from Brighton WTW to Arlington Reservoir, feeding into Arlington WSW. Additional tertiary treatment works required for Brighton WTW - land purchase required.	38.0	SBZ	This option is replaced by 2 options. 1. A water recycling plant at Brighton WTW and a pipeline to Barcombe Lake, supplying Barcombe WSW. This option is being developed by South East Water. 2. A bulk supply from Barcombe WSW bulk supply to Southern Water Rottingdean WSR in SBZ. Recycling and desalination options are generally not considered to be suitable for intermittent use only i.e. during periods of peak demand or droughts only.
Recycling (SBZ): Brighton WTW direct recycling to Barcombe (54Ml/d)	Effluent pipeline from Brighton WTW to Barcombe WSW. Additional tertiary treatment will be required at Brighton WTW, which will require land purchase.	54.0	SBZ	Public perception issues with direct reuse. Direct reuse currently not supported by the DWI. Review option in as part of WRMP29 assessment.
Recycling (SBZ): Brighton WTW direct recycling to Hazards Green (54Ml/d)	Effluent pipeline from Brighton WTW to Hazards Green WSW. Additional tertiary treatment will be required at Brighton WTW, which will require land purchase.	54.0	SBZ	Public perception issues with direct reuse. Direct reuse currently not supported by the DWI. Review option in as part of WRMP29 assessment.
Recycling (SBZ): Tonbridge direct recycling to Weir Wood (8Ml/d)	Effluent pipeline from Tonbridge WTW to Weir Wood WSW. Additional tertiary treatment will be required at Tonbridge WTW, which will require land purchase.	8.0	SNZ	Public perception issues with direct reuse. Direct reuse currently not supported by the DWI. Review option in as part of WRMP29 assessment.
Recycling (SHZ): Ashford conjunctive use with Bewl (16.8Ml/d)	Effluent pipeline (40,884m of pipeline a with 500mm diameter) from Ashford WTW to Bewl Reservoir, which feeds Darwell Reservoir, Bewl WSW and Near Rochester WSW. Additional tertiary treatment required at Ashford WTW, with surrounding land potentially available for expansion of the existing site. 450kW pump required. Pipe could benefit from throttling towards the latter lengths of the pipe to reduce discharge head.	16.8	SHZ	Acceptability of this option is dependent on approval from the Environment Agency regarding the reduction in DWF from Ashford WTW and public perception associated with indirect effluent reuse via Bewl Reservoir. There is insufficient time to further explore this option. Option should be progressed and included in the WRMP29 assessment.
Recycling (SHZ): Hastings direct recycling with Beauport (23Ml/d)t	Effluent pipeline from Hastings WTW to Beauport WSW. Additional tertiary treatment will be required at Hastings WTW, which will require land purchase.	23.0	SHZ	Public perception issues with direct reuse. Direct reuse currently not supported by the DWI. Review option in as part of WRMP29 assessment.
Recycling (SHZ): Brighton WTW direct recycling to Beauport (30Ml/d)	Effluent pipeline from Brighton WTW to Beauport WSW. Additional tertiary treatment will be required at Brighton WTW, which will require land purchase.	30.0	SHZ	Public perception issues with direct reuse. Direct reuse currently not supported by the DWI. Review option in as part of WRMP29 assessment.
Recycling (SNZ): Crawley conjunctive use with Weir Wood (25Ml/d)	Effluent pipeline (14,560m of pipeline with 7000m of 600mm diameter and 7560m of 500mm diameter pipeline) from Crawley WTW to Weir Wood Reservoir, which feeds Weir Wood WSW. Additional tertiary treatment will be required at Crawley WTW and may require land purchase. 515kW pump required. Pipe could benefit from throttling towards the latter lengths of the pipe to reduce the discharge head.	25.0	SNZ	Acceptability of this option is dependent on approval from the Environment Agency regarding the reduction in DWF from Crawley WTW. There is insufficient time to further explore this option. Option should be progressed and included in the WRMP29 assessment.
Recycling (SNZ): Crawley direct recycling to Weir Wood (20Ml/d)	Effluent pipeline from Crawley WTW to Weir Wood WSW. Additional tertiary treatment will be required at Crawley WTW, which will require land purchase.	20.0	SNZ	Public perception issues with direct reuse. Direct reuse currently not supported by the DWI. Review option in as part of WRMP29 assessment.

Option name	Option description	Maximum DO (Ml/d)	WRZ	Rejection comment
Recycling (SNZ): Littlehampton to Pulborough (5Ml/d)	This scheme proposes the transfer of recycled water from Littlehampton WTW to a new discharge point to the western River Rother upstream of the Pulborough WSW. This would support flows over the Pulborough WSW weir as the MRF is approached and prolong production at Pulborough WSW during a drought. Once abstracted at Pulborough WSW this water would be used to meet demand in SNZ.	5.0	SNZ	A 15Ml/d variant is being progressed for delivery. This option is therefore no longer relevant.
Recycling (SNZ): Littlehampton to Pulborough (26Ml/d)	This scheme proposes the transfer of recycled water from Littlehampton WTW to a new discharge point to the western River Rother upstream of the Pulborough WSW. This would support flows over the Pulborough WSW weir as the MRF is approached and prolong production at Pulborough WSW during a drought. Once abstracted at Pulborough WSW this water would be used to meet demand in SNZ.	26.0	SNZ	A 15Ml/d variant is being progressed for delivery. This option is therefore no longer relevant.
Recycling (SNZ): Horsham direct recycling to Pulborough (11Ml/d)	Effluent pipeline from Horsham WTW to Pulborough WSW. Additional tertiary treatment will be required at Horsham WTW, which will require land purchase.	11.0	SNZ	Public perception issues with direct reuse. Direct reuse currently not supported by the DWI. Review option in as part of WRMP29 assessment.
Recycling (SNZ): Littlehampton with direct river discharge (9.5Ml/d)	This scheme proposes the transfer of recycled water from Littlehampton WTW to a new discharge point to the western River Rother upstream of the Pulborough WSW. This would support flows over the Pulborough WSW weir as the MRF is approached and prolong production at Pulborough WSW during a drought. Once abstracted at Pulborough WSW this water would be used to meet demand in SNZ.	9.5	SNZ	A larger (15Ml/d) capacity variant of this option is being progressed for delivery. This option is therefore no longer relevant.
Recycling (SNZ): New reservoir at Horsfold	Construction of new reservoir at Horsfold with a capacity of 2000Ml.	TBC	SNZ	As the river is a trout fishery and SSSI the impoundment of the Arun would not be acceptable to the Environment Agency or Natural England, even with suitable fish passes. Therefore it is very unlikely that permission would be given. There are also issues with water quality due to the shallow depth and low refill potential from the local sources that can constrain the output/effectiveness of the scheme.
Recycling (SNZ): Tunbridge Wells direct recycling to Weir Wood (8Ml/d)	Effluent pipeline from Tunbridge Wells WTW to Weir Wood WSW. Additional tertiary treatment will be required at Tunbridge Wells, which will require land purchase.	8.0	SNZ	Public perception issues with direct reuse. Direct reuse currently not supported by the DWI. Review option in as part of WRMP29 assessment.
Recycling (SNZ): Weir Wood Reservoir augmentation with recycled water (20Ml/d)	20Ml/d benefit dependent on metaldehyde option being selected).	20.0	SNZ	Acceptability of this option is dependent on approval from the Environment Agency regarding the reduction in DWF from inland WTWs and public perception associated with indirect effluent reuse via Weir Wood Reservoir. There is insufficient time to further explore this option. Option should be progressed and included in the WRMP29 assessment.
Recycling (SWS): Agricultural water recycling	To reuse effluent from WTW by farmers and agriculture uses	TBC	Multiple locations	No specific locations identified. The option definition, environmental impact, water resource benefit, regulatory requirements, consideration of deliverability/planning issues, and technical design are not sufficiently developed for inclusion in WRMP24. Option should be progressed and included in the WRMP29 assessment.

Option name	Option description	Maximum DO (Ml/d)	WRZ	Rejection comment
Recycling (SWS): Micro water recycling scheme/s for smaller treatment works in vicinity of Bewl, Darwell, Powdermill, Weir Wood, Arlington, Ardingly, Bough Beech, Barcombe reservoirs (East Grinstead, Uckfield, Maresfield, Wadhurst, Lamberhurst, Hastings, Ardingly)	Identification of smaller WTW in close proximity to reservoirs. Effluent pipelines from WTW to reservoirs to allow water to be fed into the reservoirs. Additional tertiary treatment required at WTWs.	TBC	Multiple locations	The option definition, environmental impact, water resource benefit, regulatory requirements, consideration of deliverability/planning issues, and technical design are not sufficiently developed for inclusion in WRMP24. Option should be progressed and included in the WRMP29 assessment.
Recycling (SWS): Small scale catchment natural wastewater recycling	Use of reed beds and other biological methods to provide community based wastewater recycling with lower costs. This would be applicable in rural settings where there is expected to be land available for reed beds. This option has an undefined benefit. It is expected that any scheme of these type will have an output of less than 0.5Ml/d.	<0.5	Multiple locations	Potential sites need to be identified for this option to progress.
Storage (SNZ): Arun Valley SPA flow augmentation	Use of treated water or effluent to augment flows in Arun Valley SPA ditches and allow further groundwater abstraction in the Pulborough WSW Basin	TBC	SNZ	The environmental sensitivity of the receiving water courses would require very high water quality standards, similar to indirect reuse options. Indirect reuse schemes are preferred as they would provide a direct DO benefit and would not require the extensive pipework network required for an irrigation scheme.

3.2 Efficient use and management of water

3.2.1 Reducing leakage

Option name	Option description	Maximum DO (Ml/d)	WRZ	Rejection comment
Acoustic loggers	This option involves installing acoustic loggers in DMAs to assist with identification of leaks, resulting in reduced leak run time.	4.5	Multiple locations	Superseded by leakage strategy reflected in demand management elements of WRMP24.
Enhanced AMR strategy for existing metered households: monthly meter readings	Enhanced AMR strategy for existing metered households: monthly meter readings		Multiple locations	Excluded as all AMR meters are to be replaced by AMI meters by the end of AMP8.
Fixed link pressure reduction valves	Installation of fixed link pressure reducing vales in DMAs. 0.5Ml/d saving split across all WRZs.	0.5	Multiple locations	Superseded by leakage strategy reflected in demand management elements of WRMP24.
Increase household meter penetration to 100%	Circa 88% of our household customer base is currently metered. The remaining 12% of households have been identified as uneconomic or impractical to meter. This option explores the costs and benefits associated with installing meters to achieve 100% meter penetration by the end		Multiple locations	Excluded as 100% meter penetration is not considered to be feasible.

Option name	Option description	Maximum DO (Ml/d)	WRZ	Rejection comment
	of AMP7 over and above the 92% penetration achieved under a separate option.			
Increased household meter penetration to 92%	Circa 88% of our household customer base is currently metered. The remaining 12% of households have been identified as uneconomic or impractical to meter. This option re-explores the costs and benefits associated with installing meters to achieve a minimum of 92% household meter penetration in all WRZs by the end of AMP7.		Multiple locations	Superseded by smart meter strategy reflected in demand management elements of WRMP24.
Supply pipe leakage reduction associated with monthly meter reads	This option accounts for the supply pipe leakage reductions that are assumed to result from the enhanced AMR meter reading strategy for existing metered households, moving to monthly meter readings.		Multiple locations	Superseded as all AMR meters are to be replaced by AMI meters by the end of AMP8.
Supply pipe leakage reduction associated with option to increase meter penetration to 92%	This option accounts for the supply pipe leakage reductions that are assumed to result from the installation of AMR metering equipment for domestic customers to take meter penetration from estimated current 88% up to a minimum of 92% in each WRZ.	Variable	Multiple locations	Superseded by smart meter strategy reflected in demand management elements of WRMP24.
Supply pipe leakage reduction associated with option to increase meter penetration to 100%	This option accounts for the supply pipe leakage reductions that are assumed to result from the extension of the UMP[32] to cover installation of AMR metering equipment for the remaining approximately 8% of households that could not be economically metered during the UMP and that are not covered by option to achieve 92%, to achieve 100% metering by the end of AMP7 in all supply areas.		Multiple locations	Excluded as 100% meter penetration is not considered feasible.
Supply pipe leakage reduction associated with smart metering roll out	This option accounts for the supply pipe leakage reductions that are assumed to result from the installation of a smarter metering network to allow daily meter readings of existing metered households. This option starts in AMP7.		Multiple locations	Superseded by leakage strategy reflected in demand management elements of WRMP24.
Supply pipe leakage reduction associated with Target 100	This option accounts for the supply pipe leakage reductions that are assumed to result from the activities expected to form part of the Target 100 option, including: - Increasing meter reading frequency to monthly (which is estimated to save 4.02l/hh/d at all relevant properties); and - Installation of smart meters across all properties (which is estimated to save 4.79l/hh/d at all relevant properties).		Multiple locations	Superseded by leakage strategy reflected in demand management elements of WRMP24.

[32] UMP = Universal Metering Programme

3.2.2 Reducing household consumption

Option name	Option description	Maximum DO (Ml/d)	Beneficiary WRZ	Rejection comment
Compulsory rainwater capture	Make rainwater capture part of planning/building regime for extensions/refurbishments as well as new build to provide grey water for domestic use	0.0	Multiple locations	Southern Water can support any changes to planning legislation but are not responsible.
Drought awareness reward tariff	This reward-based tariff would be designed to encourage customers to use less water during times of drought. The level of the benchmark below which customers would need to reduce their consumption, as well as the level of the reward would require development and a high level of analysis by Southern Water. Communications relating to this tariff could be aligned with Drought Plan communications that Southern Water would already be undertaking. In this way, the tariff could form one of Southern Water's drought management actions. Issues around assessing the potential demand saving associated with the tariff from a WRMP perspective.		Multiple locations	Superseded by smart meter strategy reflected in demand management elements of WRMP24.
Drought levy	Additional tariff applied during droughts to discourage water use. based on the principle of the rising block tariff but only applied when the resource state falls below Southern Water's impending drought trigger levels. As with the seasonal tariff, customers may not support this tariff; issues around affordability and protecting vulnerable customers would need to be considered. This option could be best linked to the rising block tariff option so customers are already used to the concept of volumetric 'block' charging, but to draw attention to the specific need to reduce consumption during a drought event, customers could see an additional charge for the 'discretionary' block of water to discourage use of water during a drought.		Multiple locations	Superseded by WRMP24 demand management strategy.
Dual supply system for households	Different charges for different quality of water. New housing to include soakaway (where applicable) and grey water storage. Individuals can sell stored water like solar energy. Existing housing to soakaway/grey water storage and then reclaim costs. Incentives to householders to stop putting water down drains	0.0	Multiple locations	Southern Water can support any changes to planning legislation but cannot implement it independently.
Enhanced AMR strategy for existing metered households: monthly meter readings	Enhanced AMR strategy for existing metered households: monthly meter readings		Multiple locations	Excluded as all AMR meters are to be replaced by AMI meters by the end of AMP8.
Enhanced grey water usage - residential or industrial	Promotion of grey water usage to reduce clean water used in homes for non-consumption uses - e.g. gardens, toilet flushing etc. Support inclusion of facilities in 'new builds'-storage tanks, solar pumps. Reed beds for treatment of water-reduce water sent away for waste	0.0	Multiple locations	Not a WRMP option. Southern Water could support any changes to planning legislation but are not responsible.
Household reward scheme	Customers are offered a reward/incentive to be spent on items that could help them reduce their water consumption.		Multiple locations	Superseded by demand management strategy within T100 programme.

Option name	Option description	Maximum DO (Ml/d)	Beneficiary WRZ	Rejection comment
Household water efficiency kit	Customers are offered a household water efficiency kit containing e.g. cistern displacement devices, tap inserts, shower timers, tea towel, trigger/twist hosepipe devices and booklet containing advice on water efficiency.	Variable	Multiple locations	Superseded by demand management strategy within T100 programme.
Increase household meter penetration to 100%	Circa 88% of our household customer base is currently metered. The remaining 12% of households have been identified as uneconomic or impractical to meter. This option explores the costs and benefits associated with installing meters to achieve 100% meter penetration by the end of AMP7 over and above the 92% penetration achieved under a separate option.		Multiple locations	Excluded as 100% meter penetration is not considered to be feasible.
Increased household meter penetration to 92%	Circa 88% of our household customer base is currently metered. The remaining 12% of households have been identified as uneconomic or impractical to meter. This option re-explores the costs and benefits associated with installing meters to achieve a minimum of 92% household meter penetration in all WRZs by the end of AMP7.		Multiple locations	Superseded by WRMP24 demand management strategy.
Media campaigns to influence water use	Campaigns to raise public awareness can be carried out in a number of ways using a variety of different types of media. The central message is to urge all customers to conserve water, especially during periods of drought. This message must be underpinned by explanations of the background to the prevailing conditions and how the drought might continue to intensify. In addition, Southern Water may promote enhanced uptake of its water efficiency programmes. The option could be a drought option.	Variable	Multiple locations	Superseded by WRMP24 demand management strategy.
Meter remaining non-household customers	Meter remaining unmetered non-household customers (ca. 5,000) where feasible to do so.	Variable	Multiple locations	Superseded by WRMP24 demand management strategy.
Non-household and commercial water efficiency	Non-household and commercial water efficiency audits at e.g. public buildings and council-owned leisure centres, hospitals, water efficiency offset scheme for businesses/organisations.	Variable	Multiple locations	Superseded by WRMP24 demand management strategy.
Reducing per capita consumption to 100l/h/d by 2040	Southern Water launched 'Target 100' to acknowledge the synergies across the different areas of demand management which collectively contribute to customer-side reductions in consumption. 'Target 100' initiative, which aims to achieve a PCC of 100l/h/d by 2040 at the company level under average weather conditions.		Multiple locations	Superseded by WRMP24 demand management strategy.
Reducing per capita consumption to 120l/h/d during AMP7	Southern Water would undertake extensive education and media campaigns as well as water efficiency audits where possible during AMP7 with the aim of driving down per capita consumption to 120l/h/d from baseline levels.		Multiple locations	Impractical due to COVID-19 impact on household demand.
Rising block tariff	Tariff that increases as customers use additional water. Does not require smart meter technology although may be more effective if it was in place. Issue around benchmarking and occupancy to avoid social implications of tariff.		Multiple locations	Superseded by WRMP24 demand management strategy.
Seasonal tariff	Seasonal tariffs provide incentives to reduce discretionary water use at peak times. This tariff option would see customers being		Multiple locations	Superseded by WRMP24 demand management strategy.

Option name	Option description	Maximum DO (Ml/d)	Beneficiary WRZ	Rejection comment
	charged more in summer months (June to September inclusive) and less during the rest of the year (October to May inclusive). Relies upon smarter metering being in place.			
Smarter metering - longer term programme	Introduction of smarter meter technology which can provide daily meter reading data to customers and Southern Water. Implementation over a longer period of time: during AMP7 and AMP8.		Multiple locations	Excluded as all AMR meters are to be replaced by AMI meters by the end of AMP8.
Smarter metering of all household metered customers	Introduce smarter meter technology which can provide continuous meter reading data to the customer and Southern Water		Multiple locations	Excluded as all AMR meters are to be replaced by AMI meters by the end of AMP8.
Smarter metering of all household metered customers AMP8 start	Introduction of smarter meter technology which can provide daily meter reading data to customers and Southern Water. Implementation during AMP8.		Multiple locations	Excluded as all AMR meters are to be replaced by AMI meters by the end of AMP8.
Subsidised water efficient products	Options could include: • A flat rate subsidy offered to customers who purchase a new water efficient washing machine on replacement of their old one. The subsidy would cover the expected additional cost of purchasing an efficient machine over a less efficient machine. • Replacement of existing WCs in girls' facilities, with low dual flush WCs (4/2 litre). For schools to adopt this strategy, it is likely that SW would have to pay for the whole cost of the replacement WC, rather than offering a subsidy. • Southern Water would offer a flat rate subsidy towards the replacement of customers' single flush WCs with a 4 1/2 litre dual flush WC. Installation would not be funded by the company, the cost of which is expected to be met by customers when replacing their bathrooms. • Scheme would offer a flat rate subsidy to customers who purchase a new water efficient dishwasher based on replacement of their old one. The subsidy would cover the expected additional cost of purchasing an efficient appliance over a less efficient machine.	Variable	Multiple locations	Baseline demand forecast based on micro-components approach and implicitly assumes that water using devices are replaced periodically in line with their expected life. Therefore, inclusion of these options would lead to double counting.
Water butts	Free or subsidised provision of water butts to customers who apply for one on Southern Water's website.	TBC	Multiple locations	Limited water resource benefit as Southern Water has undertaken initiatives to provide a discount on water butts, so may be limited uptake. Significant resource uncertainty due to the risks of storage not being available during dry summers.
Water efficient appliance tariff			Multiple locations	Superseded by WRMP24 demand management strategy.

3.3 Green infrastructure

3.3.1 Catchment solutions

Option name	Option description	Maximum DO (Ml/d)	WRZ	Rejection comment
Arun and Western Stream in-channel catchment management	The Arun and Western Stream in-channel catchment management options will provide ecosystem resilience. There are currently limitations on the biological functioning of waterbodies within the Arun catchment with known pressures from surface water run-off, urbanisation, barriers and morphology. In-channel catchment measures will provide solutions to enable future resilience targeting achieving or maintaining good ecological status/potential, providing sustainable water and seeking naturalised river form and function, in line with other wider catchment management initiatives	TBC	SWZ	Catchment management options have been developed separately by WRSE. Excluded to avoid duplication.
Arun and Western Stream in-channel catchment management	The Arun and Western Stream in-channel catchment management options will provide ecosystem resilience. There are currently limitations on the biological functioning of waterbodies within the Arun catchment with known pressures from surface water run-off, urbanisation, barriers and morphology. In-channel catchment measures will provide solutions to enable future resilience targeting achieving or maintaining good ecological status/potential, providing sustainable water and seeking naturalised river form and function, in line with other wider catchment management initiatives		SNZ	Catchment Management options are being developed as part of the Sustainability Investigation (due to complete 2025) which will inform the AMP8 programme of delivery.
Brighton Block Pilot scheme - Further implementation of CHAMP[33] actions	Brighton Block pilot scheme - Further implementation of CHAMP actions.	TBC	SBZ	Catchment management options have been developed separately by WRSE. Excluded to avoid duplication.
Broadlands Fish Farm carrier	Divert or revise operation of the Broadlands Fish Farm Carrier to provide more water at River Test WSW.	TBC	HSW	Catchment management options are being developed separately by WRSE. Excluded to avoid duplication.

[33] CHAMP = Coastal Habitats Management Plan

Option name	Option description	Maximum DO (Ml/d)	WRZ	Rejection comment
Chilbolton nitrate scheme	Chilbolton Upper Greensand borehole is currently disused due to high nitrates (concentrations in breach of the DWSP[34]). This option comprises implementing a nitrate scheme so that the source can be reconnected to network and brought back into supply at licensed rate of 0.5Ml/d.	0.5	HAZ	Catchment management options are being developed separately by WRSE. Excluded to avoid duplication.
Generic scheme - Cryptosporidum risk reduction at surface or groundwater water source.	Use of triggers to pause abstraction at times of high pesticide risk	TBC	Multiple locations	Catchment management options are being developed separately by WRSE. Option removed to avoid duplication.
Generic scheme - pesticide reduction at surface water source via smart abstraction	Use of triggers to pause abstraction at times of high pesticide risk	TBC	Multiple locations	Catchment management options are being developed separately by WRSE. Option removed to avoid duplication.
Generic scheme - pesticide risk reduction at groundwater sources	Use of triggers to pause abstraction at times of high pesticide risk	TBC	Multiple locations	Catchment management options are being developed separately by WRSE. Option removed to avoid duplication.
Generic scheme: Nitrate reduction at groundwater source via advice and training.	Advice and training: Farmer visits to advise on management. Southern Water paid training for nutrient management and nutrient management planning.	TBC	Multiple locations	Catchment management options are being developed separately by WRSE. Option removed to avoid duplication.
Generic scheme: Nitrate reduction at groundwater source via capital funding for precision farming.	Capital funding to improve precision farming: Southern Water funding for precision farming technologies	TBC	Multiple locations	Catchment management options are being developed separately by WRSE. Option removed to avoid duplication.
Generic scheme: Nitrate reduction at groundwater source via incentives for land management.	Incentives for better land management: incentive payments for different crop rotations, cover crops, under sowing, overwintering stubbles, lower nitrogen applications	TBC	Multiple locations	Catchment management options are being developed separately by WRSE. Option removed to avoid duplication.
Generic scheme: Pesticide reduction at surface water source via advice and training.	Advice and training: advice on pesticide risks and management and generic pesticide management farmer visits. Southern Water paid training for pesticide handling, application and pelleter calibrations	TBC	Multiple locations	Catchment management options are being developed separately by WRSE. Option removed to avoid duplication.
Generic scheme: Pesticide reduction at surface water source via capital funding for precision farming.	Capital funding to improve precision farming:50:50 funding for farm-yard drainage, biobeds, biofilters etc	TBC	Multiple locations	Catchment management options are being developed separately by WRSE. Option removed to avoid duplication.

[34] DWSP = Drinking Water Safety Plan

Option name	Option description	Maximum DO (Ml/d)	WRZ	Rejection comment
Generic scheme: Pesticide reduction at surface water source via incentives for land management.	Incentives for better land management: Product substitution incentives, reduced dose, payment for ecosystem services at a catchment scale.	TBC	Multiple locations	Catchment management options are being developed separately by WRSE. Option removed to avoid duplication.
Generic scheme: Water quality risk reduction at surface or groundwater water source for at risk or emerging substances.	Pending outcome of At Risk investigations in Feb	TBC	Multiple locations	Catchment management options are being developed separately by WRSE. Option removed to avoid duplication.
Intelligent irrigation	Work with agriculture sector to improve water use efficiency and so reduce private abstraction, allowing potential diversion of aquifer supplies for public use	TBC	Multiple locations	Linked to catchment management options which are being developed separately by WRSE.
Medway - instream catchment management options	Southern Water is committed to exploring with other stakeholders the potential for catchment management as an integral part of more integrated management of the water environment. Such solutions may well provide the best outcomes for both customers and the environment. Catchment management solutions can contribute to making our water environment more resilient to changing climatic conditions, and in delivering permanent environmental improvements in our rivers. Catchment management solutions have, to date, proved difficult to quantify in sufficiently robust and certain terms that can meet the requirements of a WRMP process that focuses on achieving a supply demand balance.	TBC	KME / KMW	Catchment management options have been developed separately by WRSE. Excluded to avoid duplication.
Modify, remove and revise operation of structures controlling flows on the River Test river management (Itchen)	Consider all of the options identified during the 2015 investigation into the Western area covering the removal, modification or revision to operation of structures controlling flow on the River Test to identify if there is a water resource benefit	TBC	HSE	Catchment management options are being developed separately by WRSE. Excluded to avoid duplication.
New borehole compensation in River Test headwaters in low flows	A scheme whereby any water abstracted downstream during low flow periods is offset/compensated for, by the pumping of groundwater from the underlying aquifer and transferred back into the River Test upstream in order to maintain the same river flow volume.	TBC	HSE	Catchment management options are being developed separately by WRSE. Excluded to avoid duplication.
Nitrate option - Brighton B	Option to address nitrate risk using both conventional treatment and catchment management together to ensure successful reduction of nitrates in limited time frame	TBC	SBZ	Catchment management options have been developed separately by WRSE. Excluded to avoid duplication.
Nitrate option - Long Furlong B	The Long Furlong B catchment management scheme is designed to offset the issues caused from rising levels of nitrates in the groundwater. This is done through the construction of a nitrate treatment plant to address high nitrate levels, and through advice and direction from Southern Water only, no financial incentives proposed. This aims to address deterioration in the longer term.	TBC	SWZ	Catchment management options have been developed separately by WRSE. Excluded to avoid duplication.

Option name	Option description	Maximum DO (Ml/d)	WRZ	Rejection comment
Nitrate option - North Arundel	The North Arundel catchment management scheme is designed to offset the issues caused from rising levels of nitrates in the groundwater. This is done through the construction of a nitrate treatment plant to address high nitrate levels, and through advice and direction from Southern Water only, no financial incentives proposed. This aims to address deterioration in the longer term.	TBC	SWZ	Catchment management options have been developed separately by WRSE. Excluded to avoid duplication.
Pilot: River Rother restoration instream	River restoration addressing over-widened over-depended river channel. Installing small weir, proper fish/eel passages. Allow reduction in MRF as more water available for abstraction. Providing benefit to Pulborough.	0.0	SNZ	Catchment management options are being developed separately by WRSE. Excluded to avoid duplication.
Re-circulate water down Great Test during drought	The construction of a pumping station located before the River Test tidal limit, and associated infrastructure required to transfer the water to be re-circulated to an upstream location and put back into the main River during drought events. This would have the effect of maintaining flows in the main channel allowing abstractions to still occur.	TBC	HSE	Catchment management options are being developed separately by WRSE. Excluded to avoid duplication.
Revise existing fishing practices	Increased resources to tackle illegal exploitation in Southampton Water and the rivers to enable the salmon population to reach it's Conservation Limit, and to increase salmon migration for spawning etc. Measures could include; re-introduction of bollards to prevent vehicles, re-writing byelaws to make salmon fishing/spinning illegal, additional patrols/wardens, CCTV[35].	TBC	HS - Hants South	Catchment management options are being developed separately by WRSE. Excluded to avoid duplication.
River Itchen catchment management options and river restoration pilot	Southern Water is committed to exploring with other stakeholders the potential for catchment management not only as part of the Western area strategy needed to meet the challenges posed by the notified River Itchen sustainability reductions, and/or in response to any potential future sustainability reductions that may be considered, but also as part of more integrated management of the water environment. Such solutions may well provide the best outcomes for both customers and the environment. The particular focus for the Itchen Catchment, in the short term is to work with partners to address pressures for not achieving good status or good ecological potential for the 8 catchment waterbodies. Long term aspirations well seek to ensure the River Itchen and its tributaries become exemplar chalk stream environments that can be enjoyed by all.	TBC	HAZ	Catchment management options have been developed separately by WRSE. Excluded to avoid duplication.

[35] CCTV = Close Circuit Television

Option name	Option description	Maximum DO (Ml/d)	WRZ	Rejection comment
River Itchen catchment management options and river restoration pilot	Southern Water is committed to exploring with other stakeholders the potential for catchment management not only as part of the Western area strategy needed to meet the challenges posed by the notified River Itchen sustainability reductions, and/or in response to any potential future sustainability reductions that may be considered, but also as part of more integrated management of the water environment. Such solutions may well provide the best outcomes for both customers and the environment. The particular focus for the Itchen Catchment, in the short term is to work with partners to address pressures for not achieving good status or good ecological potential for the 8 catchment waterbodies. Long term aspirations well seek to ensure the River Itchen and its tributaries become exemplar chalk stream environments that can be enjoyed by all.	TBC	HRZ	Catchment management options have been developed separately by WRSE. Excluded to avoid duplication.
River Itchen catchment management options and river restoration pilot	Catchment management solutions can contribute to making our water environment more resilient to changing climatic conditions, and in delivering permanent environmental improvements in our rivers. Catchment management solutions have, to date, proved difficult to quantify in sufficiently robust and certain terms that can meet the requirements of a WRMP process that focuses on achieving a supply demand balance. However, Southern Water is committed to exploring with other stakeholders the potential for catchment management not only as part of the Western area strategy needed to meet the challenges posed by the notified River Itchen sustainability reductions, and/or in response to any potential future sustainability reductions that may be considered, but also as part of more integrated management of the water environment. Such solutions may well provide the best outcomes for both customers and the environment.	TBC	HSE	Generic option replaced by site specific options.
River Test catchment management options and river restoration pilot	Southern Water is committed to exploring with other stakeholders the potential for catchment management not only as part of the Western area strategy needed to meet the challenges posed by the notified River Itchen sustainability reductions, and/or in response to any potential future sustainability reductions that may be considered, but also as part of more integrated management of the water environment. Such solutions may well provide the best outcomes for both customers and the environment. Catchment management solutions can contribute to making our water environment more resilient to changing climatic conditions, and in delivering permanent environmental improvements in our rivers. Catchment management solutions have, to date, proved difficult to quantify in sufficiently robust and certain terms that can meet the requirements of a WRMP process that focuses on achieving a supply demand balance.	TBC	HAZ	Catchment management options have been developed separately by WRSE. Excluded to avoid duplication.

Option name	Option description	Maximum DO (Ml/d)	WRZ	Rejection comment
River Test catchment management options and river restoration pilot	Southern Water is committed to exploring with other stakeholders the potential for catchment management not only as part of the Western area strategy needed to meet the challenges posed by the notified River Itchen sustainability reductions, and/or in response to any potential future sustainability reductions that may be considered, but also as part of more integrated management of the water environment. Such solutions may well provide the best outcomes for both customers and the environment. The particular focus for the Itchen Catchment, in the short term is to work with partners to address pressures for not achieving good status or good ecological potential for the 8 catchment waterbodies. Long term aspirations well seek to ensure the River Itchen and its tributaries become exemplar chalk stream environments that can be enjoyed by all.	TBC	HRZ	Catchment management options have been developed separately by WRSE. Excluded to avoid duplication.
Rother pilot: additional payments for ecosystem services to farmers / landowners	Rother catchment - pilot using a model to change land management to reduce soil loss and link with HLS[36]/Single farm payments. This needs to have very clear boundaries and has to have the extent, boundaries, what is being paid for regarding the ecosystem clearly defined. Reliant on EU policy to continue and deliver this. No point if the monitoring and analysis is not being done properly, need to check that the farmers are following protocol. Need all farmers in target area to be signed up to the scheme.	TBC	SNZ	Catchment management options are being developed separately by WRSE. Excluded to avoid duplication.
Sandown	Reduce the MRF at Alverstone which controls the abstraction at Sandown	0.5	IOW	Not technically feasible as no longer considered as a drought order/permit.
Sediment reduction catchment measures. Additional payments for ecosystem services to farmers / landowners e.g. Rother.	Land management to reduce soil loss and link with HLS/Single farm payments. This needs to have very clear boundaries and has to have the extent, boundaries, what is being paid for regarding the ecosystem clearly defined. Reliant on EU policy to continue and deliver this. No point if the monitoring and analysis is not being done properly, need to check that the farmers are following protocol. Need all farmers in target area to be signed up to the scheme.	TBC	Multiple locations	No specific locations/DO benefit have been identified. The option definition including environmental impact, water resource benefit, regulatory requirements, consideration of deliverability/planning issues, and technical design are not sufficiently developed for inclusion in WRMP24. Option should be progressed and included in the WRMP29 assessment.

[36] HLS = High Leve Stewardship

Option name	Option description	Maximum DO (Ml/d)	WRZ	Rejection comment
Sediment reduction in-stream measures e.g. Rother.	River restoration addressing over-widened over-depended river channel. Installing small weir, proper fish/eel passages. Allow reduction in MRF as more water available for abstraction. Providing benefit to Pulborough WSW.	TBC	Multiple locations	No specific locations/DO benefit have been identified. The option definition including environmental impact, water resource benefit, regulatory requirements, consideration of deliverability/planning issues, and technical design are not sufficiently developed for inclusion in WRMP24. Option should be progressed and included in the WRMP29 assessment.
Support / grants to farmers for local reservoirs	Help farmers to secure water supplies on farms (i.e. reducing demand/water use so more available for others) by developing relatively small reservoirs on site. Potential to capitalise on natural ponds/seasonal dips in land (i.e. soft rather than hard engineering)	TBC	Multiple locations	Catchment management options have been developed separately by WRSE. Excluded to avoid duplication.
Using SuDS[37] to replenish aquifers	Using SuDS to replenish aquifers in upper parts of catchments	TBC	Multiple locations	No specific locations/DO benefit have been identified. The option definition including environmental impact, water resource benefit, regulatory requirements, consideration of deliverability/planning issues, and technical design are not sufficiently developed for inclusion in WRMP24. Option should be progressed and included in the WRMP29 assessment.
Western Rother Pilot Scheme- Sediment Traps	Roll out sediment traps for high risk areas across catchment. Subsidies. Additional benefits in pesticide and nutrient reduction. Benefit to Pulborough WSW.	TBC	SNZ	Catchment management options are being developed separately by WRSE. Excluded to avoid duplication.

[37] SuDS = Sustainable Urban Drainage System