Revised Draft Water Resource Management Plan 24

Annex 17: Strategic Environmental Assessment (SEA)

Environmental Report

July 2024
Version 4

from Southern Water


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Contents

Abbreviations

AONB	Area of Outstanding Natural Beauty
AQMA	Air Quality Management Areas
BNG	Biodiversity Net Gain
CAMS	Catchment Abstraction Management Strategy
CCRA	Climate Change Risk Assessment
CFMP	Catchment Flood Management Plans
CPRE	The Countryside Charity formerly known as the Council for the Protection of Rural England
CROW	Countryside and Rights of Way
CO_2	Carbon Dioxide
DLUHC	Department for Levelling Up, Communities and Housing, formerly Ministry of Housing, Communities and Local Government (MHCLG)
Defra	Department for Environment, Food and Rural Affairs
EAAP	Ecosystems Approach Action Plan
EU	European Union
FRA	Flood Risk Area
FZ	Flood Zone
GDP	Gross Domestic Product
GHG	Greenhouse Gas
GIS	Geographic Information System
HER	Historic Environment Record
HRA	Habitats Regulations Assessment
IMD	Index of Multiple Deprivation
INNS	Invasive Non-Native Species
JNCC	Joint Nature Conservation Committee
km	Kilometres
$ktCO_2$	Kilo Tonnes of Carbon Dioxide
LNR	Local Nature Reserve

LSOA	Lower Super Output Area
LWS	Local Wildlife Sites
LULUCF	Land Use, Land-use Change, and Forestry
MCZ	Marine Conservation Zone
MPA	Marine Protected Area
NCA	National Character Area
NERC	Natural Environment and Rural Communities
NNR	National Nature Reserve
NO_2	Nitrogen Dioxide
NPPF	National Planning Policy Framework
ONS	Office for National Statistics
PM	Particulate Matter
RAG	Red-Amber-Green
RCP	Representative Concentration Pathway
RBMP	River Basin Management Plan
SAC	Special Areas of Conservation
SEA	Strategic Environmental Assessment
SES Water	Sutton & East Surrey Water
SMP	Shoreline Management Plans
SM	Scheduled Monument
SPA	Special Protection Area
SSSI	Sites of Special Scientific Interest
SRO	Strategic Resource Option
SPA	Special Protection Area
HRA ToLS	Habitats Regulations Assessment Test of Likely Significance
UK	United Kingdom
UKCP18	UK Climate Projections 2018
UN	United Nations

UNESCO	United Nations Educational, Scientific and Cultural Organisation
WFD	Water Framework Directive
WHS	World Heritage Site
WRMP	Water Resource Management Plan
WRZ	Water Resource Zone
WRSE	Water Resources South East

Non-technical summary

Overview

This Non-Technical Summary (NTS) provides an overview of the Environmental Report produced as part of the Strategic Environmental Assessment (SEA) of Southern Water's Revised Draft Water Resource Management Plan 2024 (rdWRMP24). The Environmental Report represents the fourth formal output of the SEA of the WRMP24, following the scoping technical note which was issued to SEA consultation bodies in February 2022, the Environmental Report that accompanied the dWRMP24 issued for consultation between November 2022 and February 2023 and the revised Environmental Report that accompanied the rdWRMP24 on submission to regulators in September 2023. The SEA is being carried out to identify, describe and evaluate the likely significant environmental effects of the rdWRMP24 and to identify ways in which adverse effects can be avoided, minimised or mitigated and how any positive effects can be enhanced.

The Environmental Report presents the findings of the SEA and is being issued for consultation alongside the rdWRMP24. The following sections of this NTS:

- provide an overview of the rdWRMP24;
- describe the SEA process together with how it is to be applied to the rdWRMP24 taking into account the Regional Plan;
- present the relevant contextual information and outline the approach to completing the assessment of the rdWRMP24;
- summarise the findings of the SEA of the rdWRMP24, including cumulative effects and mitigation measures;
- outline the proposed monitoring measures; and
- set out the next steps in the SEA of the WRMP24.

Water Resource Management Plans

Each water company's WRMP sets out how the balance between water supply and demand, and security of supply, will be maintained over a minimum of 25 years in a way that is economically, socially and environmentally sustainable. This will include public water supply (PWS) and non-public water supply (non-PWS). The over-arching 'best value' planning objectives to meet statutory and policy requirements are:

- Deliver a secure and wholesome supply of water;
- Deliver environmental and social benefit;
- Increase the resilience of water systems;
- Deliver at a cost that is acceptable to customers.

Table NTS1 sets out these objectives and the associated criteria and metrics for the delivery of the WRMP[1].

[1] Revised Draft Water Resources Management Plan 2024: Technical Report, August 2023, Version 0.1

Table NTS1: WRMP objectives, criteria and metrics.

Best value objective	Criteria	Metric
Deliver a secure and wholesome supply of water to customers and other sectors to 2075	Meet the supply demand balance	Public water supply - supply demand balance profile (Ml/d) Provides additional water needed by other sectors (Ml/d)
	Leakage	50% reduction in leakage by each company by 2050 from 2017-18 baseline (%) % leakage reduction above 50%
	Water into supply	Distribution input (DI) per property (litres per day)
	Customer preference	Customer preference for option type (score)
Deliver environmental improvement and social benefit	Strategic Environmental Assessment (SEA)	Programme benefit (score max) Programme disbenefit (score min)
	Natural capital	Enhancement of natural capital value (£m)
	Abstraction reduction	Reduction in the volume of water abstracted at identified sites (Ml/d) and by when (date)
	Biodiversity	Net gain score (%)
	Carbon	Cost of carbon offsetting (£m)
Increase the resilience of the region's water systems	Drought resilience	Achieve 1:500 drought resilience (date achieved)
	Resilience assessment reliability	Programme reliability score
	Resilience assessment adaptability	Programme adaptability score
	Resilience assessment evolvability	Programme evolvability score
Deliverable at a cost that is acceptable to customer	Programme cost	Net present value (£m) using the social time preference rate (STPR)
	Inter-generational equity	Net present value (£m) using the long-term discount rate (LTDR)

National guidance[2] requires alignment of water company WRMPs with the regional plan. In consequence, Southern Water has worked with Water Resources South East (WRSE), a collaboration of the six[3] water companies that supply water in south east England, to develop and apply a consistent framework for water resource plan development, with work split between the regional and company level. This included the following stages:

1. Prepare supply-demand balance information.
2. Develop a list of options that considers government policy and aspirations.
3. Undertake problem characterisation and evaluate strategic needs and complexity.
4. Decide on a modelling method.
5. Identify and define data inputs to model(s).

[2] UK Government (2023) *Water Resource Planning Guideline* [online]. Available at: https://www.gov.uk/government/publications/water-resources-planning-guideline/water-resources-planning-guideline.

[3] Affinity Water, Portsmouth Water, SES Water, South East Water, Southern Water and Thames Water

6. Undertake decision-making (options appraisal) modelling.
7. Carry out sensitivity tests.
8. Produce a final planning forecast.

Steps 1-3 have primarily been undertaken by member water companies individually. WRSE has progressed steps 4-8 after agreeing on an approach with members and consulting on the overall method with other stakeholders.

In line with the steps identified, Southern Water has developed a supply-demand balance to identify those Water Resource Zones[4] (WRZs) in deficit over the lifetime of the plan (and so where additional water resources are required). The WRMP presents options for the resolution of the WRZ deficit. Option selection for the rdWRMP24 entails the following steps:

- Identification of an **unconstrained list** of options.
- Screening and filtering of the list against initial screening criteria to develop a **feasible list**. Options that are impractical or have unacceptable environmental or economic impacts are removed.
- Screening against final screening criteria to arrive at a **constrained list**. Constrained options are taken forward into the decision-making modelling process.
- **Environmental assessment** of the options as part of the Strategic Environmental Assessment (SEA), Habitats Regulations Assessment (HRA) and WFD assessment processes. The findings of which are also taken forward into the decision-making modelling process.

All of the options on the constrained options list are considered to be viable and potentially deliverable and are, therefore, made available for selection in the investment modelling process. The options selected by the investment model, under various planning scenarios in each WRZ, form the list of 'preferred options' in the rdWRMP24.

Types of water resource management options considered to meet any forecast deficit in a WRZ can include:

- **Customer options** which include measures to manage the demand for water such as smart meters, rainwater harvesting, greywater recycling or household visits to install water efficient devices.
- **Distribution options** which include measures to optimise the efficiency of water networks, reduce leakage and minimise any unscheduled resource losses.
- **Production options** include measures to increase the efficiency and effectiveness of treatment processes.
- **Resource management options** which include measures to increase supply such as greater peak output at existing groundwater sources, reservoir or surface water supply and which will include SROs; this also includes catchment management options, for example nature-based solutions.
- **Non-PWS options** which include any options which increase water resource availability or reduce the need for abstraction outside of that needed for public water supplies.

The preferred plan options collectively comprise the proposed plan programme. In developing the preferred programme, consideration is given to alternative plan programmes (or pathways) developed in response to

[4] UK Government (2023) *Water Resource Planning Guideline [online*]. Available at: https://www.gov.uk/government/publications/waterresources-planning-guideline/water-resources-planning-guideline

Section 4.4. of the WRPG defines a water resource zone as "an area within which the sources of water and distribution of water to meet demand, is largely self-contained (with the exception of agreed bulk transfers)".

different scenarios, to resolve any supply deficits in relation to financial, environmental and social costing and, potentially, to facilitate water trading between companies.

Southern Water provides water supplies to just over 2.4 million customers across an area of 4,450km^2, extending from East Kent, through parts of Sussex, to Hampshire and the Isle of Wight in the west. The Southern Water region is divided into fourteen WRZs which are geographically separate and amalgamated into three larger, sub-regional areas (see **Figure NTS1**).

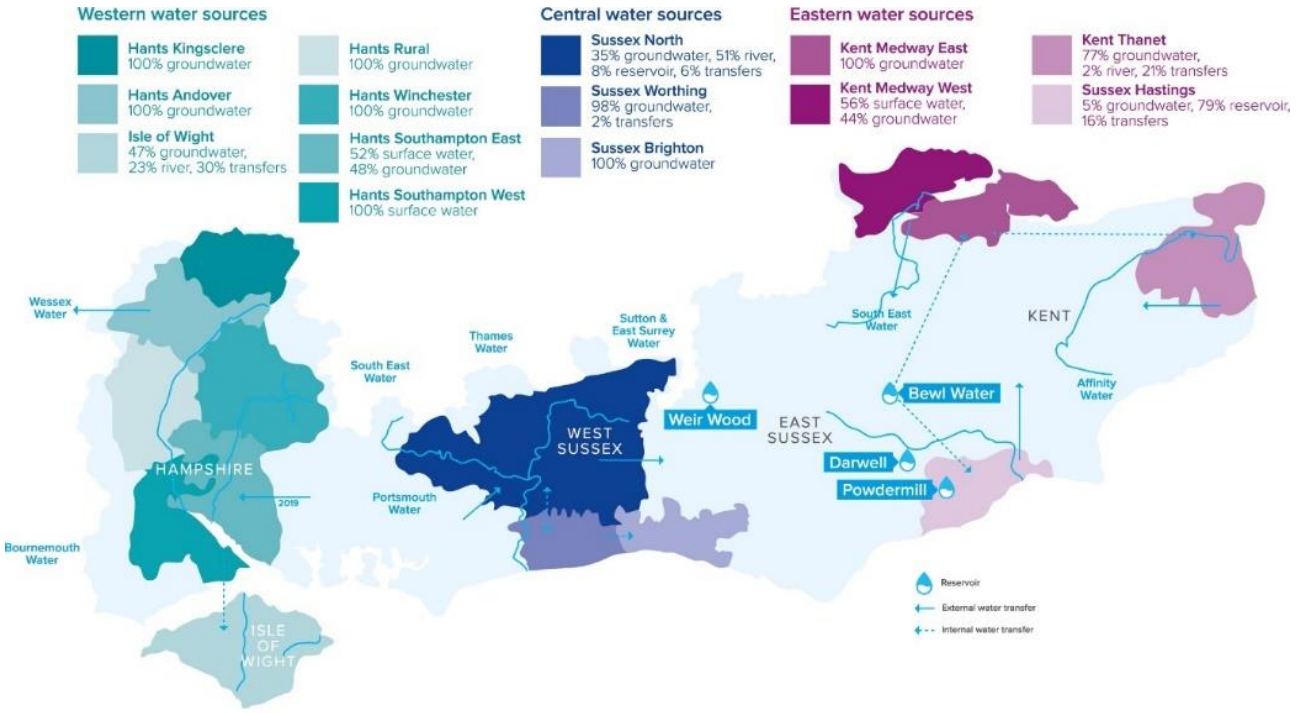

Figure NTS1: Southern Water's supply area

Southern Water face challenges in its Western and Central areas, as a result of already implemented licence changes, and proposed further abstraction reductions to protect and enhance the environment. There are now limited opportunities to develop new 'conventional' sources of water such as abstraction from rivers or groundwater. Consequently, in order to ensure uninterrupted supplies in all but the most extreme weather conditions (i.e. a drought of greater than 1:500 severity), Southern Water's rdWRMP24 includes ambitious demand management targets to reduce both leakage and consumption in addition to building 'non-conventional' sources of water such as water recycling and desalination.

At a **company level**, Southern Water aims to:

- reduce consumption by household customers in order to reduce average Per Capita Consumption to 110 litres per head per day by 2045 under dry year conditions.
- reduce leakage by 53% by 2050 compared to 2017-18.
- reduce non-household consumption by 9% compared to 2019-20 by 2037-38;
- promote catchment and nature-based solutions through our Catchment First programme to improve environmental resilience;
- stop the use of all supply-side drought permits and orders by 2040-41 at the latest, unless faced with a drought of more than 1-in-500 year severity.

The Western area strategy involves:

- continuation of all existing internal transfers as well as external bulk imports and exports;

- implementing water efficiency programmes to reduce household and non-household consumption from 2025-26 to reduce consumption by 39.2Ml/d by 2049-50;
- implementing leakage reduction measures from 2025-26 to reduce leakage by 9.9Ml/d by 2049-50;
- removing constraints at Newbury groundwater source to increase yield (1.2Ml/d) from 2027-28;
- drilling new boreholes at Romsey to provide 4.8Ml/d from 2030-31;
- removing constraints and Kings Sombourne groundwater source to provide additional 2.5Ml/d from 2030-31;
- increasing transfer capacity between Hampshire Rural and Hampshire Southampton West water resource zones through the Romsey Town and Broadlands valve to transfer an additional 5Ml/d from 2030-31;
- delivering Sandown Wastewater Treatment Works recycling scheme to provide up to 8.5Ml/d from 2030-31;
- constructing 'Hampshire grid' to move water more easily in the Hampshire area from 2030-31;
- implementing bulk import of up to 45Ml/d from Norway via sea tankers during severe droughts (1-in-200 year or greater severity) between 2030-31 and 2033-34;
- bulk import (up to 21Ml/d) from Portsmouth Water to Otterbourne Water Supply Works from 2031-32 following the construction of Havant Thicket Reservoir;
- bulk import (up to 90Ml/d) from Havant Thicket Reservoir to Otterbourne Water Supply Works from 2034-35 following the delivery of Hampshire Water Transfer and Water Recycling Project;
- implementing Test MAR groundwater scheme to provide up to 5.5Ml/d from 2035-36;
- drilling new boreholes at Newchurch groundwater source to increase yield by 1.9Ml/d from 2036-37;
- drilling new boreholes at Eastern Yar3 groundwater source to increase yield (1.5Ml/d) from 2039-40;
- bulk import (up to 120Ml/d) into Hampshire through Thames to Southern Transfer from 2039-40;
- terminating the use of Lower Itchen Drought Permit/Order after 2029-30 under any drought condition;
- terminating the use of Candover Drought Permit/Order by after 2033-34 under any drought condition;
- terminating the use of River Test Drought Permit/Order after 2033-34 under droughts of up to 1-in-200 year severity;
- terminating the use of all supply-side drought permits/orders after 2040-41 unless faced with a drought of more than 1-in-500 year severity;
- continuing to use Temporary Use Bans and Non-Essential Use Bans to manage demand during droughts.

The **Central area** strategy includes:

- continuation of all existing internal transfers as well as external bulk imports and exports;
- implementing water efficiency programme to reduce household and non-household consumption from 2025-26 by 35.8Ml/d by 2049-50;
- implementing leakage reduction measures from 2025-26 to reduce leakage by 7.6Ml/d by 2049-50;
- bulk import from SES Water (up to 4Ml/d) from 2025-26 to 2030-31;
- reinstating West Chiltington groundwater source to provide up to 3.1Ml/d from 2028-29;
- refurbishing Petersfield groundwater source to provide up to 1.6Ml/d from 2028-29;
- terminating the use of Pulborough surface water drought permit/order after 2029-30 under droughts of up to 1-in-200 year drought severity;
- delivering Weir Wood Reservoir with 21Ml/d treatment capacity from 2030-31
- drilling new boreholes at Petworth to provide up to 4Ml/d from 2030-31;
- asset enhancement at Lewes Road groundwater source to provide up to 3.5Ml/d from 2030-31;
- recycled water from Littlehampton Wastewater Treatment Works (up to 15Ml/d) from 2030-31;
- bulk import from SES Water of up to 10Ml/d from 2033-34;
- bulk import (up 10Ml/d) from South East Water to Pulborough from 2039-40;

- bulk import (up to 50Ml/d) from Havant Thicket Reservoir to Pulborough from 2039-40;
- building pipeline to transfer up to 35Ml/d between Pulborough and Worthing from 2039-40;
- improving treatment capacity at Pulborough to provide up to 2Ml/d from 2040-41;
- building pipeline up to 4Ml/d between Worthing and Brighton from 2040-41;
- building a desalination plant close to the River Arun from 2040-41 to delivery up to 40Ml/d by 2049-50;
- new transfer (up to 20Ml/d) between Worthing and Brighton from 2040-41;
- construction of River Adur Offline Storage to provide up to 19.5Ml/d from 2045-46;
- use of recycled water from Horsham Wastewater Treatment Works with storage at Pulborough to provide up to 11.5Ml/d from 2057-58;
- bulk import (up to 20Ml/d) from South East Water to Brighton from 2065-66;
- terminating the use of all supply-side drought permits/orders after 2040-41 unless faced with a drought of more than 1-in-500 year severity;
- continuing to use Temporary Use Bans and Non-Essential Use Bans to manage demand during droughts.

The **Eastern area** strategy involves:

- continuation of all existing internal transfers as well as external bulk imports and exports;
- implementing water efficiency programme to reduce household and non-household consumption from 2025-26 to reduce demand by 37.4Ml/d by 2049-50;
- implementing leakage reduction measures from 2025-26 to reduce leakage by 10.9Ml/d by 2049-50;
- recycling from Medway Wastewater Treatment Works for up to 14Ml/d from 2030-31;
- recycling from an industrial source in Sittingbourne (7.5M/d) from 2030-31;
- recommissioning Gravesend groundwater source (2.7Ml/d) from 2030-31;
- conjunctive use of Bewl Water with recycled water from Tonbridge Wastewater Treatment Works to provide up to 5.7Ml/d from 2035-36;
- reconfiguring Rye Wells to provide up to 1.5Ml/d benefit from 2039-40;
- setting up a desalination plant on the Thames Estuary from 2039-40 to provide up to 40Ml/d;
- setting up a desalination plant on the Isle of Sheppey to provide up to 20Ml/d from 2040-41, increasing to 30Ml/d by 2062-63;
- setting up a desalination plant in East Thanet to provide 20Ml/d from 2040-41, increasing to 40Ml/d by 2049-50;
- bulk import (up to 20Ml/d) from South East Water to near Canterbury from 2049-50;
- bulk import (up to 10Ml/d) from South East Water to Rye from 2049-50;
- conjunctive use of Darwell Reservoir with recycled water from Hastings Wastewater Treatment Works (up to 15.3Ml/d) from 2050-51;
- raising Bewl Water by 0.4m for up to 3Ml/d benefit from 2060-61;
- terminating the use of all supply-side drought permits/orders after 2040-41 unless faced with a drought of more than 1-in-500 year severity;
- continuing to use Temporary Use Bans and Non-Essential Use Bans to manage demand drought droughts.

Strategic Environmental Assessment

SEA is required under Statutory Instrument 2004 No.1633 - The Environmental Assessment of Plans and Programmes Regulations 2004. Throughout the course of the development of the plan, policy or programme, the aim of SEA is to identify the potential impact of options proposed in the plan in terms of their environmental, economic and social effects. If any adverse effects are identified, these options can then be avoided, or proposals modified to manage or mitigate adverse effects.

In this context, the purpose of the SEA of the rdWRMP24 is to:

- identify the potentially significant environmental effects of the plan in terms of the water resource management options being considered;
- help identify appropriate measures to avoid, reduce or manage adverse effects and to enhance beneficial effects associated with the implementation of the plan wherever possible;
- give the statutory SEA bodies, stakeholders and the wider public the ability to see and comment upon the effects that the plan may have on them, and encourage them to make responses and suggest improvements to the plan; and
- inform the selection of water resource management options to be taken forward into the final versions of the plan.

SEA comprises five key stages:

- **Stage A:** Scoping.
- **Stage B:** Develop and refine alternatives and assess effects.
- **Stage C:** Prepare Environmental Report.
- **Stage D:** Consult on the plan and Environmental Report and prepare the post adoption SEA statement.
- **Stage E:** Monitor environmental effects.

Stage A of the SEA of the WRMP24 has been summarised in the scoping technical note. The scoping stage itself is comprised of five tasks that are listed below:

i. Review of other relevant policies, plans, programmes and strategies (hereafter referred to as 'plans and programmes').

ii. Collation and analysis of baseline information.

iii. Identification of key sustainability issues.

iv. Development of the assessment framework.

v. Consultation on the scope of the SEA (this Scoping Report).

The scoping technical note sets out the approach to assessing the likely significant environmental effects of the rdWRMP24. It was issued for scoping consultation for 5 weeks from 21st February to 27th March 2022. Following scoping consultation and amendment as appropriate, the framework has been used to assess the likely significant environmental effects (including cumulative effects) of the water resource options contained in the Draft (and Revised Draft) WRMP24 and any reasonable alternatives (Stage B). For the purposes of this SEA, the constrained options have been considered as reasonable alternatives to the preferred options (that comprise the Preferred Plan).

These assessments are presented in an Environmental Report (in a form to meet the requirements of Schedule 2 of the SEA Regulations) which has been completed to accompany the Draft WRMP24 (Stage C).

The Draft WRMP24 and accompanying documents including the Environmental Report were submitted to Defra for a request for publication. Following direction, Southern Water published the documents for consultation from November 2022 and February 2023 (Stage D).

Following consultation, Southern Water prepared a Statement of Response to the representations received. It then completed further work reflecting revisions to the drought resilience and demand management expectations which led to amendments to the Draft WRMP24 and a Revised Draft WRMP24 was completed and given the changes, was also subject to further environmental assessment. The findings were presented in an accompanying Environmental Report and submitted to regulators in September 2023.

Further changes to the WRMP24 were then made following further engagement with regulators and modelling carried out by WRSE. The rdWRMP24 and accompanying documents including the revised Environmental Report will be submitted to the Secretary of State for Environment, Food and Rural Affairs, for a request for publication and once directed to do so, Southern Water will publish the documents for consultation. Taking into account the consultation responses received and any further work undertaken, a final WRMP24 will be sent to the Government, and if changes are likely to be significant, is likely to be subject to further assessment. Following direction from the Government, the final WRMP24 will be published and implemented accordingly. In conjunction with publishing the final WRMP24, a post adoption statement will also be issued to meet the requirements of SEA regulation 16 (4). This will set out the results of the consultation and SEA processes and the extent to which the findings of the SEA have been accommodated in the final plan.

The SEA requires monitoring of any resulting environmental effects of the WRMP24 (**Stage E**).

The WRSE Regional Plan Environmental Assessment

Southern Water is developing its WRMP24 as part of the WRSE Regional Plan[5,6]. WRSE is a collaboration of the six[7] water companies that supply water in south east England. The Regional Plan looks beyond the boundaries of individual companies and identifies options that will deliver the most benefit across the region.

The interactions and the need for consistency between the Regional Plan and the WRMPs, and between regions has driven development of new approaches and methodologies in the preparation of WRMP24s. In this regard, WRSE commissioned the development of a new integrated environmental appraisal process to provide a consistent framework for environmental assessments for WRMP24. The method[8] has been developed taking into account the guidance from the Environment Agency and uses an integrated approach covering SEA, HRA, WFD, Natural Capital Assessment (NCA) and Biodiversity Net Gain (BNG). A separate SEA Scoping Report[9] was published in September 2020. It was subject to consultation in 2020 and has been revised[10].

The revised environmental assessment methodology provides the approach to assessment for water companies when undertaking their WRMP24 regulatory environmental assessments. Consequently, some of the supporting information required for Southern Water's dWRMP24 and rdWRMP24 SEA has been produced as part of the regional plan environmental assessments. The following summarises how, whilst aligned with the WRSE approach, Southern Water has supplemented it (and the information provided), consistent with regulator feedback when completing the assessments of the draft and rdWRMP24:

[5] WRSE (2022) Futureproofing our water supplies: A Consultation On Our Draft Regional Plan For South East England, November 2022. Available at: https://www.wrse.org.uk/media/va1bz21z/10306a_wrse-bv-plan-2022final_online.pdf

[6] WRSE (2023) Futureproofing our water supplies: Summary Of Our Revised Draft Plan For South East England https://www.wrse.org.uk/media/u0knltxt/wrse-regional-plan-summary-august-2023_final.pdf

[7] Affinity Water, Portsmouth Water, SES Water, South East Water, Southern Water and Thames Water

[8] WRSE (2020) *WRSE Method Statement: Environmental Assessment* Consultation version July 2020. Available at: https://www.wrse.org.uk/media/wjig1mdu/wrse_file_1329_wrse-ms-environmental-assessment.pdf

[9] WRSE (2020) *WRSE Regional Plan Strategic Environmental Assessment Scoping Report*. Available at https://www.wrse.org.uk/media/51vdwyw0/wrse-regional-plan-strategic-environmental-assessment-scoping-report.pdf

[10] WRSE (2021*), Method Statement: Environmental Assessment Post-consultation version*, November 2021. Available at: https://www.wrse.org.uk/media/qmtb1e5v/method-statement-environmental-assessment-nov-2021.pdf

- Used the WRSE Regional Plan SEA Scoping Report[11] and consultation responses received as the basis of the proposed approach to assessment (including the relevant contextual information, the 14 assessment objectives and the assessment scoring criteria). Consistent with paragraph 1.36 of the WRSE Method Statement, where relevant, the contextual information (including the review of plans and programmes and baseline information) has been revised to supplement the information already collated and presented.
- Revised the approach to assessment of the revised preferred options, reflecting comments received on the dWRMP24 Environmental Report to ensure the consistent treatment of designated conservation, heritage and landscape sites and features within the assessment. This includes Sites of Specific Scientific Interest (SSSIs), SSSI risk zones, Marine Conservation Zones (MCZs), National Nature Reserves (NNRs), Ancient Woodland, World Heritage Sites, National Parks and Areas of Outstanding Natural Beauty (AONBs), and supplements the range of features already considered when identifying, describing and evaluating the likely significant effects of individual options. These changes are summarised in Section 4.4.4 of the main Environmental Report.
- Used the revised SEA assessment methodology to complete:
  - an assessment of the likely significant effects of the revised preferred options for each of Southern Water WRZs in deficit;
  - an assessment of the effects of the revised preferred programme of options and any identified alternative plans;
  - an assessment of the cumulative effects of the rdWRMP24 (by WRZ) and with other infrastructure proposals or plans will be considered and assessed including, in particular, other water company WRMPs, the Regional Plan and SROs.

Key environmental issues for WRMP24

The key environmental issues relevant to the assessment of the rdWRMP24 have been identified from a variety of sources, including a review of baseline data, other relevant plans and programmes and the WRSE work. A summary of the issues identified as being most relevant to the assessment of the rdWRMP24 are shown in **Table NTS2**.

[11] https://www.wrse.org.uk/media/51vdwyw0/wrse-regional-plan-strategic-environmental-assessment-scoping-report.pdf

Table NTS2: Key environmental issues.

SEA topic	Summary
Biodiversity, flora and fauna	The key sustainability issues arising from the baseline assessment for biodiversity are: • The need to protect or enhance and support the achievement of favourable condition and conservation status WRMP24 area's biodiversity, particularly within designated sites, species and habitats of principal importance, informed by the evidence base. • The need to consider the implications of effluent re-treatment options on existing discharges from wastewater treatment works and the consequences for nutrients within receiving waters. • The need to avoid activities likely to cause irreversible damage to natural heritage. • The need to take opportunities to improve connectivity between fragmented habitats to create functioning habitat corridors and habitat patches or stepping stones. • The need to take opportunities to deliver biodiversity net gains. • The need to control the spread of Invasive Non-Native Species (INNS). • The need to recognise the importance of building wildlife's resilience to, and allowing wildlife to adapt to climate change. • The need to engage more people in biodiversity issues so that they personally value biodiversity and know what they can do to help, including through recognising the value of the ecosystem services.
Water	The key issues arising from the baseline assessment for water are: • The need to further improve the quality of the regions river, estuarine, wetlands and coastal waters taking into account WFD objectives. • The need to maintain the quantity and quality of groundwater resources taking into account WFD objectives. • The need to improve the resilience, flexibility and sustainability of water resources in the WRMP24 area, particularly in light of potential climate change impacts on surface water and groundwaters. • The need to ensure sustainable abstraction to protect the water environment and meet society's needs for a resilient water supply. • The need to ensure that people understand the value of water.
Soil	The key sustainability issues arising from the baseline assessment for soil, geology and land use are: • The need to protect and enhance geological features of importance (including geological SSSIs). • The need to maintain and enhance soil function and health, including its role as a carbon sink. • The need to manage the land and soil more holistically at the catchment level, benefitting landowners, other stakeholders, the environment and sustainability of natural resources (including water resources and best and most versatile soils).
Air	The key sustainability issues arising from the baseline assessment for air are: • The need to reduce air pollutant and greenhouse emissions and limit air emissions to comply with air quality standards.
Climatic factors	The key sustainability issues arising from the baseline assessment for climatic factors are: • The need to reduce greenhouse gas emissions (industrial processes and transport). • The need to adapt to the impacts of climate change for example through, sustainable water resource management, water use efficiencies, specific aspects of natural ecosystems (e.g. connectivity) as well as accommodating potential opportunities afforded by climate change.

SEA topic	Summary
Population, communities and human health	The key sustainability issues arising from the baseline assessment for population and human health are: • The need to ensure water supplies remain affordable especially for deprived or vulnerable communities, reflecting the importance of water for health and wellbeing. • The need to ensure water supplies contribute to improvements in levels of health, particularly in urban areas and deprived areas. • The need to ensure water quantity and quality is maintained for a range of uses including tourism, recreation, navigation and other use such as agriculture. • The need to ensure a balance between different aspects of the built and natural environment that will help to provide opportunities for local residents and tourists, including opportunities for access to, protecting and enhancing recreation resources, green infrastructure and the natural and historic environment. • The need to accommodate an increasing population and housing growth through provision of essential services including water supply. • Sites of nature conservation importance, heritage assets, water resources, important landscapes and public rights of way contribute to recreation and tourism opportunities and subsequently health and wellbeing and the economy. • The need to reduce the risk of harm from environmental hazards, such as flooding and drought.
Historic environment	The key sustainability issues arising from the baseline assessment for archaeology and cultural heritage are: • The need to conserve or enhance sites of archaeological importance and cultural heritage interest, particularly those which are sensitive to the water environment. • The need to protect water-dependent heritage sites during drought and flood conditions.
Landscape	The key sustainability issues arising from the baseline assessment for landscape and visual amenity are: • The need to protect and improve the natural beauty of the area's AONBs, National Parks and other areas of natural beauty. • The need to protect and improve the character of landscapes and townscapes.
Material assets	The key sustainability issues arising from the baseline assessment for material assets and resource use are: • The need to minimise the consumption of resources, including water and energy. • The need to reduce the total amount of waste produced in the region, from all sources, and to reduce the proportion of this waste sent to landfill. • The need to continue to reduce leakage from the water supply system to help reduce demand for water. • Daily consumption of water is relatively high and consequently there is a continued need to encourage more efficient water use by consumers.

Section 2 of this report summarises the review of plans and programmes relevant to the rdWRMP24 and SEA that is contained in Error! Reference source not found.**.**

Section 3 presents the baseline analysis of characteristics, along with how these are likely to change in the future.

Assessing the effects of the rdWRMP24

The WRSE assessment framework has been used to assess the environmental effects of the rdWRMP24. The assessment framework sets out 14 assessment objectives relating to the key issues identified in **Table NTS2**. For each objective, guide questions are provided.

The performance of the constrained, preferred options/preferred programme within the rdWRMP24 and any reasonable alternatives have been assessed against these objectives to ensure that each option is assessed in a robust and consistent manner. The assessment framework is shown in **Table NTS3**.

Table NTS3: SEA topics and assessment objectives.

SEA topic	SEA objective
Biodiversity, flora and fauna	Protect and enhance biodiversity, priority species, vulnerable habitats and habitat connectivity (no loss and improve connectivity where possible)
Soil	Protect and enhance the functionality, quantity and quality of soils
Water	Increase resilience and reduce flood risk
	Protect and enhance the quality of the water environment and water resources
	Deliver reliable and resilient water supplies
Air	Reduce and minimise air emissions
Climatic factors	Reduce embodied and operational carbon emissions
	Reduce vulnerability to climate change risks and hazards
Landscape	Conserve, protect and enhance landscape, townscape and seascape character and visual amenity
Historic environment	Conserve, protect and enhance the historic environment, including archaeology
Population and human health	Maintain and enhance the health and wellbeing of the local community, including economic and social wellbeing
	Maintain and enhance tourism and recreation
Material assets	Minimise resource use and waste production
	Avoid negative effects on built assets and infrastructure

The rdWRMP24 constrained and preferred options have been assessed based on the nature of the effect, its timing and geographic scale, the sensitivity of the human or environmental receptor that could be affected, and how long any effect might last. Specific guidance has been developed for what constitutes either a neutral, minor, moderate or major positive or negative effect for each of the SEA objectives. These 'definitions of significance' have helped to ensure a consistent approach to interpreting the significance of effects and will help the reader understand the decisions made by the assessor. Assessment matrices have been used to capture the assessment of each measure in a consistent manner.

The assessment is based on option information confirmed with Southern Water in June 2024 to ensure the timely completion of the necessary individual option assessments to include in this report to accompany the submission of the rdWRMP24.

Section 4 of the Environmental Report provides further information in relation to the approach to the assessment of the rdWRMP24.

Principal outcomes of the assessment

Sections 5 and 6 of this report provide further information in relation to the assessment of the rdWRMP24.

The assessment of each of the constrained options is presented in Error! Reference source not found..

Following option appraisal and screening, 85 revised preferred supply options[12], 10[13] generic drought options and 11 generic demand management options[14] and 5 leakage options[15] have been identified to support the delivery of WRMP24. The assessment of each of the preferred options is presented in Error! Reference source not found..

Table NTS4 summarises the likely significant effects (positive and negative) identified in respect of various preferred options, presented by WRZ, water transfer schemes and catchment management. These are post-mitigation effects and, if taken forward, would require the application of additional mitigation measures with the aim of reducing the significant effects to a more acceptable level. Some of the significant effects may not be able to be further mitigated.

Tables NTS4 summarises, by SEA Topic, the likely significant effects identified for the options by WRZ.

Table NTS4: Significant effects identified by SEA topic and objective (post mitigation).

SEA topic	SEA objective	Significant effects identified
Biodiversity, flora and fauna	Protect and enhance biodiversity, priority species, vulnerable habitats and habitat connectivity (no loss and improve connectivity where possible)	Significant negative effects with uncertainty have been identified for the biodiversity SEA objective for options located in the Isle of Wight, Hampshire Southampton East, Kent Medway East, Kent Medway West, and Kent Thanet WRZs. All of the following options were identified as having significant negative effects with uncertainty in the operation phase, whilst for option Desalination (KTZ): East Thanet (20Ml/d) Phase 1 and 2, this was also identified as having a significant negative uncertain effect during the construction phase: • Drought option - supply side (HSE): Candover (22Ml/d)- Drought option - supply side (HSE): Lower Itchen; • Drought option - supply side (HSW): Sea tankering from Norway (45Ml/d); • Desalination (KME): Isle of Sheppey (10Ml/d) phase 2; • Desalination (KME): Isle of Sheppey 20Ml/d; • Recycling (KME): Sittingbourne Industrial Water Reuse (7.5Mld); • Desalination (KMW): Thames Estuary (10Ml/d); • Desalination (KMW): Thames Estuary (10Ml/d) Phase 2; • Desalination (KMW): Thames Estuary (20Ml/d); • Desalination (KMW): Thames Estuary (20Ml/d) Phase 2; • Desalination (KTZ): East Thanet (20Ml/d); • Desalination (KTZ): East Thanet (10Ml/d) Phase 2; and • Desalination (KTZ): East Thanet (20Ml/d) Phase 2.
Soil	Protect and enhance the functionality, quantity and quality of soils	No significant effects have been identified.

[12] Supply-side options that can be developed in a modular fashion, such as desalination options at 10Ml/d and 20Ml/d capacities, have been counted as discreet options.

[13] Demand-side drought options such as Temporary Use Bans and leakage initiatives have been counted once at the company level rather than 14 times at the WRZ level.

[14] Demand management options such as smart metering have been counted once at the company level rather than 14 times at the WRZ level.

[15] Leakage reduction options such as mains renewal have been counted once at the company level rather than 14 times at the WRZ level.

SEA topic	SEA objective	Significant effects identified
Air	Reduce and minimise air emissions	No significant effects have been identified.
Water	Increase resilience and reduce flood risk	Significant negative effects have been identified for the flood risk SEA objective for the construction phase of the Groundwater (HRZ): Remove constraints at Kings Sombourne (2.5Ml/d) option located in the Hampshire Rural WRZ: • Groundwater (HRZ): Remove constraints at Kings Sombourne (2.5Ml/d).
	Protect and enhance the quality of the water environment and water resources	Significant negative effects have been identified for the water quality SEA objective for the operation phase for options located in the Sussex North WRZ, Sussex Hastings WRZ, Kent Medway West WRZ and Kent Medway East WRZ, reflecting the findings of non-compliance with the WFD (with medium confidence) in the WFD assessment. This relates to the following options: • Recycling (SHZ): Tonbridge to Bewl (5.7Ml/d); • Recycling (SHZ): Hastings to Darwell (15.3Ml/d); • Recycling (KMW): Medway WTW to lake (14Ml/d); and • Groundwater (KME): Recommission Gravesend (2.7Ml/d).
	Deliver reliable and resilient water supplies	Significant positive effects have been identified in respect of the delivery of reliable water supplies in the operation phase, for the following options located within the Hampshire Southampton East, Hampshire Southampton West and Kent Medway West WRZs: • Recycling (HSE) - Recharge of Havant Thicket from recycled water from Budds Farm (60Ml/d); • T2ST Option B - Central route via Newbury (West of Newbury and remaining west of the A34, to Winchester) (75Ml/d); • T2ST Option C - Central route via Newbury (West of Newbury and then crossing east over the A34, to Winchester) (75Ml/d); • Bulk import (HSE): Havant Thicket Reservoir to Otterbourne WSW (90Ml/d); • Interzonal transfer (HSE-HSW): Yew Hill WSW to River Test WSW bi-directional (60Ml/d); and • Drought option - supply side (HSW): River Test (80Ml/d).
Climatic Factors	Reduce embodied and operational carbon emissions	Significant negative effects are identified in respect of the carbon generation during operation for: • T2ST Option B - Central route via Newbury (West of Newbury and remaining west of the A34, to Winchester); and • T2ST Option C - Central route via Newbury (West of Newbury and then crossing east over the A34, to Winchester).
	Reduce vulnerability to climate change risks and hazards	No significant effects have been identified.
Landscape	Conserve, protect and enhance landscape, townscape and seascape character and visual amenity	No significant effects have been identified for this objective.
Historic Environment	Conserve, protect and enhance the historic	No significant effects have been identified for this objective.

SEA topic	SEA objective	Significant effects identified
	environment, including archaeology	
Population and Human Health	Maintain and enhance the health and wellbeing of the local community	A significant positive effect has been identified, associated with the maintenance of public water supplies in drought conditions within the Hampshire Southampton East WRZ as follows: • Drought option - supply side (HSE): Lower Itchen. Significant negative effects have been identified in respect of the health and well-being SEA objective in the operation phase of the Non-essential use bans options identified within each of the WRZ. Option as IDs: • Drought option - demand side (SNZ): NEUBs; • Drought option - demand side (SWZ): NEUBs; • Drought option - demand side (SBZ): NEUBs; • Drought option - demand side (SHZ): NEUBs; • Drought option - demand side (HSE): NEUBs; • Drought option - demand side (KME): NEUBs; • Drought option - demand side (KTZ): NEUBs; • Drought option - demand side (IOW): NEUBs; • Drought option - demand side (HAZ): NEUBs; • Drought option - demand side (HKZ): NEUBs; • Drought option - demand side (HRZ): NEUBs; • Drought option - demand side (HWZ): NEUBs; • Drought option - demand side (HSW): NEUBs; and • Drought option - demand side (KMW): NEUBs.
	Maintain and enhance tourism and recreation	No significant effects have been identified for this objective.
Material Assets	Minimise resource use and waste production	No significant effects have been identified for this objective.
	Avoid negative effects on built assets and infrastructure	No significant effects have been identified for this objective.

Seventeen demand management and leakage options have been assessed relating to:

- Policy Regulation: Implementation of changes to regulation and policy on building standards and appliances (All resource zones);
- Home Visits: Water use audit and inspection - household;
- Water Audits (Non-Households): Water use audit and inspection - Non-household;
- Enabler Activities Awareness Campaigns: Targeted water conservation information (advice on appliance water usage);
- Enabler Activities (Non-Households) Awareness Campaigns: Targeted water conservation information (advice on appliance water usage);
- Tariffs: Changes to existing measured tariffs - Volumetric charges;
- NHH Tariffs: Changes to existing measured tariffs - Volumetric charges;

- Water Efficiency Partnership Fund: Sponsoring Water efficiency enabling activities by others;
- Smart Metering: Enhanced metering - Household;
- Smart Metering USPL: Customer supply pipe leakage reduction;
- Smart Metering Unmeasured Households: Compulsory metering - Household;
- NHH Smart Metering: Enhanced metering - Non-household;
- Advanced Find & Fix: Leakage reduction - Active Leakage Control;
- Advanced Pressure Management: Leakage reduction - Pressure reduction programmes;
- Comms Pipe Replacement: Comms pipe leakage reduction; and
- Digitalisation/Smart Networks: Leakage reduction - Active Leakage Control.

The assessment of the above options is presented in **Section 5.7** (with the full assessment tables in Error! Reference source not found.).

Significant effects have been identified for the revised demand management and leakage options, each covering all 14 WRZs. **Tables NTS5** summarises, by SEA topic, the likely significant effects identified for the demand management and leakage options.

Table NTS5: Significant effects identified by SEA topic and objective (post mitigation) for the demand management and leakage reduction options.

SEA Topic	SEA objective	Significant Effects Identified
Biodiversity, flora and fauna	Protect and enhance biodiversity, priority species, vulnerable habitats and habitat connectivity (no loss and improve connectivity where possible)	No significant effects have been identified.
Soil	Protect and enhance the functionality, quantity and quality of soils	No significant effects have been identified.
Air	Reduce and minimise air emissions	No significant effects have been identified.
Water	Increase resilience and reduce flood risk	No significant effects have been identified.
	Protect and enhance the quality of the water environment and water resources	No significant effects have been identified.
	Deliver reliable and resilient water supplies	Two significant positive effects, and one significant positive uncertain effects (Policy Regulation) have been identified that relate to the operation and the following options: • Smart metering; • Mains replacement; and • Policy regulation.

SEA Topic	SEA objective	Significant Effects Identified
Climatic factors	Reduce embodied and operational carbon emissions	Significant negative effects were identified during construction for the following options: • Smart metering; • Mains replacement; and • Policy regulation. Two significant positive effects, and one significant positive uncertain effects (Policy Regulation) have been identified that relate to the operation and the following options: • Smart metering; • Mains replacement; and • Policy regulation.
	Reduce vulnerability to climate change risks and hazards	Two significant positive effects, and one significant positive uncertain effect (Policy Regulation) have been identified that relate to the operation and the following options: • Smart metering; • Mains replacement; and • Policy regulation.
Landscape	Conserve, protect and enhance landscape, townscape and seascape character and visual amenity	No significant effects have been identified for this objective.
Historic environment	Conserve, protect and enhance the historic environment, including archaeology	No significant effects have been identified for this objective.
Population and human health	Maintain and enhance the health and wellbeing of the local community	Significant positive effects were identified during construction for the following options: • Smart metering; • Mains replacement; and • Policy regulation. Two significant positive effects, and one significant positive uncertain effect (Policy Regulation) have been identified that relate to the operation and the following options: • Smart metering; • Mains replacement; and • Policy regulation.
	Maintain and enhance tourism and recreation	No significant effects have been identified for this objective.
Material assets	Minimise resource use and waste production	Significant negative effects were identified during construction for the following options: • Smart metering; • Mains replacement; and • Policy regulation.
	Avoid negative effects on built assets and infrastructure	No significant effects have been identified for this objective.

Cumulative effects

Cumulative effects of the revised preferred programme

For the preferred programme of options, cumulative significant positive effects have been identified for the resilient and reliable water supplies SEA objective and health and wellbeing SEA objective in the operation phase. This reflects the overall increased capacity of the water supply, and likely improvements to its resilience, across the Southern Water area delivered by the preferred programme of options as whole. No further cumulative significant positive effects were assessed.

Significant cumulative negative effects have been identified for the biodiversity SEA objective in the construction and operation phase. This reflects the works required in the construction phase and likely impacts, from, for example, disturbance to designated sites including SSSIs. Some cumulative minor positive effects have also been identified in the operation phase reflecting the achievement of at least 10% biodiversity net gain for some options.

The HRA concluded that no adverse effects on European site integrity are anticipated as a result of the options in combination; however, there are some minor residual uncertainties in relation to sites potentially affected by the desalination options that can only be resolved with more detailed investigations (although mitigation or avoidance measures will almost certainly be available given the long lead time before any potential in combination effects are realised).

Significant cumulative negative effects have also been identified for the water quality SEA objective in the operation phase which reflects the findings of the WFD assessment. Based on available information, the WFD assessment concludes that there may be cumulative effects resulting in WFD non-compliance, to a greater extent than for the options individually, for four catchments. These are the Adur, Arun, Ouse and Medway catchments. However, the nature and scale of those potential cumulative impacts will require further assessment.

Significant cumulative negative effects have also been identified for landscape in the construction phase. This reflects the likely cumulative impact of the construction works required to deliver the preferred programme of options as a whole and particularly the impact on designated landscapes (notably the South Downs National Park and North Downs AONB) in this phase. Construction impacts would be temporary in nature.

Significant negative effects have been identified for the carbon emissions SEA objective in the construction and operation phase. This reflects the scale of embodied carbon in, for example, construction materials, and emissions associated with vehicle movements during the construction phase. There will also be a significant generation of emissions associated with the ongoing operation of the options although some minor positive effects are also likely in the operation phase. Additionally, significant negative effects have been identified for the material assets SEA objective in the construction phase. This reflects the scale of the resources (including concrete, steel and plastics) required to construct the preferred programme of options.

No other significant effects have been identified for the preferred programme as a whole.

Cumulative effects with existing relevant plans, programme and projects

Cumulative effects have been considered in respect of:

- Regional and water resource management plans;
- Other plans (Environment Agency National Drought Plan, River Basin Management Plans (RBMPs), Shoreline Management Plans); and
- Strategic level projects.

In summary, there are potential cumulative/ in-combination effects between Southern Water's rdWRP24 and options within the rdWRMP24s of South East Water, SES Water and Thames Water related to either HRA or WFD assessment which should be given further consideration.

Section 6 of this report provides further information in relation to the assessment of the cumulative effects of the rdWRMP24.

Mitigation measures

Mitigation may be defined as a measure to limit the effect of an identified significant impact or, where possible, to avoid the adverse impact altogether. Consideration of mitigation measures has been an integral part of the SEA process and has informed development of the rdWRMP24. The assessments set out in this report (and its appendices) identify the residual impacts, i.e. those impacts likely to remain after the implementation of reasonable mitigation measures such as operation of water sources in line with regulatory requirements and the use of good construction practice, including measures such as:

- Minimise disturbance to biodiversity during the construction phase, for example by:
  - scheme design to minimise the environmental effects by 'designing to avoid' potential habitat features that may be important e.g. linear features such as hedges or stream corridors. large areas of scrub or woodland. mature trees. etc.) through scheme-specific routing studies.
  - the works programme and requirements for each measure should be determined at the earliest opportunity to allow investigation schemes, surveys and mitigation to be appropriately scheduled and to provide sufficient time for consultations with Natural England.
- Invasive species on site are to be identified and removed in advance of construction.
- Heavy Goods Vehicle (HGV) routing, cap on movements, appropriate working hours.
- Screening around the perimeter of works at the start of construction (creation of landscaping/planting for large scale construction).
- Footpath diversions established regarding construction work including pipelines.
- Resources for construction of the scheme would be sourced locally where possible.
- Minimising removal of spoil from construction sites.
- Runoff from the construction sites would be attenuated and the quality managed according to best construction practices.
- Appropriate pipeline laying techniques regarding river crossings.
- Flood risk management during construction (temporary flood defence and siting of spoil and contaminants away from areas at risk of flooding).
- Siting of temporary and permanent works to minimise impacts on setting of heritage and landscape features.
- Archaeological watching briefs during excavation.
- Noise abatement barriers where required.
- Dust control measures: dampening dust emissions from groundworks and vehicle washing.

The mitigation measures described above would, in some cases, be implemented through Environmental Impact Assessment (EIA) and planning process. In this way, effective mitigation plans can be developed to minimise many of the residual adverse effects currently identified in the SEA appraisals.

Section 7 of this report provides further information in relation to the mitigation of the effects of the rdWRMP24.

Consideration of reasonable alternatives

Southern Water has developed different plan options and tested these under different future growth and demand scenarios to address the future predicted supply deficits. Consistent with WRPG requirements, WRSE outputs and assessments and regulator feedback, Southern Water has selected the Least Cost (Cost Efficient) (LCP) Plan and Best Value Environment and Societal Plan (BESP) as reasonable alternatives to the preferred best value plan (BVP) to be subject to SEA.

Given the scale of the supply-demand deficit and challenges being faced, the investment model often selects the majority of schemes available for the LCP, and BESP as well as the BVP. As a result, there are limited differences between the options being selected, focused principally on phasing of options, although a few options are not selected.

The alternative plans do not include any new schemes or remove any existing schemes selected under the preferred programme (BVP) that are predicted to result in a significant (major) effect. As a result, the summary of significant effects presented for the preferred programme (BVP) are also valid for the alternative plans.

Section 8 of this report provides further information in relation to the assessment of the reasonable alternatives to the rdWRMP24.

Conclusion

Southern Water's rdWRMP24 forecasts significant deficits in supply-demand balance through to 2075 (estimated to be 280.17 Ml/d in 2035 and 552.58 Ml/d in 2075 in the 1-in-500 year or 1:500 Dry Year Annual Average (DYAA) scenario) as a result of growth, climate change impacts and the need to reduce existing abstractions in order to maintain and enhance the environment. Southern Water is investigating the potential environmental impacts of a number of its existing sources under the Water Industry National Environment Programme (WINEP). The majority of these investigations will be complete by 2027 and will be used to determine the scale of any licence reductions needed to achieve Environmental Destination[16].

The forecast deficit will be addressed through the implementation of new options to increase supply as well as measures to reduce demand, including reduction in both leakage and water consumed by household and non-household customers. The supply-side and demand-side options considered are discussed in Annex 12 (Options Appraisal) and Annex 14 (Demand Management Strategy) accompanying the rdWRMP24.

Overall, the rdWRMP24 is considered to have significant positive operational effect against SEA objectives to: deliver reliable and resilient water supplies; and maintain and enhance the health and wellbeing of the local community, including economic and social wellbeing. The additional design capacity for potable water that Southern Water would provide would help to ensure a continual supply of clean drinking water, supporting economic/population growth, generating a positive effect on human health and increasing adaptability to the effects of climate change.

The rdWRMP24 (post mitigation) is also considered to have a range of likely significant negative effects on the following SEA objectives:

- Protect and enhance biodiversity, priority species, vulnerable habitats and habitat connectivity (no loss and improve connectivity where possible);

[16] Environmental Destination is a strategy developed at a regional level to help enhance the natural environment through water resources activities and sustainable abstraction (water removal)

- Protect and enhance the quality of the water environment and water resources;
- Reduce embodied and operational carbon emissions;
- Conserve, protect and enhance landscape, townscape and seascape character and visual amenity;
- Minimise resource use and waste production.

These effects reflect the number, scale, proposed location and findings of the HRA and WFD assessments, including a precautionary view on the treatment of uncertainty. Many of the options have been revised from the dWRMP24, with delivery delayed in the rdWRMP24 to allow sufficient time for investigation and consideration of additional mitigation options.

The HRA has concluded that for a number of options, adverse effects on integrity cannot be excluded. This reflects the desalination plant options concerning either construction (East Thanet, with potential effects arising from the proposed outfall being located within the Outer Thames Estuary SPA and potentially within the Margate and Long Sands SAC) and operation in relation to the hypersaline discharge related to the operation of the desalination schemes:

- Isle of Sheppey regarding impacts on the Medway Estuary and Marshes SPA and Ramsar and Thames Estuary and Marshes SPA and Ramsar;
- River Thames desalination regarding impacts on the Thames Estuary and Marshes SPA and Ramsar;
- East Thanet desalination scheme with regards to Outer Thames Estuary SPA and Margate and Long Sands SAC.

The revised earliest implementation date allow Southern Water to engage with other water companies to review the proposed desalination options on the north Kent coast, with the intention, to be reflected in future WRMPs of a revised, integrated sub-regional solution, providing substantial yield to the benefit of customers, but appropriately sited to avoid and minimise the range of current identified option and cumulative effects.

The WFD assessment found that the supply options could have effects on water quality affecting the ability of some waterbodies to meet WFD objectives. These issues could result in changes to physico-chemical quality elements (e.g. BOD, DO, pH, temperature). Many of the options with potential non-compliance were assessed with low confidence. However, for four options, the WFD assessment concluded the potential for non-compliance with the WFD (with medium compliance). Some of these options involve effluent re-use schemes where the effluent would be discharged to a lake. The others involve a groundwater abstraction. There is limited detail available for these options, and subject to further investigation, it is possible that different conclusions could be drawn with more evidence. Further evidence and assessment is required, and is being progressed through the programme of work to reduce delivery risk as well as programmes to support the Hampshire Water Transfer and Water Recycling Project (HWTWRP) SRO. Given the significant lead in time for some options, it is considered to provide an adequate period with which to conclude such investigations and establish conclusions with which the regulator would concur.

When compared to the assessment of effects the reasonable alternative plan, there are no significant differences between the Southern Water's rdWRMP24 and the alternative plans (the LCP and the BESP) in terms of the predicted cumulative effects. The alternative plans do not remove or add any additional significant effects not already identified for the BVP. However, changes in implementation dates could result in some differences as to when effects may occur, which may also have localised effects, but these would not affect the overall cumulative effects predicted for the plans.

Role of the SEA in developing the rdWRMP24

The SEA, along with the findings of the HRA and WFD assessment, have been used to help inform the development of the rdWRMP24, and enable the consideration of reasonable alternative options for inclusion

in the plan and/or alternative phasing of implementing the different options. In summary, the application of these processes has:

- Informed dialogue with the Environment Agency and Natural England as to the options to be included in the rdWRMP24, their effects and potential for modifications.
- Identified a small number of options that have been excluded from the rdWRMP24 due to environmental and other concerns.
- Supported engineering design changes to six schemes to reflect further mitigation opportunities (Isle of Sheppey desalination, River Arun desalination, Thanet Coast desalination, River Test Managed Aquifer Recharge, Pulborough to Havant Thicket Reservoir transfer, SES to SNZ transfer).
- Fostered sub-regional discussions and commitments to refinement of the proposed desalination options on the north Kent coast, with the intention, to be reflected in future plan cycles, of a revised, integrated solution, providing substantial yield to the benefit of customers, but appropriately sited to avoid and minimise the range of current identified option and cumulative effects.

Monitoring the effects of the WRMP24

Once the WRMP is implemented, its effects on the environment and people will need to be monitored. Monitoring the significant effects of the WRMP can help to answer questions such as:

- Were the SEA predictions of effects accurate?
- Is the WRMP contributing to the achievement of the SEA objectives?
- Are mitigation measures performing as well as expected?
- Are there any adverse effects? Are these within acceptable limits, or is remedial action desirable?

Section 9 of this report identifies a number of potential indicators that could be used for monitoring the effects of the WRMP's implementation. These proposed indicators would form the core component of a monitoring programme to assess whether the identified effects in the SEA are occurring as anticipated, or whether it is giving rise to greater or lesser effects (adverse or beneficial). In turn, the monitoring may identify changes to the mitigation measures necessary to minimise adverse effects and/or modifications to scheme design or operation to further augment beneficial effects.

As options are brought forward for development, further specific monitoring requirements may be set out in detailed designs and plans accompanying scheme development (including, where applicable, formal applications for any required environmental permits or abstraction licences, planning permission, as well as any scheme-specific HRA and WFD assessments). These will be discussed with relevant regulatory and statutory bodies and stakeholders to agree the appropriate scale and duration of such scheme-specific monitoring activities proportionate to the assessed environmental risks.

Monitoring proposals will be considered further and a final monitoring framework that satisfies the requirements of the SEA Regulation will be presented in the Post Adoption Statement.

Section 9 of this report provides further information in relation to the proposed measures for monitoring the effects of the rdWRMP24.

Quality assurance

The Government's guidance on SEA[17] contains a quality assurance checklist to help ensure that the requirements of the SEA Directive are met. The checklist is reproduced in Appendices A to L, demonstrating how this Environmental Report meets these requirements.

Next steps

This Environmental Report is being issued for further consultation to the SEA consultation bodies (the Environment Agency, Historic England and Natural England) and provided as part of the evidence base to support the public consultation on the rdWRMP24.

Following consultation and an analysis of responses and any further work, Southern Water will produce a final WRMP24. This will be submitted to Government. Following receipt of Government direction, Southern Water will publish the Final WRMP24. In conjunction with publishing the final WRMP24, Southern Water will also issue an SEA post adoption statement. This will set out the results of the consultation and SEA processes and the extent to which the findings of the SEA have been accommodated in the final WRMP24.

Once the final WRMP24 has been published, the preferred options for managing water supply and demand contained in it will need to be implemented through specific projects. As part of this process, each project may be subject to further assessment to understand and manage its potential environmental and social impacts. These assessments, which may include HRA and EIA, will take account of the issues discussed in this report but will also be informed by the greater detail available as the work progresses about construction techniques, building materials, agreed locations and routes.

[17] Office of the Deputy Prime Minister (2005) *A Practical Guide to the Strategic Environmental Assessment Directive*.

1 Introduction

1.1 Background and purpose of report

This Strategic Environmental Assessment (SEA) Environmental Report has been prepared in support of the development of Southern Water's Water Resources Management Plan 2024 (WRMP24). A Habitats Regulations Assessment (HRA) and a Water Framework Directive (WFD) assessment have also been carried out in parallel.

SEA is a statutory requirement for plans or programmes which could have significant environmental implications and helps to identify where there are potential impacts and how any negative impacts might be mitigated. More information about SEA, and its role in supporting the development of the WRMP24 is provided in **Section 1.2**.

This Environmental Report presents the findings of the SEA of Southern Water rdWRMP24. The purposes of the report are

- to ensure that the likely significant environmental and socio-economic effects of the rdWRMP24 and any reasonable alternatives are identified, characterised and assessed;
- to help identify appropriate measures to avoid, reduce or mitigate adverse effects and to enhance beneficial effects associated with the implementation of the rdWRMP24 wherever possible;
- to provide a framework for monitoring the potential significant effects arising from the implementation of the rdWRMP24;
- to give the statutory consultees, stakeholders and the wider public the opportunity to review and comment upon the environmental effects that the rdWRMP24 may have on them, their communities and their interests, and to encourage and support them to make responses and suggest improvements to the rdWRMP24;
- to inform Southern Water's decisions on the rdWRMP24; and
- to demonstrate that the rdWRMP24 has been developed in a manner consistent with the requirements of the SEA Regulations.

This Environmental Report presents the review of relevant policies and plans (Section 2) and the baseline environment information (Section 3) that set the context for the assessment that has been carried out in accordance with the assessment methodology (Section 4). The potential effects of the rdWRMP24's revised preferred options are described in Sections 5, with assessment of the cumulative, or in-combination, effects between rdWRMP24 measures and other activities, programmes and plans set out in Section 6. Information regarding mitigation is included in Section 7 and the assessment of reasonable alternatives in Section 8. Information on monitoring measures is provided in Section 9. A quality assurance checklist is provided in Appendices A to L.

This Environmental Report has been updated from the report that presented the findings of the SEA that accompanied the dWRMP24, and was subject to consultation between November 2022 and February 2023.

1.2 Application of SEA to the WRMP24

1.2.1 Overview of Strategic Environmental Assessment

SEA became a statutory requirement in the UK following the adoption[18] of Directive 2001/42/EC (the SEA Directive) on the assessment of effects of certain plans and programmes on the environment. The Directive was transposed into national legislation by The Environmental Assessment of Plans and Programmes Regulations 2004 (referred to as the SEA Regulations)[19].

SEA is a systematic decision support process, aiming to ensure that the likely significant environmental effects of plans and programmes are identified, described and assessed to avoid, manage or mitigate any significant adverse effects and to enhance any beneficial effects. In this context, the purpose of SEA is to encourage relevant plan authors to integrate environmental considerations into the development of any plan or programme. Generally, a SEA is therefore conducted before an Environmental Impact Assessment (EIA) is undertaken.

1.2.2 Requirement for SEA of Southern Water's WRMP24

The SEA Regulation 5 requires "an environmental assessment … of certain plans and programmes which are likely to have significant effects on the environment". Plans and programmes are defined as those:

"*which are subject to preparation and/or adoption by an authority at national, regional or local level or which are prepared by an authority for adoption, through a legislative procedure by Parliament or Government; and which are required by legislative, regulatory or administrative provisions*" (Regulation 2 (1)).

Guidance produced by the European Commission (EC)[20] indicates that in preparing plans for ensuring water resources, privatised utilities companies can be considered an authority because they are providing services that would be carried out by public authorities in a non-privatised regime. The preparation of a WRMP is a statutory requirement and therefore meets the requirements of Regulation 2.

Plans and programmes that may have significant effects on the environment are identified as those:

"*which are prepared for… water management… and which set the framework for future development consent of projects listed in Annexes I and II to Directive 85/337/EEC* [the Environmental Impact Assessment Directive]; *or*

which, in view of the likely effect on sites, have been determined to require an assessment pursuant to Article 6 or 7 of Directive 92/43/ EEC [the Habitats Directive]" (Regulation 5 (2)).

Broadly, this includes plans that may include development of infrastructure to source, store, transfer or manage water, or may affect sites that have European designations (Special Areas of Conservation (SACs), Special Protection Areas (SPAs), and Ramsar sites).

[18] EU law has ceased to apply in the UK under the terms of the Withdrawal Agreement and EU Treaties. The European Union (Withdrawal) Act 2018 (EUWA) has established a new body of domestic law known as retained EU law. Any references to EU Directives in this report should be read as references to the domestic legislation that implemented the Directive (including that domestic legislation as it is revised or replaced from time to time).

[19] The Environmental Assessment of Plans and Programmes Regulations 2004 (Statutory Instrument 2004 No. 1633) apply to any plan or programme which relates solely or in part to England.

[20] EC (2003) *Implementation of Directive 2001/42 on the Assessment of the Effects of Certain Plans and Programmes on the Environment.* Available online: http://ec.europa.eu/environment/archives/eia/pdf/030923_sea_guidance.pdf

Government[21], regulator[22] and industry[23] guidance indicates that there is a requirement for water companies, as responsible authorities, to determine if their WRMPs fall within the scope of the SEA Regulations and whether a SEA must be undertaken.

1.2.3 Applying SEA to Water Resource Management Plans

Southern Water's WRMP24 is subject to SEA. SEA is required based on the scope of the potential effects that could arise, particularly given the number and area covered by European designated conservation sites in the operational area covered by the WRMP. In this context, the purpose of the SEA of the rdWRMP24 is to:

- identify the potentially significant environmental effects of the revised draft plan in terms of the water resource management options being considered;
- help identify appropriate measures to avoid, reduce or manage adverse effects and to enhance beneficial effects associated with the implementation of the draft plan wherever possible;
- give the statutory SEA bodies, stakeholders and the wider public the ability to see and comment upon the effects that the draft plan may have on them, and encourage them to make responses and suggest improvements to the draft plans; and
- inform the development of the final version of the WRMP24.

In summary, the SEA identifies, describes and assesses the likely significant effects arising from the following aspects of the WRMP24:

- the constrained water resource options;
- the preferred water resources options;
- the preferred programme of options selected to comprise the preferred plan to address the supply demand deficit;
- any cumulative, secondary and/or synergistic effects of implementing the plans;
- any alternative plans proposed to address the supply demand deficit.

Where relevant, any assessment work that has already been completed e.g., as part of the RAPID[24] gated submission process for the SROs, this will be used to inform the assessments of the options as they are presented.

[21] Office of the Deputy Prime Minister (ODPM), Scottish Executive, Welsh Assembly Government and Department of the Environment Northern Ireland (2005) A *Practical Guide to the SEA Directive and European Commission (2001) Assessment of plans and projects significantly affecting Natura 2000 sites*

[22] UK Government (2023) *Water Resource Planning Guideline* [online]. Available at: https://www.gov.uk/government/publications/water-resources-planning-guideline/water-resources-planning-guideline

[23] UKWIR (2021) *Environmental Assessment Guidance for Water Resources Management Plans and Drought Plans*. Report Ref. No. 21/WR/02/15

[24] Regulators Alliance for Progressing Infrastructure Development (RAPID) was established in 2019 to "*help accelerate the development of new water infrastructure and design future regulatory frameworks. The joint team is made up of the 3 water regulators Ofwat, Environment Agency and Drinking Water Inspectorate".* Available online https://www.ofwat.gov.uk/regulated-companies/rapid/3/

1.3 Southern Water supply area and the WRMP24

1.3.1 Southern Water's supply area

Southern Water provides water supplies to nearly 2.6 million customers across an area of 4,450km^2, extending from East Kent, through parts of Sussex, to Hampshire and the Isle of Wight in the west.

Water supplies are predominantly reliant on the transmission and storage of groundwater from the widespread chalk aquifer that underlies much of the region. This extends throughout parts of Kent, Sussex, Hampshire and the Isle of Wight; and makes up 70% of the total water supply. River abstractions account for 23% of the water supplies, most notably the Eastern Yar and Medina on the Isle of Wight, the Rivers Test and Itchen in Hampshire, the Western Rother and Arun in West Sussex, the River Eastern Rother and River Brede in East Sussex, and the River Teise, River Medway and Great Stour in Kent. Four surface water impounding reservoirs provide the remaining 7% of water supplies: Bewl Water, Darwell, Powdermill and Weir Wood. The total storage capacity of these four reservoirs amounts to 42,390Ml. South East Water is entitled to 25% of the available supplies from the River Medway Scheme, which incorporates Bewl Water Reservoir.

Although the South East is one of the driest regions in the UK, rainfall is still integral to the maintenance of water supplies. During winter, when most of the effective rainfall occurs, groundwater reserves are recharged naturally through infiltration processes. Rain infiltrates through the soil to recharge the natural storage in the underlying groundwater to support river baseflows for the following year. Annual rainfall averages 730mm across the Southern Water region. Rainfall experienced outside of winter is of less value to groundwater recharge as it is mostly lost to evaporation, plant transpiration or runs off directly into rivers from the land.

The Southern Water region is divided into fourteen Water Resource Zones (WRZs) which are geographically separate and amalgamated into three larger, sub-regional areas (see Figure 1):

Western area - comprising the following seven WRZs:

- Hampshire Near Basingstoke (HKZ);
- Hampshire Andover (HAZ);
- Isle of Wight (IOW);
- Hampshire Rural (HRZ);
- Hampshire Winchester (HWZ);
- Hampshire Southampton East (HSE);
- Hampshire Southampton West (HSW).

Central area - comprising the following three WRZs:

- Sussex North (SNZ);
- Sussex Worthing (SWZ);
- Sussex Brighton (SBZ).

Eastern area - comprising the following four WRZs:

- Kent Medway East (KME);
- Kent Medway West (KMW);
- Kent Thanet (KTZ);
- Sussex Hastings (SHZ).

A number of bulk water supplies are made between Southern Water and several adjacent water companies. Southern Water's supply area is bounded by eight other water companies:

- Affinity Water;
- Cholderton and District Water;
- Portsmouth Water;
- SES Water;
- South East Water;
- South West Water;
- Thames Water;
- Wessex Water.

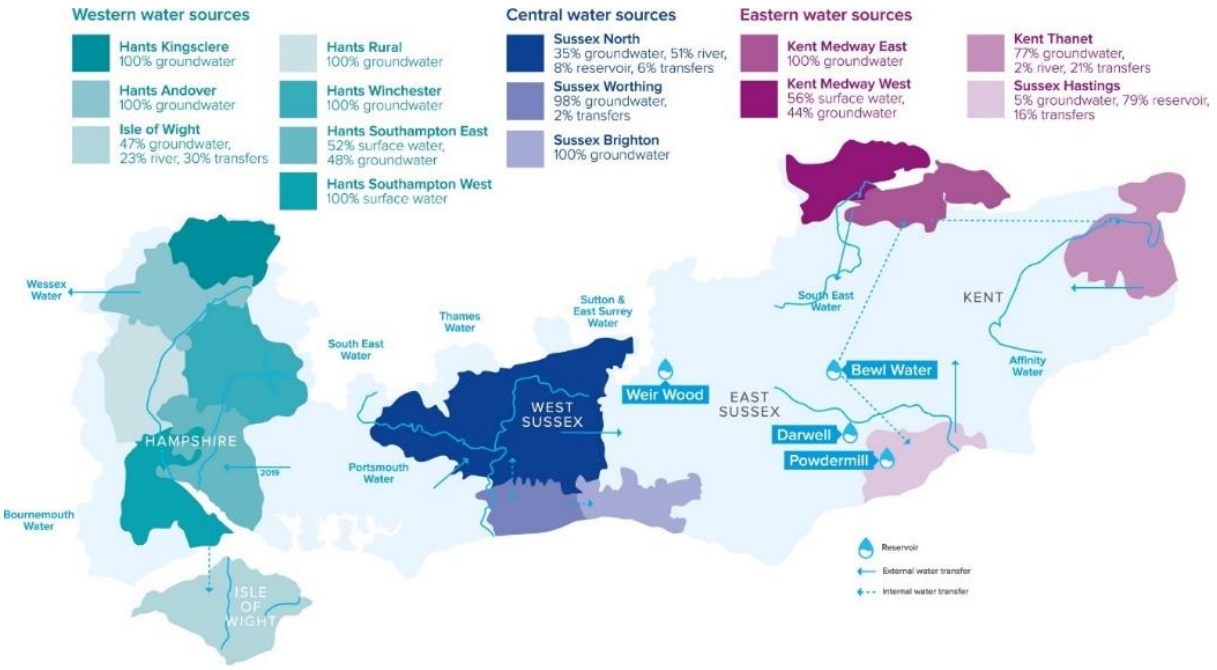

Figure 1: Southern Water's supply area.

The geographical area under consideration for the SEA covers all of Southern Water's WRZs as well as the river and/or groundwater catchments of those water sources and sources of bulk water supply imports that serve these WRZs but which lie outside their boundaries (see Figure 2).

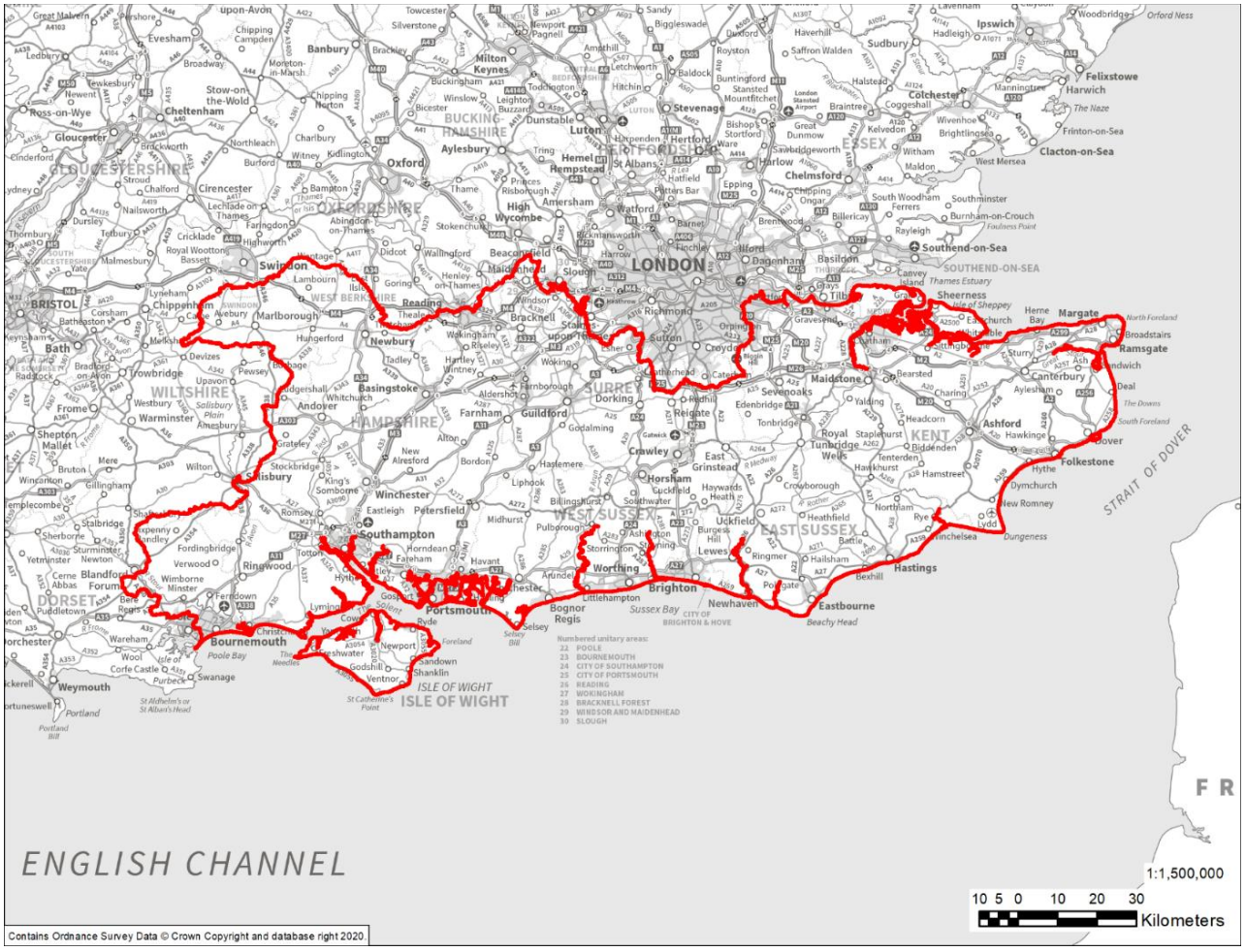

Figure 2: SEA area under consideration.

1.4 Southern Water's WRMP process

1.4.1 Overview

Water resources management planning is undertaken by all water companies in England and Wales in order to ensure reliable, resilient water supplies over the long-term planning horizon. The process includes working out and forecasting how much water customers will need over the planning period (assessing demand) and how best to provide it (assessing options to reduce or constrain demand growth and/or augment reliable supplies of water) in an efficient, timely manner (programme appraisal). Companies identify the preferred, 'best value' programme of demand management and water supply options to develop an overall strategy to maintain a balance between reliable supply and demand in each WRZ and for their supply area as whole (the WRMP). Water companies in England and Wales have a statutory requirement to prepare a WRMP every five years. Each water company's WRMP sets out how the balance between water supply and demand, and security of supply, will be maintained over a minimum of 25 years in a way that is economically, socially and environmentally sustainable. This will include public water supply (PWS) and non-public water supply (non-PWS).

1.4.2 WRMP24 objectives

The over-arching 'best value' planning objectives to meet statutory and policy requirements are:

- Deliver a secure and wholesome supply of water;
- Deliver environmental and social benefit;
- Increase the resilience of water systems;
- Deliver at a cost that is acceptable to customers.

Table 1-1 sets out these objectives and the associated criteria and metrics for the delivery of the WRMP[25].

Table 1-1 WRMP objectives, criteria and metrics.

Best value objective	Criteria	Metric
Deliver a secure and wholesome supply of water to customers and other sectors to 2075	Meet the supply demand balance	Public water supply - supply demand balance profile (Ml/d) Provides additional water needed by other sectors (Ml/d)
	Leakage	50% reduction in leakage by each company by 2050 from 2017-18 baseline (%) % leakage reduction above 50%
	Water into supply	Distribution input (DI) per property (litres per day)
	Customer preference	Customer preference for option type (score)
Deliver environmental improvement and social benefit	Strategic Environmental Assessment (SEA)	Programme benefit (score max) Programme disbenefit (score min)
	Natural capital	Enhancement of natural capital value (£m)
	Abstraction reduction	Reduction in the volume of water abstracted at identified sites (Ml/d) and by when (date)
	Biodiversity	Net gain score (%)
	Carbon	Cost of carbon offsetting (£m)
Increase the resilience of the region's water systems	Drought resilience	Achieve 1:500 drought resilience (date achieved)
	Resilience assessment reliability	Programme reliability score
	Resilience assessment adaptability	Programme adaptability score
	Resilience assessment evolvability	Programme evolvability score
Deliverable at a cost that is acceptable to customer	Programme cost	Net present value (£m) using the social time preference rate (STPR)
	Inter-generational equity	Net present value (£m) using the long-term discount rate (LTDR)

1.4.3 WRMP24 development

National guidance[26] requires alignment of water company WRMPs with the regional plan. In consequence, Southern Water has worked with Water Resources South East (WRSE), a collaboration of the six[27] water companies that supply water in south east England, to develop and apply a consistent framework for water

[25] Draft Water Resources Management Plan 2024: Technical Report, October 2022, Version 0.1

[26] UK Government (2023) *Water Resource Planning Guideline* [online]. Available at: https://www.gov.uk/government/publications/water-resources-planning-guideline/water-resources-planning-guideline.

[27] Affinity Water, Portsmouth Water, SES Water, South East Water, Southern Water and Thames Water

resource plan development, with work split between the regional and company level. This included the following stages:

1. Prepare supply-demand balance information.
2. Develop a list of options that considers government policy and aspirations.
3. Undertake problem characterisation and evaluate strategic needs and complexity.
4. Decide on a modelling method.
5. Identify and define data inputs to model(s).
6. Undertake modelling to inform decision-making.
7. Carry out sensitivity tests.
8. Produce a final planning forecast.

Steps 1-3 have primarily been undertaken by member water companies individually. WRSE has progressed steps 4-8 after agreeing on an approach with members and consulting on the overall method with other stakeholders.

In line with the steps identified, Southern Water has developed a supply-demand balance to identify those water resource zones[28] (WRZs) in deficit over the lifetime of the plan (and so where additional water resources are required). The WRMP presents options for the resolution of the WRZ deficit. Option selection for the revised draft WRMP entails the following steps:

- Identification of an **unconstrained list** of options.
- Screening and filtering of the list against initial screening criteria to develop a **feasible list**.
- Options that are impractical or have unacceptable environmental or economic impacts are removed. Screening against final screening criteria to arrive at a **constrained list**. Constrained options are taken forward into the decision-making modelling process.
- **Environmental assessment** of the options as part of the Strategic Environmental Assessment (SEA), Habitats Regulations Assessment (HRA) and WFD assessment processes.

The unconstrained list of options 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.

The unconstrained list of options was assessed 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?

[28] UK Government (2023) *Water Resource Planning Guideline [online*]. Available at: https://www.gov.uk/government/publications/waterresources-planning-guideline/water-resources-planning-guideline

Section 4.4. of the WRPG defines a water resource zone as “an area within which the sources of water and distribution of water to meet demand, is largely self-contained (with the exception of agreed bulk transfers)”.

- **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 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 WFD non-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.

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

- Are there are 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?

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.

Screening against these criteria has led to the identification of the feasible options list. Constrained options are taken forward into the decision-making modelling process. All the options on the constrained options list are considered to be viable and potentially deliverable and are, therefore, made available for selection in the investment modelling process. The constrained options are subject to more detailed engineering and environmental assessment, to provide consistent and comparable information as an input to the selection of options for the rdWRMP24 which includes investigations and assessments to provide:

- engineering description and designs to calculate a cost;
- the earliest potential start date, taking account of construction complexity, likely planning constraints and risks, and environmental and other investigations likely to be required to implement the scheme;
- likely costs - capital expenditure, operating and financing costs;
- carbon emissions - embodied carbon (the lifecycle carbon emissions of materials used in construction) and operational carbon (emitted through operation of the scheme over its lifetime);
- environmental and social considerations - impacts and costs informed by the Strategic Environmental Assessment (SEA), more general environmental assessment, Habitats Regulations Assessment (HRA) and its ability to meet the WFD objectives;
- the water savings across a range of potential drought event scenarios.

The options selected by the investment model, under various planning scenarios in each WRZ, form the list of 'preferred options' in the rdWRMP24.

Types of water resource management options considered to meet any forecast deficit in a WRZ can include:

- **Customer options** which include measures to manage the demand for water such as smart meters, rainwater harvesting, greywater recycling or household visits to install water efficiency measures;
- **Distribution options** which include measures to optimise the efficiency of water networks, reduce leakage and minimise any unscheduled resource losses;
- **Production options** include measures to increase the efficiency and effectiveness of treatment processes;
- **Resource management options** which include measures to increase supply such as greater peak output at existing groundwater sources, reservoir or surface water supply and which will include SROs; this also includes catchment management options, for example nature-based solutions;
- **Non-PWS options** which include any options which increase water resource availability or reduce the need for abstraction outside of that needed for public water supplies.

The preferred plan options that collectively comprise the proposed plan programme. In developing the preferred programme, consideration is given to alternative plan programmes (or pathways) developed in response to different scenarios, to resolve any supply deficits in relation to financial, environmental and social costing and, potentially, to facilitate water trading between companies.

1.4.4 SWS Revised Draft WRMP24 (rdWRMP24)

To meet the challenge of securing sustainable, long-term water supplies and to protect the environment, Southern Water strategy is built on four pillars that work in tandem to deliver a step change in water resources planning:

- Efficient use of water and minimal wastage across society;
- New water sources that provide resilient and sustainable supplies;
- A network that can move water around the region;
- Catchment and nature-based solutions that improve the environment.

The overall aims of the rdWRMP24 are to:

- reduce consumption by household customers in order to reduce average Per Capita Consumption to 110 litres per head per day by 2045 under dry year conditions.
- reduce leakage by 53% by 2050 compared to 2017-18.
- reduce non-household consumption by 9% compared to 2019-20 by 2037-38;
- promote catchment and nature-based solutions through our Catchment First programme to improve environmental resilience;
- stop the use of all supply-side drought permits and orders by 2040-41 at the latest, unless faced with a drought of more than 1-in-500 year severity.

The Western area strategy involves:

- continuation of all existing internal transfers as well as external bulk imports and exports;
- implementing water efficiency programmes to reduce household and non-household consumption from 2025-26 to reduce consumption by 39.2Ml/d by 2049-50;
- implementing leakage reduction measures from 2025-26 to reduce leakage by 9.9Ml/d by 2049-50;
- removing constraints at Newbury groundwater source to increase yield (1.2Ml/d) from 2027-28;
- drilling new boreholes at Romsey to provide 4.8Ml/d from 2030-31;
- removing constraints and Kings Sombourne groundwater source to provide additional 2.5Ml/d from 2030-31;
- increasing transfer capacity between Hampshire Rural and Hampshire Southampton West water resource zones through the Romsey Town and Broadlands valve to transfer an additional 5Ml/d from 2030-31;
- delivering Sandown Wastewater Treatment Works recycling scheme to provide up to 8.5Ml/d from 2030-31;
- constructing 'Hampshire grid' to move water more easily in the Hampshire area from 2030-31;
- implementing bulk import of up to 45Ml/d from Norway via sea tankers during severe droughts (1-in-200 year or greater severity) between 2030-31 and 2033-34;
- bulk import (up to 21Ml/d) from Portsmouth Water to Otterbourne Water Supply Works from 2031-32 following the construction of Havant Thicket Reservoir;
- bulk import (up to 90Ml/d) from Havant Thicket Reservoir to Otterbourne Water Supply Works from 2034-35 following the delivery of Hampshire Water Transfer and Water Recycling Project;
- implementing Test MAR groundwater scheme to provide up to 5.5Ml/d from 2035-36;
- drilling new boreholes at Newchurch groundwater source to increase yield by 1.9Ml/d from 2036-37;
- drilling new boreholes at Eastern Yar3 groundwater source to increase yield (1.5Ml/d) from 2039-40;
- bulk import (up to 120Ml/d) into Hampshire through Thames to Southern Transfer from 2039-40;
- terminating the use of Lower Itchen Drought Permit/Order after 2029-30 under any drought condition;
- terminating the use of Candover Drought Permit/Order by after 2033-34 under any drought condition;
- terminating the use of River Test Drought Permit/Order after 2033-34 under droughts of up to 1-in-200 year severity;
- terminating the use of all supply-side drought permits/orders after 2040-41 unless faced with a drought of more than 1-in-500 year severity;
- continuing to use Temporary Use Bans and Non-Essential Use Bans to manage demand during droughts.

The **Central area** strategy includes:

- continuation of all existing internal transfers as well as external bulk imports and exports;
- implementing water efficiency programme to reduce household and non-household consumption from 2025-26 by 35.8Ml/d by 2049-50;
- implementing leakage reduction measures from 2025-26 to reduce leakage by 7.6Ml/d by 2049-50;
- bulk import from SES Water (up to 4Ml/d) from 2025-26 to 2030-31;
- reinstating West Chiltington groundwater source to provide up to 3.1Ml/d from 2028-29;
- refurbishing Petersfield groundwater source to provide up to 1.6Ml/d from 2028-29;
- terminating the use of Pulborough surface water drought permit/order after 2029-30 under droughts of up to 1-in-200 year drought severity;
- delivering Weir Wood Reservoir with 21Ml/d treatment capacity from 2030-31
- drilling new boreholes at Petworth to provide up to 4Ml/d from 2030-31;
- asset enhancement at Lewes Road groundwater source to provide up to 3.5Ml/d from 2030-31;
- recycled water from Littlehampton Wastewater Treatment Works (up to 15Ml/d) from 2030-31;
- bulk import from SES Water of up to 10Ml/d from 2033-34;
- bulk import (up 10Ml/d) from South East Water to Pulborough from 2039-40;
- bulk import (up to 50Ml/d) from Havant Thicket Reservoir to Pulborough from 2039-40;
- building pipeline to transfer up to 35Ml/d between Pulborough and Worthing from 2039-40;
- improving treatment capacity at Pulborough to provide up to 2Ml/d from 2040-41;
- building pipeline up to 4Ml/d between Worthing and Brighton from 2040-41;
- building a desalination plant close to the River Arun from 2040-41 to delivery up to 40Ml/d by 2049-50;
- new transfer (up to 20Ml/d) between Worthing and Brighton from 2040-41;
- construction of River Adur Offline Storage to provide up to 19.5Ml/d from 2045-46;
- use of recycled water from Horsham Wastewater Treatment Works with storage at Pulborough to provide up to 11.5Ml/d from 2057-58;
- bulk import (up to 20Ml/d) from South East Water to Brighton from 2065-66;
- terminating the use of all supply-side drought permits/orders after 2040-41 unless faced with a drought of more than 1-in-500 year severity;
- continuing to use Temporary Use Bans and Non-Essential Use Bans to manage demand during droughts.

The **Eastern area** strategy involves:

- continuation of all existing internal transfers as well as external bulk imports and exports;
- implementing water efficiency programme to reduce household and non-household consumption from 2025-26 to reduce demand by 37.4Ml/d by 2049-50;
- implementing leakage reduction measures from 2025-26 to reduce leakage by 10.9Ml/d by 2049-50;
- recycling from Medway Wastewater Treatment Works for up to 14Ml/d from 2030-31;
- recycling from an industrial source in Sittingbourne (7.5M/d) from 2030-31;
- recommissioning Gravesend groundwater source (2.7Ml/d) from 2030-31;
- conjunctive use of Bewl Water with recycled water from Tonbridge Wastewater Treatment Works to provide up to 5.7Ml/d from 2035-36;
- reconfiguring Rye Wells to provide up to 1.5Ml/d benefit from 2039-40;
- setting up a desalination plant on the Thames Estuary from 2039-40 to provide up to 40Ml/d;
- setting up a desalination plant on the Isle of Sheppey to provide up to 20Ml/d from 2040-41, increasing to 30Ml/d by 2062-63;
- setting up a desalination plant in East Thanet to provide 20Ml/d from 2040-41, increasing to 40Ml/d by 2049-50;

- bulk import (up to 20Ml/d) from South East Water to near Canterbury from 2049-50;
- bulk import (up to 10Ml/d) from South East Water to Rye from 2049-50;
- conjunctive use of Darwell Reservoir with recycled water from Hastings Wastewater Treatment Works (up to 15.3Ml/d) from 2050-51;
- raising Bewl Water by 0.4m for up to 3Ml/d benefit from 2060-61;
- terminating the use of all supply-side drought permits/orders after 2040-41 unless faced with a drought of more than 1-in-500 year severity;
- continuing to use Temporary Use Bans and Non-Essential Use Bans to manage demand drought droughts.

Once the final WRMP24 has been published, the selected schemes for water resource management will need to be implemented through specific projects. As part of this process, further study, investigations and assessment will be undertaken to understand and manage the potential environmental and social impacts. These assessments, which may include HRA and EIA, will take account of the issues discussed in this Environmental Report but will also be informed by the greater detail available as work progresses regarding option design, siting and pipeline routing, construction methods and scheme operation. All will be supported by active engagement with the relevant regulators.

1.4.5 Changes from the dWRMP24

As a result of further modelling carried out by WRSE and engagement with regulators, Southern Water has made several changes to the draft WRMP24 submitted in September 2023. These are summarised below:

- the removal of options that are no longer required, or for clarity / consistency where bi-directional schemes are proposed;
- the addition of three new 'resilience options' comprising two new supply-side groundwater schemes and one new drought option;
- the inclusion of two WRMP19 options that were not explicitly noted previously;
- minor amendments to some supply-side network schemes (reflecting further engineering information);
- amendments to the first year and/or yield for some options;
- other minor amendments to reflect consultation responses.

1.5 Stages of Strategic Environmental Assessment

SEA comprises five key stages:

- **Stage A:** Scoping;
- **Stage B:** Develop and Refine Alternatives and Assess Effects;
- **Stage C:** Prepare Environmental Report;
- **Stage D:** Consult on the Draft Plan and Environmental Report and Prepare the Post Adoption (SEA) Statement; and
- **Stage E:** Monitor Environmental Effects.

Stage A of the SEA of the WRMP24 has been summarised in a scoping technical note. The scoping stage itself comprises five tasks that are listed below:

i. Review of other relevant policies, plans, programmes and strategies (hereafter referred to as 'plans and programmes').

ii. Collation and analysis of baseline information.

iii. Identification of key sustainability issues.

iv. Development of the assessment framework.

v. Consultation on the scope of the SEA (this Scoping Report).

The scoping technical note set out the approach to assessing the likely significant environmental effects of the rdWRMP24. It was issued for scoping consultation for 5 weeks from 21st February to 27th March 2022. The representations received and how they have been taken into account are presented in Error! Reference source not found..

Following consultation, and amendment as appropriate, the assessment framework has been used for assessing the likely significant effects (including cumulative effects) of the water resource options contained in the WRMP24 and any reasonable alternatives (**Stage B**).

These assessments are presented in this Environmental Report (in a form to meet the requirements of Schedule 2 of the SEA Regulations) which has been completed to accompany the Draft (and the Revised Draft) WRMP24 (**Stage C**).

An early regulator consultation on the draft SEA of the dWRMP24 was undertaken in June 2022. The representations received and how they have been taken into account are presented in Error! Reference source not found..

The dWRMP24 and accompanying documents including the Environmental Report were submitted to the Secretary of State for Environment, Food and Rural Affairs, for a request for publication. Following direction, Southern Water published the documents for consultation from 14th November 2022 and 20th February 2023 (**Stage D**). A summary of the representations received and how they have been taken into account are presented in Error! Reference source not found.. Following consultation, Southern Water prepared a Statement of Response to the representations received.

It then completed further work reflecting revisions to the drought resilience and demand management expectations which led to amendments to the dWRMP24 and a rdWRMP24 was completed and given the changes, was also subject to further environmental assessment. The rdWRMP24 and accompanying documents including the Environmental Report will then be submitted to the Secretary of State for Environment, Food and Rural Affairs, for a request for publication and once directed to do so, Southern Water will publish the documents for further consultation (**Stage D**). Following consultation, a final dWRMP24 will be completed, and if changes are likely to be significant, is likely to be subject to further assessment. It will be sent to the Government, and following direction, the final WRMP24 will be published and implemented accordingly. In conjunction with publishing the final WRMP24, a Post Adoption Statement will also be issued (to meet the requirements of SEA regulation 16 (4)). This will set out the results of the consultation and SEA processes and the extent to which the findings of the SEA have been accommodated in the final plan.

The SEA requires monitoring of any resulting environmental effects of the WRMP24 (**Stage E**).

1.5.1 WRSE environmental assessment

Southern Water is developing its WRMP24 within the context of the WRSE Draft and Revised Draft Regional Plan[29,30]. The interactions and the need for consistency between the regional plans and the WRMPs, and between regions has driven development of new approaches and methodologies in the preparation of water

[29] WRSE (2022) Futureproofing our water supplies: A Consultation On Our Draft Regional Plan For South East England, November 2022. Available at: https://www.wrse.org.uk/media/va1bz21z/10306a_wrse-bv-plan-2022final_online.pdf

[30] WRSE (2023) Futureproofing our water supplies: Summary Of Our Revised Draft Plan For South East England https://www.wrse.org.uk/media/u0knltxt/wrse-regional-plan-summary-august-2023_final.pdf

resources plans. In this regard, WRSE commissioned the development of a new integrated environmental appraisal process to provide a consistent framework for environmental assessments for WRMP24. The method[31] has been developed taking into account the guidance from the EA and uses an integrated approach covering SEA, HRA, WFD assessment, Natural Capital Assessment (NCA) and Biodiversity Net Gain (BNG). A separate SEA Scoping Report[32] was published in September 2020. It was subject to consultation in 2020 and has been revised[33].

The revised environmental assessment methodology provides the approach to assessment for water companies when undertaking their WRMP24 regulatory environmental assessments. For the SEA, this includes the SEA Assessment framework used to undertake the assessment of the Southern Water dWRMP24 and rdWRMP24. Further work however has been identified and undertaken to ensure the assessments reflect Southern Water requirements. This is also acknowledged in paragraph 1.36 of the post consultation environmental assessment method statement, which outlines specific actions to be undertaken by individual water companies when undertaking the assessments:

- "Collection, analysis and presentation of locally relevant plans and programmes to supplement the WRSE plans and programmes database.
- Collection, analysis and presentation of local baseline information to supplement the environmental datasets defined under the SEA topics.
- Identification, development and/or selection of local relevant assessment sub-objectives to provide a tailored assessment.
- Completion of an SEA for WRMP24."

In applying SEA to the Southern Water rdWRMP24, implementation has:

- Used the WRSE Regional Plan SEA Scoping Report[34] and consultation responses received as the basis of the proposed approach to assessment (including the relevant contextual information, the 14 assessment objectives and the assessment scoring criteria). This formed the basis of the revised approach to assessment contained in a Southern Water scoping technical note issued for separate scoping consultation for 5 weeks from 21st February to 27th March 2022. Consistent with paragraph 1.36 of the WRSE Method Statement, where relevant, the contextual information (including the review of plans and programmes and baseline information) has been revised to supplement the information already collated and presented.
- Further revised the approach to assessment of the revised preferred options, reflecting comments received on the dWRMP24 Environmental Report to ensure the consistent treatment of designated conservation, heritage and landscape sites and features within the assessment. These changes are summarised in Section 4.4.4.
- Used the further revised SEA assessment methodology to complete:
  - an assessment of the likely significant effects of the revised preferred options for each of Southern Water WRZs in deficit;

[31] WRSE (2020) WRSE Method Statement: Environmental Assessment Consultation version July 2020. Available at: https://www.wrse.org.uk/media/wjig1mdu/wrse_file_1329_wrse-ms-environmental-assessment.pdf

[32] WRSE (2020) WRSE Regional Plan Strategic Environmental Assessment Scoping Report. Available at https://www.wrse.org.uk/media/51vdwyw0/wrse-regional-plan-strategic-environmental-assessment-scoping-report.pdf

[33] WRSE (2021) *Method Statement: Environmental Assessment Post-consultation version*, November 2021. Available at: https://www.wrse.org.uk/media/qmtb1e5v/method-statement-environmental-assessment-nov-2021.pdf

[34] https://www.wrse.org.uk/media/51vdwyw0/wrse-regional-plan-strategic-environmental-assessment-scoping-report.pdf

  - an assessment of the effects of the revised preferred programme of options and any identified alternative plan pathways;
  - an assessment of the cumulative effects with other infrastructure proposals or plans will be considered and assessed including, in particular, other water company WRMPs, the Regional Plan and SROs.
- Present the findings of the environmental assessment in an Environmental Report, consistent with the requirements of Schedule 2 of the SEA Regulations to accompany the draft and rdWRMP24.

1.6 Consultation

1.6.1 Consultation on the scoping report

Consultation bodies, stakeholders and the public were invited to express their views on the proposed scope of the SEA in accordance with SEA Regulation 12(5). The scoping information was issued on 2nd February 2022 to the Environment Agency, Historic England and Natural England. The responses to comments provided on the updated scoping information and how these have been taken into account in carrying out the SEA are presented in Error! Reference source not found..

1.6.2 Consultation on the environmental report

In June 2022 Southern Water submitted an early dWRMP24 submission to Defra as required by the WRMP Direction 2022. This was accompanied by an Environmental Report. This enabled Southern Water to take on board some early feedback which has influenced the development of the plan and accompanying assessments. The specific comments received from the Environment Agency on the draft Environmental Report (June 2022) are summarised in Error! Reference source not found., along with details on how these have been addressed.

Southern Water consulted on the dWRMP24 and supporting technical documents (including the Environmental Report) between 14th November 2022 and 20th February 2023. Over 500 responses were received including a limited number (ten) on the Environmental Report. The comments received from consultees on the draft Environmental Report (October 2022) are set out in Error! Reference source not found., along with information on how these have been addressed in this revised Environmental Report.

Southern Water submitted a draft WRMP24, Statement of Response and a revised Environmental Report to regulators in September 2023. Comments were received from the Environment Agency on the Environmental Report and these are set out in Appendix E.

Southern Water are seeking from the Secretary of State to undertake a further consultation on the rdWRMP24 in Autumn 2024. If permission is granted, this revised Environmental Report will also be issued for consultation.

1.7 Habitats Regulations Assessment

Regulations 63 and 64 of The Conservation of Habitats and Species Regulations (2017) (the 'Habitats Regulations') transpose the provisions of Articles 6(3) and 6(4) of Council Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora (the 'Habitats Directive') as they relate to plans or projects in England and Wales. Regulation 63 states that if a plan or project is "(*a) is likely to have a*

significant effect on a European site[35] *or a European offshore marine site*[36] *(either alone or in combination with other plans or projects); and (b) is not directly connected with or necessary to the management of the site*" then the competent authority must "…*make an appropriate assessment of the implications for the site in view of that site's conservation objectives*" before the giving consent or authorisation (etc.).

The plan or project can only be given effect if it can be concluded (following an 'appropriate assessment') that it *"…will not adversely affect the integrity*" of a site, unless the provisions of Regulation 64 are met.

The process by which Regulation 63 (and, if applicable, Regulation 64) is met is known as Habitats Regulation Assessment (HRA)[37]. An HRA determines whether there will be any 'likely significant effects' on any European site as a result of a plan's implementation (either on its own or 'in combination' with other plans or projects)[38] and, if so, whether there will be any 'adverse effects on site integrity'[39].

Water resource plans (whether WRMPs or Regional Plans) are not explicitly included within this legislation, although the regulator guidance[40] requires that it should extend to the WRMP if the preferred plan "*would be likely to have a significant effect on a European site (either alone or in combination with other plans or projects)*". The Habitats Regulations require every Competent Authority, in the exercise of any of its functions, to have regard to the requirements of the Habitats Directive. The water companies have a statutory duty to prepare WRMP24 and are therefore the Competent Authority for an HRA.

A HRA was undertaken for the dWRMP24 and this has been updated for the rdWRMP24 to ensure that the preferred plan has been assessed in accordance with Regulation 63 of the Habitats Regulations. Whilst the HRAs has been undertaken and reported separately from the SEAs, its findings have been used as appropriate to inform the findings of this SEA, notably against the biodiversity, fauna and flora topic.

1.8 Water Framework Directive assessment

The Water Framework Directive[41] (WFD) has been enacted into UK legislation as the Water Environment (Water Framework Directive) (England and Wales) Regulations 2017 in England and Wales.

The WFD sets a default objective for all rivers, lakes, estuaries, groundwater and coastal water bodies to achieve 'good' status or potential by 2027 at the latest. The current (baseline) status (e.g., 2015 classification), and the measures required to achieve the 2027 status objective, are set out for each water body in the relevant River Basin Management Plans (RBMPs), prepared by the EA and NRW every six years. The current, updated RBMPs were published in October 2022.

[35] Strictly, 'European sites' are: any Special Area of Conservation (SAC) from the point at which the European Commission and the UK Government agreed the site as a 'Site of Community Importance' (SCI) (if this was before 31 Jan 2020); any classified Special Protection Area (SPA); and any candidate SAC (cSAC). However, the term is also commonly used when referring to potential SPAs (pSPAs), to which the provisions of Article 4(4) of Directive 2009/147/EC (the 'new wild birds directive') apply; and to possible SACs (pSACs) and listed Ramsar Sites. "European site" is therefore used in this proposal in its broadest sense, as an umbrella term for all of the above designated sites.

[36] 'European offshore marine sites' are defined by Regulation 18 of *The Conservation of Offshore Marine Habitats and Species Regulations 2017*; these regulations cover waters (and hence sites) over 12 nautical miles from the coast.

[37] The term 'Appropriate Assessment' has been historically used to describe the process of assessment; however, the process is now more accurately termed 'HRA', with the term 'Appropriate Assessment' limited to the specific stage within the process.

[38] Also referred to as the 'test of significance'.

[39] Also referred to as the 'integrity test'.

[40] EA, Ofwat and NRW (2023) *Water Resource Planning Guidance* (WRPG) [online]. Available at: Water resources planning guideline - GOV.UK (www.gov.uk) [Accessed August 2023].

[41] European Union (2000) Directive 2000/60/EC of the European Parliament and of the Council.

In undertaking the WFD assessment of the WRMP24, Southern Water is seeking to demonstrate that the plan will not cause a deterioration in respect of these baseline conditions. Furthermore, for those water bodies that are not currently attaining good status, Southern Water must be able to confirm that WRMP24 would not preclude the delivery of measures to facilitate the improvements needed to attain good status. Where a plan is assessed as WFD non-compliant, in circumstances where there is an over-riding public interest or the benefits of achieving the WFD Assessment Objectives are outweighed by benefits to human health, human safety or sustainable development there is scope to apply for a Regulation 19 exemption as to why these WFD Assessment Objectives are not achieved.

A separate WFD assessment has been undertaken for the dWRMP24 to provide the evidence base to respond to these requirements. The WFD assessment has been updated for the rdWRMP24 and, where appropriate, the findings have been used to inform this SEA, notably against the water quality topic.

1.9 Structure of this report

This SEA Environmental Report presents the findings of the assessment of the constrained, preferred options and programme of options that comprise the cost efficient WRMP24**.** It provides the public, stakeholders and regulatory bodies with an opportunity to express their opinions on the findings of the assessment. The Environmental Report is structured as follows:

- Section 1 (this section): describes the requirement for, purpose and process of the SEA, and its context in relation to the WRMP24.
- Section 2 - Policy Context: identifies key messages and environmental protection objectives from other relevant plans and programmes.
- Section 3 - Environmental Baseline Review: draws out the key environmental issues Southern Water intends to consider in the SEA. Identifies the current and future baseline conditions within the area of potential influence of the WRMP24.
- Section 4 - Methodology: outlines the revised approach to the SEA of the revised draft WRMP including the scoping, timeframe and assessment framework comprising assessment objectives and guide questions, categorisation of effects including the cumulative effects and assessment of reasonable alternatives.
- Section 5 - Assessment of the rdWRMP24: presents the summary of the likely significant effects of the rdWRMP24 options, by WRZ against the SEA framework.
- Section 6 - Cumulative Effects Assessment: outlines the potential in-combination impacts of rdWRMP24 scheme options and other plans and projects in the region.
- Section 7 - Mitigation: discusses measures envisaged to prevent, reduce and offset any significant adverse effects of implementing the rdWRMP24.
- Section 8 - Assessment of the Reasonable Alternatives to the RdWRMP24: outlines the selection of reasonable alternatives to the rdWRMP24 and summarises the effects of the alternatives considered.
- Section 9 - Next Steps and Proposals for Monitoring: outlines the next steps in the development of the rdWRMP24 and its assessment and outlines monitoring measures to track the environmental effects to show whether they are as predicted, to help identify any adverse impacts and trigger deployment of mitigation measures.

The report also contains the following appendices:

- Appendix A: Quality Assurance Checklist.
- Appendix B: Scoping Report Consultation Reponses.

- Appendix C: Environment Agency Comments on June 2022 Environmental Report and Southern Water Response.
- Appendix D: Consultation Responses to the October 2022 Environmental Report and Southern Water Responses
- Appendix E: Environment Agency comments on September 2023 Environmental Report and Southern Water Responses
- Appendix F: Review of Plans and Programmes.
- Appendix G: Environmental Baseline.
- Appendix H: Assessment Definitions of Significance.
- Appendix I: Constrained Options Assessment.
- Appendix J: Demand Management and Leakage Options Assessment.
- Appendix K: Revised Preferred Options Assessment.
- Appendix L: Summary of Post Mitigation Significant Effects by Water Resource Zone Options.

2 Policy context

2.1 Introduction

The SEA Regulations require a report containing "an outline of the contents, main objectives of the plan or programme and relationship with other relevant plans and programmes" (Schedule 2(1)) as well as "The environmental protection objectives, established at international (European) Community or Member State level, which are relevant to the plan or programme and the way those objectives and any environmental considerations have been taken into account during its preparation" (Schedule 2(5)).

In accordance with the regulation, a review of relevant plans and programmes is presented in Section 2.

2.2 Review of policies, plans and programmes

2.2.1 Policies, plans and programmes reviewed

One of the first steps in undertaking SEA is to identify other relevant policies, plans, programmes and environmental protection objectives. The review of these other plans sets out to establish how Southern Water's rdWRMP24 might be affected by other plans, to identify other environmental and social objectives which the rdWRMP24 should consider and to help to identify the assessment objectives for the SEA.

Through updated work completed for WRSE environmental assessment, potentially relevant plans and programmes were identified at the international, national, regional and local level. If the plan or programme was assessed as not having a significant effect on the objectives of the rdWRMP24 and/or the rdWRMP24 does not have a significant effect on achieving the objectives of the other plan or programme, it was not reviewed in detail.

The full list of international, national, regional and local policies, plans, programmes and strategies reviewed and the key policy objectives, targets and how they relate to SEA topics and SEA objectives are provided in Error! Reference source not found. and listed in Table 2-1.

Table 2-1 Key policy objectives derived from the review of plans, policies and programmes.

International/European	
• Ramsar Convention - The Convention on Wetlands of International Importance (1971) • UNESCO (1972) Convention Concerning the Protection of the World Cultural and Natural Heritage • Bern Convention on the Conservation of European Wildlife and Natural Habitats (1979) • Directive on the Conservation of Wild Birds (79/409/EEC) (as amended) • Bonn Convention on the Conservation of Migratory Species of Wild Animals (1983) • The Convention for the Protection of the Architectural Heritage of Europe (Granada Convention) (1985) • Charter for the Protection and Management of Archaeological Heritage (1990) • The Nitrates Directive (91/676/EEC) • Urban Wastewater Treatment Directive (91/271/EEC) • Convention on Biological Diversity (1992)	• European Commission Environmental Liability Directive (2004/35/EC) • Thematic Strategy on Air Pollution (2005) • Directive on Animal health requirements for aquaculture animals and products thereof, and on the prevention and control of certain diseases in aquatic animals (2006/88/EC) • Fresh Water Fish Directive (2006/44/EC) • Groundwater Directive (2006/118/EC) • The European Landscape Convention (2006) • Thematic Strategy for Soil Protection (2006) • Directive on the Assessment and Management of Flood Risks (2007/60/EC) • Establishing measures for the recovery of the stock of European eel 2007 (1100/2007) • Limiting Global Climate Change to 2 degrees Celsius - The way ahead for 2020 and beyond (2007) • Ambient Air Quality Directive (2008/50/EC) • Marine Strategy Framework Directive (2008/56/EEC)

• Directive on the Conservation of Natural Habitats and of Wild Flora and Fauna (92/43/EEC) • European Commission (1992) The Habitats Directive 1992/43/EEC • The European Convention on the Protection of Archaeological Heritage (Valletta Convention) (1992) • Kyoto Protocol to the UN Framework Convention on Climate Change (1997) • Convention on Access to Information, Public Participation in Decision-making and Access to Justice in Environmental Matters (Aarhus Convention) (1998) • Drinking Water Directive (1998/83/EC) • The Water Framework Directive (WFD) (2000/60/EC) • The SEA Directive (Directive 2001/42/EC) • Commitments arising from the World Summit on Sustainable Development, Johannesburg (2002) • The Environmental Noise Directive (2002/49/EC) European Soils Charter (2003)	• Promotion of the use of energy and renewable sources Directive (2009/28/EC) • Defra (2011) Mainstreaming Sustainable Development • European Commission (2011) The EU Biodiversity Strategy to 2020 • United Nations Framework Convention on Climate Change (UNFCCC) (2011) The Cancun Agreements • Blueprint to Safeguard Europe's Water Resources (2012) • Energy Act 2013 • Directive on Bathing Water (76/160/EEC); and Directive 2006/7/EC repealing Directive 76/160/EEC (from 2014) • Paris Agreement (2015) • A Clean Planet for all: A European strategic long-term vision for a prosperous, modern, competitive and climate neutral economy (2018) The Water Resources Planning Guideline (2021)
National	
• National Parks and Access to the Countryside Act 1949 • Salmon and Freshwater Fisheries Act 1975 • The Ancient Monuments and Archaeological Areas Act 1979 • The Wildlife and Countryside Act 1981 (as amended) • Environmental Protection Act 1990 • Planning (Listed Buildings and Conservation Areas) Act 1990 • Water Industry Act 1991 • Water Resources Act 1991 • Environment Act 1995 • Countryside and Rights of Way (CROW) Act 2000 • Water Act 2003 (as amended) • Environmental Assessment of Plans and Programmes Regulations 2004 • Securing the Future - Delivering the UK Sustainable Development Strategy (2005) • The Natural Environment and Rural Communities Act 2006 (NERC Act) • The Water Resources Management Plan Regulations 2007 • Climate Change Act 2008 • Climate Change and the Historic Environment, English Heritage (2008) • Planning Act 2008 • Marine and Coastal Access Act (2009) • Safeguarding our Soils - A strategy for England, Defra (2009) • The Eels (England & Wales) Regulations 2009 (as amended) • Delivering a healthy natural environment. Ecosystem approach action plan, Defra (2010)	• Conservation 21 - Natural England's Conservation Strategy for the 21st Century, Natural England (2016) • Managing Water Abstraction, Environment Agency (2013) • Historic England (2015) The Setting of Heritage Assets, Historic Environment Good Practice Advice in Planning 3 • National Infrastructure Delivery Plan 2016-2021, Infrastructure and Projects Authority (HM Government) (2016) • Standing Advice on Protected Species, Natural England (2016) • Strategic Environmental Assessment, Sustainability Appraisal and the Historic Environment, Historic Environment (2016) • Water Resources Planning Framework (2015-2065), Water UK (2016) • Groundwater protection technical guidance, Environment Agency (2017) • Protect groundwater and prevent groundwater pollution, Environment Agency (2017) • The Conservation of Habitats and Species Regulations (2017) (as amended) • The Water Environment (Water Framework Directive) (England and Wales) Regulations 2017 (as amended) • UK Climate Change Risk Assessment, Defra (2017) • A Green Future: Our 25 Year Plan to Improve the Environment, UK Government (2018) • Creating a better place: Our ambition to 2020, Environment Agency (2018) • Defra and The Environment Agency (2018) Resources and waste strategy for England

• Flood and Water Management Act 2010 • Making Space for Nature - A review of England's Wildlife Sites and Ecological Network (2010) • Biodiversity 2020: A strategy for England's wildlife and ecosystem services, Defra (2011) • The Natural Choice: Securing the Value of Nature, Defra (2011) • Water for Life White Paper, Defra (2011) • UK Marine Policy Statement (2011) • National Policy Statement for Wastewater (2012) • UK Post-2010 Biodiversity Framework, Joint Nature Conservation Committee (JNCC) and Defra (2012) • Climate change approaches in water resources planning - Overview of new methods, Environment Agency (2013) • Ancient Woodland and Veteran Trees: Protecting them from development, Forestry Commission and Natural England (2014) • UK National Ecosystem Assessment Follow-on (2014) • Fixing the foundations: Creating a more prosperous nation, HM Government (2015) • The Environmental Damage (Prevention and Remediation) (England) Regulations 2015 • The Great Britain Invasive Non-Native Species Strategy, Defra (2015) • A narrative for conserving freshwater and wetland habitats in England, Natural England (2016)	• Draft National Policy Statement for Water Resources Infrastructure, Defra (2018) • Environment Agency and Natural Resources Wales (2018) Water Resources Planning Guideline: Interim update • HM Government (2018) The Water Supply (Water Quality) Regulations 2018 • Preparing for a drier future: England's water infrastructure needs, National Infrastructure Commission (2018) • The Environment Agency's approach to groundwater protection, Environment Agency (2018) • The National Adaptation Programme and the Third Strategy for Climate Adaptation Reporting, Defra (2018) • The Conservation of Habitats and Species (Amendment) (EU Exit) Regulations (2019) • The Invasive Alien Species (Enforcement and Permitting) Order 2019 • Meeting our future water needs: a national framework for water resources, Environment Agency (2020) • National Flood and Coastal Erosion Risk Management Strategy for England, Environment Agency (2020) • State of Natural Capital Annual Report 2020, Natural Capital Committee (2020) • National Planning Policy Framework (NPPF) (2021) • Marine Plans - South East Inshore, South Inshore, South Offshore (to be published 2021) • The Environment Act 2021 • Water Resources Planning Guideline and Technical Supplementary Guidance, Environment Agency, OfWAT and Natural Resources Wales (2023)
Regional/Local	
• Chichester Harbour AONB Management Plan 2019-2024 (Chichester Harbour Conservancy) • Chiltern Hills AONB Management Plan 2014-2019 • Cotswolds AONB Management Plan 2013-2018 • Cranborne Chase AONB Management Plan 2019-2024 • Dorset AONB - A Framework for the Future AONB Management Plan 2019 - 2024 • Drought Plans from adjacent water companies • Environment Agency Catchment Abstraction Management Strategies (CAMS) • Green infrastructure plans • Isle of Wight AONB Management Plan 2014 - 2019 (Wight AONB Partnership) • Kent Downs AONB Management Plan 2014-2019 • Partnership Plan for the New Forest National Park 2021-2026 • Public Rights of Way Improvement Plans (ROWIP)	• South East Biodiversity Strategy (2009), South East England Biodiversity Forum Environment Agency (2010), Water Resources Strategy - A Regional Action Plan for Thames Region • Defra (2010), Eel Management plans for the United Kingdom South East River Basin District and Implementation of UK Eel Management Plans (2017-2020) • Environment Agency (2011), Water Resources Strategy - A Regional Action Plan for Thames Region • Environment Agency, The Wild Trout Trust and the Atlantic Salmon Trust South Coast Sea Trout Action Plan (2011) • Mayor of London (2011), Securing London's Water Future The Mayor's Water Strategy • South Downs National Park (2013), Partnership Management Plan, Shaping the future of your south downs national park 2014-2019

- RSPB Pagham Harbour Local Nature Reserve Management Plan 2013-2018
- Surrey Hills AONB Management Plan 2020-2025
- Surrey Wildlife Trust 5-year Plan 2018-2023
- The High Weald AONB Management Plan 2019-2024
- The North Wessex Downs AONB Management Plan 2014-19
- Water Resources in the South East (WRSE) Group (forthcoming) regional water resources strategy
- West Sussex County Council (2005), A Strategy for the West Sussex Landscape
- Environment Agency (2007), Water for the Future - Managing Water in the South East of England
- Environment Agency (2009), Water Resources Strategy. Regional Action Plan for Southern Region
- Environment Agency (2015), South West River Basin District, River basin management plan
- Environment Agency and Defra (2015), South East River Basin District River Basin Management Plan
- Environment Agency (2016), South East River Basin District Flood Risk Management Plan 2015 - 2021
- Environment Agency (2016), South West River Basin district Flood Risk Management Plan
- Environment Agency and Defra (2016), Thames River Basin District River Basin Management Plan
- Port of London Authority (2016) The Vision for the Tidal Thames
- Southern Water Business Plan 2020-25 (2019)Southern Water Environment Policy (2019)
- Southern Water WRMP (2019)
- Southern Water WRMP19 2020-2070 (2019)
- Water Resources Management Plans from adjacent water companies (2019)

2.2.2 Identification of key themes

The main themes, messages and objectives from the policies, plans and programmes review that are considered relevant to the rdWRMP24 are as follows:

- Conserve flora and fauna and their habitats;
- Conservation and wise use of wetlands and their resources;
- Protection of wild birds and their habitats;
- Halt overall biodiversity loss;
- Creation of green infrastructure;[42]
- Protection of landscape character and quality;
- Improve water quality so all waters achieve ‘good status’ as set out in the Water Framework Directive;
- Prevent or limit inputs of pollutants into groundwater;
- Monitor and provide information to consumers on drinking water quality;
- Promote efficient use of water;
- Reduce and manage the risks of flooding;
- Reduce greenhouse gas emissions;

[42] The European Commission defines green infrastructure as a strategically planned network of natural and semi-natural areas with other environmental features designed and managed to deliver a wide range of ecosystem services such as water purification, air quality, space for recreation and climate mitigation and adaptation. This network of green (land) and blue (water) spaces can improve environmental conditions and therefore citizens' health and quality of life. It also supports a green economy, creates job opportunities and enhances biodiversity. The Natura 2000 network constitutes the backbone of the EU green infrastructure. Available at: http://ec.europa.eu/environment/nature/ecosystems/index_en.htm

- Adapt to the impacts of climate change;
- Increase resource efficiency and reduce natural resource use and waste;
- Create a green economy and promote sustainable growth;
- Promote sustainable and healthy communities;[43]
- Promote social inclusion and community participation;
- Carbon sequestration with the aim of net zero carbon emissions by 2050 as per Paris Climate Agreement (and legislation passed by UK govt. in 2018);
- Habitat creation and safeguarding ecosystem services (Woodland Carbon Guarantee scheme in line with the Woodland Carbon Fund);
- Catchment management / nature-based solutions working to enhance natural processes (existing work through a Catchment Based Approach (CaBA));
- Reduce water waste and leakage (Ofwat targets and penalties);
- Improve resilience to extreme droughts ensuring consistency with WRMP24 (1/500 year resilience);
- Protect cultural heritage assets including archaeology and built heritage;
- Protect best quality soils and agricultural land.
- Support the Lawton recommendation[44] for statutory undertakers planning the management of water resources to:
  - Make space for water and wildlife along rivers and around wetlands
  - Restore natural processes in river catchments, including in ways that support climate change adaptation and mitigation;
  - Accelerate the programme to reduce nutrient overload, particularly from diffuse pollution.
- Support the UK Government's 25 Year Plan to Improve the Environment: [45]
  - Using and managing land sustainably - including embedding an "environmental net gain" principle into development (as reflected in the Environment Act 2021[46]);
  - Recovering nature and enhancing the beauty of landscapes;
  - Connecting people to the environment to improve health and wellbeing;
  - Increase resource efficiency and reducing pollution;
  - Securing clean, healthy and productive and biologically diverse seas and oceans;
  - Protecting and improving the global environment.

[43] The UK Government definition of sustainable communities as outlined in the document 'Sustainable Communities: Homes for All' (ODPM, January 2005, page 74) is: "*Sustainable communities are places where people want to live and work, now and in the future. They meet the diverse needs of existing and future residents, are sensitive to their environment, and contribute to a high quality of life. They are safe and inclusive, well planned, built and run, and offer equality of opportunity and good services for all*". Available at: https://webarchive.nationalarchives.gov.uk/20120920061353/http://www.communities.gov.uk/documents/corporate/pdf/homes-for-all.pdf

[44] Lawton (2010) *Making Space for Nature* (Recommendation 4, Page 73). Available at: https://www.gov.uk/government/news/making-space-for-nature-a-review-of-englands-wildlife-sites-published-today

[45] UK Government (2018) *A Green Future: Our 25 Year Plan to Improve the Environment*. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/693158/25-year-environment-plan.pdf

[46] UK Government (2021). Environment Act 2021. Available at: https://www.legislation.gov.uk/ukpga/2021/30/contents/enacted

The themes, messages and objectives identified from the policies, plans, and programmes review have been used to identify key issues and opportunities and develop the SEA Framework.

3 Environmental baseline review

3.1 Introduction

The SEA Regulations require a report containing 'The relevant aspects of the current state of the environment and the likely evolution thereof without implementation of the plan or programme' (Schedule 2(2)), 'The environmental characteristics of areas likely to be significantly affected' (Schedule 2(3)), and 'Any existing environmental problems which are relevant to the plan or programme including, in particular, those relating to any areas of a particular environmental importance, such as areas designated pursuant to Council Directive 79/409/EEC on the conservation of wild birds(1) and the Habitats Directive' (Schedule 2(4))'.

In this context, an essential part of the SEA process is the identification of the current baseline conditions and their likely evolution. Only with a knowledge of existing conditions, and a consideration of their likely evolution, can the effects of the rdWRMP24 be identified and appraised and its subsequent success or otherwise be monitored. This is also useful in determining the key issues for each topic that should be taken forward in the SEA, through the SEA objectives and guide questions.

Full environmental baseline data are presented in Error! Reference source not found. and have been drawn from a variety of sources, including a number of the plans and programmes reviewed as part of the SEA process (as set out above in Table 2-1). This environmental baseline review also summarises the likely future trends for the environmental issues being considered (as far as information is available). The key issues arising from the review of baseline conditions are summarised in **Section 3.2**.

3.2 Key issues and opportunities

Table 3-1 Key issues and opportunities.

SEA topic	Scoped in	Implications	Opportunities
Biodiversity, flora and fauna	Yes	The WRMP24 area is rich in habitats and species diversity, and includes national and internationally designated sites including SSSIs, SPAs, SACs, Ramsar sites and MPAs/MCZs. Development of new water infrastructure can directly or indirectly affect designated and non-designated sites, habitats and species through loss of land, disturbance and damage. There is potential for the options within the WRMP24 to result in surface and/or groundwater pollution which could have an impact on wildlife. Wetland and marsh habitat rely on water, the WRMP24 should ensure that it does not affect these areas through over abstraction and should look for opportunities to reduce abstraction pressure where possible. Best value outcomes can be identified through combining nature-based solutions work with abstraction reduction scenarios. WRMP24 policies should be more clearly aligned to the 25 Year Environment Plan, including commitments on how the WRMP24 can contribute to the 25 Year Environment Plan policies.	The key sustainability issues arising from the baseline assessment for biodiversity are: • The need to protect or enhance and support the achievement of favourable condition and conservation status WRMP24 area's biodiversity, particularly within designated sites, species and habitats of principal importance, informed by the evidence base. • The need to consider the implications of effluent re-treatment options on existing discharges from wastewater treatment works and the consequences for nutrients within receiving waters. • The need to avoid activities likely to cause irreversible damage to natural heritage. • The need to take opportunities to improve connectivity between fragmented habitats to create functioning habitat corridors and habitat patches or stepping stones. • The need to take opportunities to deliver biodiversity net gains. • The need to control the spread of Invasive Non-Native Species (INNS). • The need to recognise the importance of building wildlife's resilience to, and allowing wildlife to adapt to climate change. • The need to engage more people in biodiversity issues so that they personally value biodiversity and know what they can do to help, including through recognising the value of the ecosystem services.
Water	Yes	Phosphate and physical modifications are the most common pressures affecting the achievement of 'Good' status. The significant water management issues which are most common in affecting the achievement of 'Good' are pollution from wastewater, physical modifications and pollution from town, cities or rural areas. There is potential for the options within the WRMP24 to have a negative impact on water quality. Areas of the WRMP24 area are at high risk of flooding from both surface water and rivers and the	The key issues arising from the baseline assessment for water are: • The need to further improve the quality of the regions river, estuarine, wetlands and coastal waters taking into account WFD objectives. • The need to maintain the quantity and quality of groundwater resources taking into account WFD objectives. • The need to improve the resilience, flexibility and sustainability of water resources in the WRMP24 area, particularly in light of potential climate change impacts on surface water and groundwaters.

SEA topic	Scoped in	Implications	Opportunities
		sea. There is potential that the options within the WRMP24 could be affected by or contribute to an increased risk of flooding.	• The need to ensure sustainable abstraction to protect the water environment and meet society's needs for a resilient water supply. • The need to ensure that people understand the value of water.
Soil	Yes	Agriculture has a dominant role in the landscape of the WRMP24 area. Agricultural land of Grades 2 and 3 is the most common. The options within the WRMP24 have the potential to result in a loss of agricultural land or through a reduction in water availability for agricultural processes. There is also potential for soil contamination through the construction phase.	The key sustainability issues arising from the baseline assessment for soil, geology and land use are: • The need to protect and enhance geological features of importance (including geological SSSIs). • The need to maintain and enhance soil function and health, including its role as a carbon sink. • The need to manage the land and soil more holistically at the catchment level, benefitting landowners, other stakeholders, the environment and sustainability of natural resources (including water resources and best and most versatile soils).
Air	Yes	Air quality in the region is varied. Generally, it is good, however there are some areas designated as AQMAs. Air pollution sources include transport and industry. The options within the WRMP24 have the potential to impact air quality. This could include the generation of air pollutants from treatment plants and there is also likely to be effects from the construction phase.	The key sustainability issues arising from the baseline assessment for air are: • The need to reduce air pollutant and greenhouse emissions and limit air emissions to comply with air quality standards.
Climatic factors	Yes	The WRMP24 area is projected to have hotter and drier summers, and wetter and warmer winters, as well as short duration "extreme weather events" such as thunderstorms and heatwaves. There is potential that this could affect water availability through increases in periods of drought. There is also potential for options within the WRMP24 to result in carbon emissions during the construction and operation phase which will further contribute to climate change. Increased demand due to extreme events (i.e. heatwaves). Greater risks to rapid responding catchments (i.e. North Sussex clay catchments).	The key sustainability issues arising from the baseline assessment for climatic factors are: • The need to reduce greenhouse gas emissions (industrial processes and transport). • The need to adapt to the impacts of climate change for example through, sustainable water resource management, water use efficiencies, specific aspects of natural ecosystems (e.g. connectivity) as well as accommodating potential opportunities afforded by climate change.
Population, communities and human health	Yes	Population is expected to grow which will likely place additional pressure on the water environment within the WRMP24 area. Economic growth and climate	The key sustainability issues arising from the baseline assessment for population and human health are:

SEA topic	Scoped in	Implications	Opportunities
		change will also add to this pressure. Health is generally good. The options within the WRMP24 have the potential to result in temporary disturbance effects during the construction phase. There is also potential for impacts on the water or natural environment which could have impacts on recreation and wellbeing.	• The need to ensure water supplies remain affordable especially for deprived or vulnerable communities, reflecting the importance of water for health and wellbeing. • The need to ensure water supplies contribute to improvements in levels of health, particularly in urban areas and deprived areas. • The need to ensure water quantity and quality is maintained for a range of uses including tourism, recreation, navigation and other use such as agriculture. • The need to ensure a balance between different aspects of the built and natural environment that will help to provide opportunities for local residents and tourists, including opportunities for access to, protecting and enhancing recreation resources, green infrastructure and the natural and historic environment. • The need to accommodate an increasing population and housing growth through provision of essential services including water supply. • Sites of nature conservation importance, heritage assets, water resources, important landscapes and public rights of way contribute to recreation and tourism opportunities and subsequently health and wellbeing and the economy. • The need to reduce the risk of harm from environmental hazards, such as flooding and drought.
Historic environment	Yes	The WRMP24 area is rich in heritage and contains many listed buildings, conservation areas, scheduled monuments, and registered parks and gardens, amongst others. The options within the WRMP24 have the potential to directly or indirect impact the historic environment through effecting the asset's fabric or setting.	The key sustainability issues arising from the baseline assessment for archaeology and cultural heritage are: • The need to conserve or enhance sites of archaeological importance and cultural heritage interest, particularly those which are sensitive to the water environment. • The need to protect water-dependent heritage sites during drought and flood conditions.
Landscape	Yes	The WRMP24 area's landscape is diverse and there are important landscapes within the region, including two National Parks and eight AONB. There is potential for the options within the WRMP24 to have an impact on the landscape. This could include temporary construction effects and permanent effects associated with infrastructure	The key sustainability issues arising from the baseline assessment for landscape and visual amenity are: • The need to protect and improve the natural beauty of the area's AONBs, National Parks and other areas of natural beauty. • The need to protect and improve the character of landscapes and townscapes.

SEA topic	Scoped in	Implications	Opportunities
		which could affect visual amenity or the character of the area.	
Material Assets	Yes	The WRMP24 area contains important transport links which could be affected during construction works. There is also significant water and wastewater treatment infrastructure across the WRMP24 area. The WRMP24 area also produces and manages a significant amount of waste. The WRMP24 has the potential to increase the use of resources and result in the generation of waste.	The key sustainability issues arising from the baseline assessment for material assets and resource use are: • The need to minimise the consumption of resources, including water and energy. • The need to reduce the total amount of waste produced in the region, from all sources, and to reduce the proportion of this waste sent to landfill. • The need to continue to reduce leakage from the water supply system to help reduce demand for water. • Daily consumption of water is relatively high and consequently there is a continued need to encourage more efficient water use by consumers.

3.3 Limitations of the data and assumptions made

The area under consideration for the SEA is relatively large and covers a number of different geographical and political regions, which makes establishing a baseline at the sub-regional level challenging. There are also challenges around extrapolating information from data collated at differing spatial resolutions. Spatial data have been obtained wherever possible in relation to the SEA topics and the baseline is presented graphically as mapped information where appropriate (see Error! Reference source not found.). In some instances, reporting cycles mean that available information is dated.

The data gathered to complete the baseline includes information that predates the Covid-19 pandemic and its environmental, social and economic effects. Data that relates to these changes is only becoming available periodically and it may well be a number of years before the effects of the crisis can be determined, along with whether changes to the topics covered in the baseline have been short-term or sustained. This is an additional uncertainty that will need to be identified within the subsequent assessment, and where appropriate, some qualitative commentary may be provided regarding the evolution of the baseline.

The assessments presented in Section 5 and 6 include consideration of the uncertainty and limitations of the available data and comments are provided as to any underpinning assumptions made where data are lacking or dated.

3.4 Inter-relationships

It is noted that there are inter-relationships between SEA topics. These include impacts of changes to water flows and quality on biodiversity, the economy, recreation, tourism, navigation, cultural heritage and landscape. Inter-relationships that result in changes to individual effects are considered by evaluation of synergistic effects throughout the assessment.

4 Methodology

4.1 Overview

This section describes the approach to the assessment of Southern Water's rdWRMP24. It draws on the information contained in Sections 2 and 3, to define the scope of the assessment (in terms of the environmental and socio-economic issues to be considered) and sets out the SEA objectives and guide questions that comprise the assessment framework. The section then outlines how this assessment framework will be used to assess the options contained in the rdWRMP24.

4.2 Scope of the assessment

4.2.1 Topics

The aim of SEA is to identify, describe and evaluate the likely significant effects of implementing the rdWRMP24 on the environment. Schedule 2 of the SEA Regulations require that the assessment includes information on the "*likely significant effects on the environment, including on issues such as: biodiversity; population; human health; fauna; flora; soil; water; air; climatic factors; material assets; cultural heritage, including architectural and archaeological heritage; landscape; and the inter-relationship between the issues referred to*".

The key policy objectives identified from the review of other plans and programmes relevant to the assessment of the rdWRMP24 (Section 2) and the economic, social and environmental issues arising from the analysis of the baseline (Section 3), together with the characteristics of the water resource management options, have been used to define the scope of the assessment in terms of the topics set out in Schedule 2 of the SEA Regulations.

In this instance, all SEA topics identified by Schedule 2 of the SEA Regulations have been scoped in for assessment to provide a comprehensive basis to identify, describe and evaluate the likely significant effects arising from the construction and operation of the water resource management options reflecting the wide ranging nature of the plan and baseline evidence and key issues identified.

4.2.2 Geographic scope

The geographic extent of each SEA will reflect the operational area covered by Southern Water's WRMP24.

Where water resource options include transfers and potential water trading options between companies, where appropriate further consideration has been given to the effects outside the operational area of Southern Water's WRMP24. This also extends to the assessment of cumulative effects, where consideration of plans or programmes that cover areas that either overlap or are adjacent to the plan being assessed are also taken into account e.g. other water company WRMP24s and the WRSE Regional Plan.

4.2.3 Timescales

When considering the timing of potential effects of the rdWRMP24, the assessment has classified effects as 'short,' 'medium' or 'long-term.' This reflects an intention to capture the differences that could arise at different timescales, consistent with the requirements of Schedule 1 (2)(a) of the SEA Regulations where the assessment of the effects should have regard to "*the probability, duration, frequency and reversibility of the effects*".

Table 4-1 below summarises the timescales applied in the SEA informed by the 5-year cycle of review of the plan. For the purposes of this assessment, short-term will be considered as up to 1 year, medium-term (from

1 year to 5 years (to the end of the plan review cycle)) and long-term for the period beyond 5 years (i.e. beyond the plan review (5 year AMP) cycle).

Table 4-1 Duration of short, medium and long term.

Estimated length (years)	Duration
0-1 years	Short
>1-5 years	Medium
Over 5 years	Long

4.2.4 Consultation on the scope

Consultation bodies, stakeholders and the public were invited to express their views on the proposed scope of the SEA in accordance with SEA Regulation 12(5). The scoping information was issued on 2nd February 2022 to the Environment Agency, Historic England and Natural England. The responses to comments provided on the updated scoping information and how these have been taken into account in carrying out the SEA are presented in Error! Reference source not found..

4.3 The SEA framework

Establishing appropriate SEA objectives and guide questions is central to assessing the effects of the rdWRMP24 on the environment. Each of the constrained water resource management options and revised preferred options has been assessed against the SEA objectives to determine the scale and significance of the effect. Guide questions focus the assessment on specific aspects of the objective that reflect issues identified from the review of baseline and contextual information relating to Southern Water's WRMP24 area.

The SEA objectives and assessment questions used to undertake the assessment is shown in Table 4-2. It reflects the SEA assessment framework developed by WRSE[47,48] (to ensure alignment of assessments across the region) and is based on an analysis of the baseline information, review of plans and programmes and regulator feedback.

Table 4-2 SEA objectives and assessment questions.

SEA topic	SEA objective	Assessment questions
Biodiversity, flora and fauna	Protect and enhance biodiversity, priority species, vulnerable habitats and habitat connectivity (no loss and improve connectivity where possible)	• Is the option likely to affect the conservation status of any SPA, SACs, Ramsar sites and MCZ, undermine or prevent restoration of SSSI condition or affect the condition of locally designated sites? • Will the option protect and enhance aquatic and habitats and species, including freshwater fisheries and chalk rivers? • Will the option affect the marine environment, habitats and species (including MCZs and MPAs)?

[47] WRSE (2020) *WRSE Method Statement: Environmental Assessment Consultation version July 2020*. Available at: wrse_file_1329_wrse-ms-environmental-assessment.pdf

[48] WRSE (2021) *Method Statement: Environmental Assessment Post-consultation version*, November 2021. Available at: methodstatement-environmental-assessment-nov-2021.pdf (wrse.org.uk)

SEA topic	SEA objective	Assessment questions
		• Is the option likely to affect ancient woodland, priority habitat or species? • Will the option affect any habitats that support legally protected species or species of conservation concern? • Is there potential for contribution to achieving 'favourable' conservation status or for creation of new habitats and species "of principal importance for the purpose of conserving biodiversity" covered under Section 41 (England) of the NERC Act (2006)? • Is the option likely to have an impact on a current or future Nature Recovery Network? • Are there any opportunities for habitat creation or restoration? • Will the option contribute to the loss or gain in habitat connectivity? • Is there a possibility for INNS to be spread/ introduced or for algal blooms to occur? • Is there an opportunity to improve biodiversity value through removal of INNS? • Does the option enable or reduce the potential of water dependent wildlife to adapt to climate change?
Soil	Protect and enhance the functionality, quantity and quality of soils	• Will the option affect high grade agricultural land? • Will the option promote the efficient use of land? • Will the option prevent soil erosion and retain soil stocks as a natural resource? • Will the option promote soil health? • Will the option involve use of brownfield or greenfield land? • Will the option prevent mineral sterilisation? • Will the option affect soil contamination or involve remediation? • Is the option likely to affect geodiversity, including SSSIs of geological importance? • Will the option promote the sustainable use of land? • Will the option prevent nutrient loading in water bodies?
Water	Increase resilience and reduce flood risk	• Is the option vulnerable to flood risk? • Will the option contribute to the risk of flooding? • Will the option mitigate flood risk? (i.e. attenuation of flows through (Natural Flood Management (NFM), catchment storage etc.)
	Protect and enhance the quality of the water	• Will the option affect surface water quality or quantity?

SEA topic	SEA objective	Assessment questions
	environment and water resources	• Will the option affect ground water quality or quantity? • Is the option likely to contribute to or conflict with the achievement of WFD objectives? • Will the option affect bathing waters? • Will the option affect shellfish water protected areas? • Will the option affect chalk rivers? • Will the option affect raw water quality? • Will the option reduce the flashy nature of surface waters? • Will the option slow the flow in upper catchments and reduce soil losses to river systems? • Will the option comply with flow targets (i.e. EFI, CSMG)? • Will the option provide a water environment more resilient to drought or prolonged dry weather?
	Deliver reliable and resilient water supplies	• Does the option provide a reliable and sustainable water supply which meets changing demand? • Will the option protect and enhance the environmental resilience of the water environment to climate change, flood risk and drought? • Does the option reduce the presence of containments in waterbodies, and make more water available to the environment?
Air	Reduce and minimise air emissions	• Is the option in an air quality management area (AQMA)? • Will the option affect local air quality?
Climatic factors	Reduce embodied and operational carbon emissions	• Will the option affect carbon or other greenhouse gas (GHG) emissions? • Is there potential for the option to incorporate climate mitigation measures to reduce its carbon footprint, such as lower embodied carbon or incorporating renewable energy? • Will the option affect carbon sequestration?
	Reduce vulnerability to climate change risks and hazards	• Is the option vulnerable to climate change effects? • Does the option include climate resilience measures? • Will the option create catchment resilience to drought?
Landscape	Conserve, protect and enhance landscape, townscape and seascape character and visual amenity	• Will the option have an effect on the character of the landscape, townscape or seascape, including tranquillity and views? • Will the option improve access to the countryside?

SEA topic	SEA objective	Assessment questions
		• Will the option create or improve green infrastructure which contributes to access to the landscape? • Will the option protect and enhance designated landscapes and features?
Historic environment	Conserve, protect and enhance the historic environment, including archaeology	• Will the option affect designated or non-designated historic assets, sites and features? • Will the option affect the setting and/or significance of a historic asset? • Will the option affect archaeology (including unknown archaeology)? • Will the option affect heritage assets at risk? • Will the option affect conservation areas or historic landscape/townscape areas?
Population and human health	Maintain and enhance the health and wellbeing of the local community, including economic and social wellbeing	• Does the option promote water efficiency and encourage a reduction in water consumption? • Will the option secure resilient water supplies for the health and wellbeing of customers? • Will the option allow for economic development? • Will the option allow for economic diversity? • Will the option have an effect on active lifestyles, such as impacts on active travel through disruption to pedestrian and cycle routes? • Will the option affect Public Rights of Way? • Will the option affect road or rail infrastructure? • Will the option minimise disturbance from noise, light, visual, and transport? • Will the local communities have been actively engaged to foster an inclusive environment and participate in decision making?
	Maintain and enhance tourism and recreation	• Will the option maintain or enhance tourism? • Does the option improve access to the natural environment for recreation, including those living within deprived areas? • Will the option have an effect on freshwater fisheries for recreational purposes? • Will the option have an effect on marine fisheries for recreational purposes?
Material assets	Minimise resource use and waste production	• Will the option reuse existing infrastructure? • Will the option minimise the use of resources? • Will the option reduce the production of waste?
	Avoid negative effects on built assets and infrastructure	• Will the option affect built assets and infrastructure, including transport infrastructure?

4.4 Undertaking the assessment

4.4.1 Option assessment

Both the construction and operational effects of all the constrained options (for the draft and rdWRMP24) and the draft and revised draft preferred options have been assessed against all of the SEA objectives that comprise the assessment framework. This approach ensures a comprehensive consideration of any likely effects. It also recognises that the environmental effects are likely to be different in their nature, scale and significance during construction as opposed to their operation. For those options that would not require construction works *per se* and may be ongoing in nature (for example, the installation of water efficient devices, audits and educational programmes), construction in the context of the SEA refers to any enabling/installation works or option implementation.

GIS shapefiles for the water resource options have been uploaded onto a web-based GIS tool, which has then used to identify proximities to a range of environmental constraints and to interrogate the environmental data to identify likely effects and opportunities for each constrained option. This has included consideration of the following *inter alia*:

- Biodiversity, flora and fauna: Special Areas of Conservation (SACs), Special Protection Areas (SPAs), Ramsar sites, Sites of Special Scientific Interest (SSSIs) and Local Nature Reserves (LNRs);
- Soil: Agricultural Land Classifications (ALC), historic landfill sites;
- Air: Air Quality Management Areas (AQMA);
- Flood risk: Flood zone 2 and 3
- Water: Source Protection Zones (SPZs) and Nitrate Vulnerable Zones (NVZs);
- Landscape: National Parks and Areas of Outstanding Natural Beauty (AONB);
- Historic Environment: World Heritage Sites (WHS), Schedule Monument (SMs), Registered Parks and Gardens and Registered Battlefields.

Using the assessment framework, the GIS mapping, in determining the effects, consideration has been given to the following:

- the nature of the potential effect (what is expected to happen);
- the timing and duration of the potential effect (e.g., short, medium or long term);
- the geographic scale of the potential effect (e.g., local, regional, national);
- the location of the potential effect (e.g., whether it affects rural or urban communities, or those in particular parts of a water company area); and
- the potential effect on vulnerable communities or sensitive sites.

Professional judgement was applied to score the option using the guidance in Error! Reference source not found..

An option may have both positive and negative effects under a SEA objective. Rather than trading these effects to cancel each other out, both positive and negative scoring was used to show there are potential mixed effects. The results of the HRA and WFD assessments fed into the SEA objectives on biodiversity and water topics.

The assessment matrix set out in Table 4-3 has been used to assess each of the constrained and preferred options against the SEA objectives. The outcomes of the assessment have been used to inform the development of the rdWRMP24.

The first and second columns set out the SEA topics and objectives. The third, fourth and fifth columns provides the scoring (see Table 4-4) and commentary of the impact of each option on the objectives for each topic, with reference to the key questions set out above in Table 4-2. The assessment assumes the implementation of standard industry best practice methods in implementing the measures as well as any defined mitigation measures (which are set out in the commentary) such that the significance of effects relates to the residual effects after the application of any mitigation measures in line with the Government[49] and industry[50] guidance. Following proposed mitigation (if required) set out in the sixth column of Table 4-3, residual construction and operation effects are recorded in the seventh and eight columns. The scoring is used for the assessment of the likely significant effects of each option.

Where qualitative and/or quantitative information was available this has been used to inform the assessment. Objectives or key questions that are not supported by available data or information have been evaluated using spatial analysis, professional judgement and applicable assessment guidelines relating to that topic/objective.

Varying levels of uncertainty are inherent within the assessment process. The level of uncertainty of the option assessment for each SEA objective is included in the appraisal framework. Where there is significant uncertainty which precludes an effects assessment category being assigned for a particular SEA objective, an “uncertain” residual effects assessment label is applied to that specific SEA objective.

Table 4-3 SEA assessment matrix completed for each WRMP24 option.

SEA topic	SEA objective	Construction effects		Operational effects		Commentary	Mitigation	Residual construction effects		Residual operational effects	
Biodiversity, flora and fauna	Protect and enhance biodiversity, priority species, vulnerable habitats and habitat connectivity (no loss and improve connectivity where possible)	0	-	0	-	etc	etc	0	0	0	-
Soil	etc										
Water											
etc											

[49] Office of the Deputy Prime Minister (ODPM), Scottish Executive, Welsh Assembly Government and Department of the Environment Northern Ireland (2005) A *Practical Guide to the SEA Directive and European Commission (2001) Assessment of plans and projects significantly affecting Natura 2000 sites*

[50] UKWIR (2021) *Environmental Assessment Guidance for Water Resources Management Plans and Drought Plans*. Report Ref. No. 21/WR/02/15

Table 4-4 Qualitative scoring system.

Score	Description	Symbol
Major/Significant Positive Effect	Major positive effect of the water resource option on this objective	+++
Moderate Positive Effect	Moderate positive effect of the water resource option on this objective	++
Minor Positive Effect	Minor positive effect of the water resource option on this objective	+
Neutral	Neutral effect of the water resource option on this objective	0
Minor Negative Effect	Negative effect of the water resource option on this objective	-
Moderate Negative Effect	Moderate effect of the water resource option on this objective	--
Major/Significant Negative Effect	Major negative effect of the water resource option on this objective	---
Uncertain	The water resource option has an uncertain relationship to the objective or the relationship is dependent on the way in which the aspect is managed. In addition, insufficient information may be available to enable an assessment to be made.	?

The outcomes of the SEA have been translated into metrics to feed into the WRSE multi-criteria optimisation for options selection, programme appraisal. They were also used as part of the Best Value Planning metrics Southern Water used to decide the Best Value Plan.

The completed assessment framework tables for each option are presented in **Appendices I, J and K**. The completed assessment framework table for each option is also accompanied by a summary comprising an overview of the adverse and beneficial.

A summary visual evaluation matrix has been completed for each option and is presented in **Section 5**, with outputs summarised by each WRZ. Each coloured box represents the assessed post mitigation significance of effect for that SEA objective for the particular WRMP24 option (for example, a red box indicates a major adverse significance of effect whilst blue indicates a negligible significance of effect and dark green a major beneficial significance of effect). Adverse and beneficial effects are kept separate in line with SEA best practice.

4.4.2 Secondary, cumulative and synergistic environmental effects

Schedule 2(6) of the SEA Regulations requires the assessment of "the likely significant effects on the environment, including short, medium and long-term effects, permanent and temporary effects, positive and negative effects, and secondary, cumulative and synergistic effects…." For the purposes of this report, "cumulative effects" is taken to include secondary and synergistic effects.

A cumulative effects assessment has been carried out in order to identify if different options are mutually exclusive or whether combinations of measures might lead to greater adverse impacts (or beneficial effects). This involved examining the likely significant effects of each of the WRMP24 options individually, in combination with each other (both inter- and intra- water resource zone), and in combination with the implementation of other plans and programmes. A matrix has been used to help consider interactions between the options. In assessing these effects, consideration has been given to other factors which may affect the receiving environment during implementation of the options.

The following cumulative assessments have been undertaken (see **Section 5** for the assessment findings):

- An assessment of cumulative effects as a result of rdWRMP24 options interacting with each other. Identified options where the construction phases (within a 5-year period) overlap with one another and where they also fall within 10km of each other. Following this, and informed by the WRSE environmental assessment methodology a receptor based approach was then carried out. Options were identified that fell within the distance thresholds to the receptors outlined below:
  - Sites of Special Scientific Interest (within 500m);

- Ancient Woodlands (within 50m);
- National Nature Reserves (within 500m);
- Marine Conservation Zones (within 500m);
- Historic landfill sites (within 1,000m);
- Authorised landfill sites (within 1,000m);
- Scheduled Monuments (within 500m);
- World Heritage Sites (within 500m);
- Conservation Areas (within 500m);
- Historic Battlefields (within 500m);
- Registerred Parks and Gardens (within 500m);
- Listed Buildings (within 20m);
- National Landscapes (within 500m);
- National Parks (within 500m);
- Air Quality Management Areas (0m direct intersection only); and
- Major Roads (0m direct intersection only).

- Assessment of cumulative effects of the rdWRMP24 with the Southern Water Drought Plan, other water company WRMPs and drought plans.
- Assessment of potential cumulative effects of the Southern Water's rdWRMP24 with any other identified relevant programmes, plans and projects that may be in place / implemented during the period of the WRMP24.

Neighbouring water companies have been invited to comment on the rdWRMP24 and Southern Water is also continuing its communications with neighbouring companies regarding potential measures in their respective WRMPs to identify any new trans-boundary issues that may arise. Potential effects with other plans are identified, particularly in the context of spatial and temporal proximity.

4.4.3 Reasonable alternative plan assessment

SEA Regulation 12(2) requires the identification, description and evaluation of "the likely significant effects on the environment of implementing the plan or programme, and reasonable alternatives taking into account the objectives and the geographical scope of the plan or programme". The EC guidance[51] on the SEA Directive discusses possible interpretations of handling 'reasonable alternatives'. It states that "The alternatives chosen should be realistic. Part of the reason for studying alternatives is to find ways of reducing or avoiding the significant adverse effects of the proposed plan or programme. Part of the reason for studying alternatives is to find ways of reducing or avoiding the significant adverse effects of the proposed plan or programme". Echoing this, Government guidance[52] of the SEA states "Only reasonable, realistic and relevant alternatives need to be put forward. It is helpful if they are sufficiently distinct to enable meaningful comparisons to be made of the environmental implications of each". It is an area of plan making that has received considerable scrutiny and challenge.

[51] EC (2003) *Implementation of Directive 2001/42 on the Assessment of the Effects of Certain Plans and Programmes on the Environment.*

[52] Office of the Deputy Prime Minister et al (2005) *A Practical Guide to the Strategic Environmental Assessment Directive. Available from* https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/7657/practicalguidesea.pdf [Accessed June 2019]

For the purposes of this SEA, the constrained options will be considered as reasonable alternatives to the revised preferred options (that comprise the preferred plan).

In addition, reasonable alternatives that operate at the plan level have been considered and the cumulative effects have been identified, described and for consideration along with the preferred plan. Southern Water has used an adaptive planning approach to the development of the rdWRMP24 as promoted by the National Framework and the WRPG. In consequence, Southern Water considered nine different situations as representative of different combinations of population growth, climate change and environmental ambition expressed as different magnitudes of supply-demand deficit.

There are then different branch and decision points. Southern Water has selected the core 'reported pathway', informed by discussion with WRSE and regulators which is fully adaptive across the whole range of the future situations. In using a WRSE methodology that converts individual option SEAs into metric values for use in decision making on the selection of the best value plan, Southern Water has however, been able to consider the environmental implications of the many different outcomes and possible plan pathways.

Given the complexities, the sophistication of the adaptive plan pathways and flexibility of the Preferred Plan, effective environmental assessment of outputs has focused on the Least Cost (Cost Efficient) (LCP) Plan and Best Value Environment and Societal Plan (BESP), consistent with WRPG requirements, WRSE outputs and assessments and regulator feedback.

4.4.4 Changes made to the environmental assessments of the rdWRMP24 revised preferred options.

Southern Water consulted on the dWRMP24 and supporting technical documents (including the Environmental Report) between 14th November 2022 and 20th February 2023. The comments received from consultees on the draft Environmental Report (October 2022) are set out in Error! Reference source not found.. Some of these comments required refinement to the approach to assessment of the revised preferred options to ensure the consistent treatment of designated conservation, heritage and landscape sites and features. This has included:

- When assessing effects against the biodiversity, flora and fauna topic, supplementing the existing option assessment information (which includes reference as appropriate to designated sites and features such as Special Areas of Conservation (SACs), Special Protection Areas (SPAs), Ramsar sites, Sites of Special Scientific Interest (SSSIs) and Local Nature Reserves (LNRs) with the following:
  - updated HRA findings, including Appropriate Assessment and any findings regarding adverse effects on the integrity of sites (post mitigation);
  - named SSSIs and consistent reference to SSSI risk zones;
  - reference, where relevant, to Marine Conservation Zones (MCZs) and identification of potential effects;
  - reference, where relevant, to National Nature Reserves (NNRs) and identification of potential effects;
  - reference, where relevant, to Ancient Woodlands and identification of potential effects;
  - reference, where relevant to the revised Annex 9 'Protecting and Enhancing the Environment', which includes additional information from existing or planned investigations from the WINEP programme to address the potential effects of existing licensed abstractions on designated sites (notably the River Itchen SAC and the Arun Valley SAC).
- When assessing effects against the SEA objective "Protect and enhance the quality of the water environment and water resources" of the water topic, ensuring findings reflect the updated WFD assessment of the option.

- When assessing effects against the historic environment topic, ensuring the existing option assessment information includes relevant reference to World Heritage Sites (WHS) which in Southern Water operational area is Canterbury Cathedral Note that WHS were included within the sensitive receptors previously considered, along with Scheduled Monuments, Listed Buildings, Conservation Areas, Registered Parks and Gardens and Registered Battlefields, and this action meant clearly checking the WHS was explicitly referenced where relevant to the option assessment.
- When assessing effects against landscape topic, ensuring the existing option assessment information includes relevant reference to named National Parks and AONBs. These have also been supplemented with NCAs.
- When considering interzonal transfers (where options will have different effects in different WRZs), these are identified and summarised separately from the options, whose effects occur all within one WRZ. They are presented by the 'source' WRZ. These are included in **Section 5**.
- When considering cumulative effects of the rdWRMP24, options were identified that due to location and phasing, were considered to have potential cumulative effects, either during construction or operation. Options included in this assessment were based on having a proximity of within 10km, and whose implementation was within 5 years of each other (given some of the schemes will have extended development and construction phases). Effects of options within 10km were then considered on designated sites and features, with effects including but not limited to:
  - Biodiversity, flora and fauna: SACs, SPAs, Ramsar sites, MCZs, SSSIs, NNRs, LNRs, Ancient Woodlands and Groundwater Dependent Terrestrial Ecosystems (GWDTEs);
  - Soil: ALC, historic landfill sites;
  - Air: AQMA;
  - Flood risk: Flood zone 2 and 3
  - Water: SPZs and VNZs;
  - Landscape: AONBs, National Parks and National Character Areas (NCAs);
  - Historic Environment: WHS, SMs, Listed Buildings, Conservations Areas, Registered Parks and Gardens and Registered Battlefields;
  - Population and human health: highways, national trails, national cycle network.

  Where such effects have been identified, these are included in the summary of WRZ cumulative effects identified in **Section 6**.
- When considering the cumulative effects of the rdWRMP24, with adjacent water company revised draft WRMPs and the WRSE revised Regional Plan, option assessment information has been shared and reviewed to ensure alignment of findings. This has been checked for corroboration with the WRSE environmental assessments to ensure consistency and completeness.
- When considering the reasonable alternatives, two reasonable alternatives to the rdWRMP24 have been considered and assessed, the LCP and BESP.
- Mitigation measures have been revised to reflect any additional effects identified, and more recent commitments made by Southern Water.

4.5 Limitations of the assessment

SEA is a plan level assessment aimed at highlighting potential environmental concerns at a strategic level. Where particular limitations or outstanding issues are known, these are described in the SEA appraisal tables for the relevant water resources management option concerned. Further detailed assessment will still be required at the point of planning for the implementation of each option to take account of the prevailing environmental conditions and any new evidence that is available at that time.

Some broad assumptions have been applied when considering the potential for options. In summary:

- It is assumed that the relevant Catchment Abstraction Management Strategy (CAMS) documents are largely correct and reliable, and that there is 'water available for use' where this is confirmed by the CAMS.
- It is assumed that all normal licensing, consenting and management procedures will be employed at option delivery and throughout operation, and that established best-practice avoidance and mitigation measures will be employed throughout scheme design and construction to safeguard environmental receptors, including European site interest features.
- For desalination schemes, whilst it is possible that environmental changes could be experienced some distance from an outfall (mainly if there is limited mixing and stratified saline flows develop), many studies[53] have demonstrated that near-field dilution of brine to ambient levels typically occurs within a relatively short distance (tens or hundreds of metres rather than kilometres), and that impacts to benthic communities from concentrate discharges could be minimised by using properly-designed diffuser systems. However, at this stage, where appropriate a precautionary view on effects has been taken.
- For effluent re-use schemes it is assumed that all existing consents and permits (as they relate to water quality) can be met and that any material / effluent produced from the recovery process will be disposed of in landfill or returned to the head of the works for treatment (i.e. the recovery will reduce flow volumes but not water quality).
- Whilst leakage scenarios have been identified within the rdWRMP24, detailed option information of an equivalence to that for the supply options has not been available for assessment and the option assessments have been completed, proportionate to the information available.
- The assessment is based on option information confirmed with Southern Water in June 2024 to ensure the timely completion of the necessary individual option assessments to include in this report to accompany the submission of the rdWRMP24.

4.6 Links to the WRSE Regional Plan environmental assessment

The WRSE regional plan environmental assessments including the SEA has been used as a basis for the WRSE member water companies when undertaking their WRMP24 statutory environmental assessments.

Figure 4-1[54] shows the interactions between the two processes and information shared from the regional plan environmental appraisal to support the water company WRMP24 development process. The approach aims to reduce the amount of work individual water companies need to undertake during WRMP24, streamline the environmental assessment process, and ensure consistency across water company environmental assessments.

[53] e.g. Roberts DA, Johnston EL & Knott NA (2009) Impacts of desalination plant discharges on the marine environment: A critical review of published studies. *Water Research* 44 (2010) 5117-5128; Fernández-Torquemada Y, Gónzalez-Correa JM, Loya A, Ferrero LM, Díaz-Valdés M (2009) Dispersion of brine discharge from seawater reverse osmosis desalination plants. *Desalination and Water Treatment* 5 (2009) 137-145; Portillo E., Ruiz de la Rosa M., Louzara G., Quesada J.,. Ruiz J.M. & Mendoza H. (2014) Dispersion of desalination plant brine discharge under varied hydrodynamic conditions in the south of Gran Canaria, *Desalination and Water Treatment*, 52:1-3, 164-177.

[54] WRSE (2022) WRSE (2022) *WRSE Regional Plan Strategic Environmental Assessment Report.* Report for WRSE by Mott MacDonald Figure 4-2

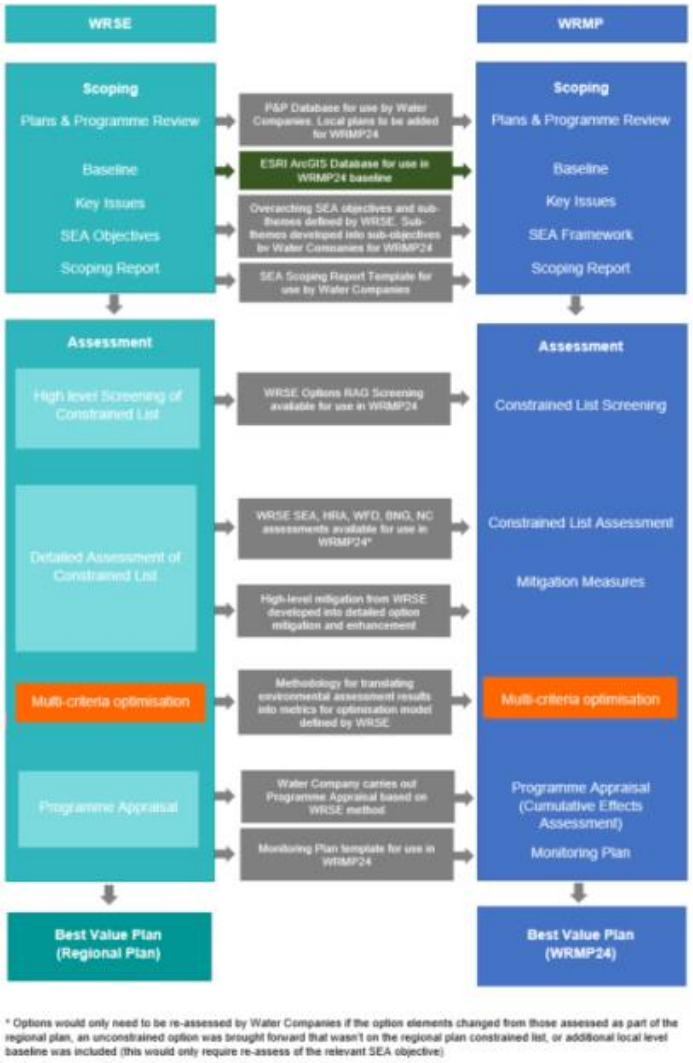

Figure 4-1 Interactions Figure 2: Interactions and Information exchange between the WRSE assessment and WRMP process.

The interactions and the need for consistency between the Regional Plan and the WRMP's assessments has meant that the assessment framework and resultant Southern Water constrained option assessments are consistent with those used in the WRSE Emerging and Draft Regional Plan SEA[55]. These were completed to support the decision making and investment modelling completed by WRSE.

4.6.1 SEA inputs into decision making

The WRSE methodology also includes a translation of the SEA outputs into numerical values to incorporate the SEA findings directly into the WRSE investment model. The SEA metrics were based on the option (including embedded mitigation) results and included construction and operation effects combined. These are illustrated in **Table 4-5** below.

[55] WRSE (2022) *WRSE Regional Plan Strategic Environmental Assessment Report*. Report for WRSE by Mott MacDonald.

Table 4-5 WRSE SEA Scoring.

Effect	Description	Numerical Value
+++	Major Positive	+8
++	Moderate Positive	+4
+	Minor Positive	+1
0	Neutral	0
-	Minor Negative	-1
--	Moderate Negative	-4
---	Major Negative	-8

Two metrics were developed, one for positive effects and one for negative effects. The positive results were summed, and the negative results were summed to give the two metrics. WRSE state[56] that "The advantages of this approach are that it is straightforward and easy to understand, and it avoids the trading and cancelling out of effects (if positive and negative effects are added together in one metric). It also has the additional advantage of alleviating some of the issues of hidden significant effects and cumulative minor effects because of using more pronounced values between minor and major effects…. It is acknowledged that there is a risk of simplification of actual positive and negative effects from combining the SEA results into just two metrics. The programme appraisal reviewed potential biases and considered near alternatives and actual positives and negatives to ensure effects were not being masked by the metrics."

Section 15 in the WRSE Draft Regional Plan Annex I sets out how the environmental metrics were used in the investment model to develop the WRSE draft Regional Plan.

[56] WRSE (2022) *WRSE Regional Plan Strategic Environmental Assessment Report*. Section 4.2.2.1

5 Assessment of rdWRMP24

This section presents an assessment of the rdWRMP24.

Section 5.1 presents an analysis of the compatibility of the rdWRMP24 objectives with the SEA objectives to determine the extent to which there may be any inherent inconsistencies which are then reflected in proposed options identified to progress the plan objectives. **Section 5.2** summarises the assessment of the effects from the 300 constrained options. **Section 5.3** details the changes to the rdWRMP24, and **Sections** Error! Reference source not found. **to** Error! Reference source not found. summarise the likely significant post-mitigation positive and negative effects for the options selected within the central, western and eastern region of Southern Water rdWRMP24. **Section 5.7** summarises the effects from the demand management and leakage options and **Section 5.8** summarises the likely significant effects by topic and by WRZ.

5.1 Compatibility of the rdWRMP24 objectives with the SEA objectives

The over-arching 'best value' planning objectives of Southern Water rdWRMP24 to meet statutory and policy requirements are:

- Deliver a secure and wholesome supply of water;
- Deliver environmental and social benefit;
- Increase the resilience of water systems;
- Deliver at a cost that is acceptable to customers.

A compatibility assessment of these objectives has been completed against the SEA objectives and is presented in Table 5-1. Any incompatibilities, if identified, would then be reflected in the subsequent assessment of the options to deliver the plan objectives.

The compatibility matrix demonstrates that the rdWRMP24 objectives and SEA objectives are broadly compatible with one another. The great majority of interactions between elements of the rdWRMP24 objectives and the SEA objectives have either a positive relationship or have no direct or an uncertain relationship. This reflects the scope and intent of the plan which are likely to broadly result in the positive environmental outcomes against the objectives.

However, there are a number of potentially uncertain relationships associated with the rdWRMP24 Objective: *"Deliver a secure and wholesome supply of water"* and the following SEA objectives:

- Protect and enhance biodiversity and vulnerable habitats
- Reduce and minimise air emissions.
- Reduce embodied and operational carbon emissions
- Conserve, protect and enhance landscape, townscape and seascape character and visual amenity
- Conserve, protect and enhance the historic environment, including archaeology
- Minimise resource use and waste production

In these instances, particular attention will need to be paid to proposals that seek to increase water storage capacity and/or supply through appropriate impact assessment of specific schemes, as well as the likely mitigation of emissions and resource use associated with construction and operation.

Table 5-1 SEA and rdWRMP24 objectives compatibility matrix.

SEA objectives	WRMP24 Objectives			
	Deliver a secure and wholesome supply of water	Increase the resilience of water systems	Deliver environmental and social benefit	Deliver at a cost that is acceptable to customers
1. Protect and enhance biodiversity, priority species, vulnerable habitats and habitat connectivity (no loss and improve connectivity where possible)	/	+	+	+
2. Protect and enhance the functionality, quantity and quality of soils	0	+	+	+
3. Increase resilience and reduce flood risk	+	+	+	+
4. Protect and enhance the quality of the water environment and water resources	+	+	+	+
5. Deliver reliable and resilient water supplies	+	+	+	+
6. Reduce and minimise air emissions	/	+	+	+
7. Reduce embodied and operational carbon emissions	/	+	+	+
8. Reduce vulnerability to climate change risks and hazards	+	+	+	+
9. Conserve, protect and enhance landscape, townscape and seascape character and visual amenity	/	+	+	+
10. Conserve, protect and enhance the historic environment, including archaeology	/	0	+	+
11. Maintain and enhance the health and wellbeing of the local community, including economic and social wellbeing	+	+	+	+
12. Maintain and enhance tourism and recreation	+	+	+	+
13. Minimise resource use and waste production	/	+	+	+
14. Avoid negative effects on built assets and infrastructure	0	0	+	+

Key to Table 5-1 to illustrate the compatibility.

+	Objectives are compatible	0	Objectives are not related
-	Objectives are potentially incompatible	/	Uncertainty over relationship

5.2 Assessment of the effects of the constrained options by WRZ

Constrained options to resolve the deficits for each of the 14 WRZs in Southern Water's operational area have been developed and considered as part of the preparation of the WRMP. Assessment of the constrained options has been carried out in accordance with the methodology described in **Section 4**.

SEA assessment framework tables have been completed for each of the 300 constrained options and are presented in full in Appendix IError! Reference source not found..

As would be expected given the wide range of water resource options considered, a diverse range of effects have been identified for options, noting that the assessment was proportionate to the level of information available. Significant effects were identified for SEA topics including biodiversity, flora and fauna, landscape, population and human health, with effects on designated sites and features a key determinant of identifying likely significant effects:

The findings of the completed individual option SEA were used as part of the more detailed option screening, with considered the following criteria:

- **Environmental and social assessment** - which used the findings of the SEA and HRA screening to highlight:
  - 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.

In moving from constrained options to preferred options, the reasons why options have not been selected includes effects identified through the SEA (and HRA and WFD processes), for example:

- Potential effects upon SSSI/SAC from options which could not be addressed by standard mitigation measures or construction best practice (or arise from option operation) with an acknowledgement that any adverse unmitigable effects would increase risk of planning consent not being granted.
- Significant and potentially non-compliant effects on water quality from option operation during period of low flows.

- Option uncertainties arising from insufficient progress on option definition resulting in potential, environmental effects.

Detailed information on the appraisal of each option is included in the completed Water Resources Planning Tables 2024 (a technical annex to the rdWRMP24) and in particular worksheet 4 'Options Appraisal Summary' which presents an appraisal of all options with key cost, benefit and natural capital metrics. The rdWRMP Annex 12 (Options Appraisal) has also been updated to include information on the individual schemes and the process of option appraisal which includes outline reasons for the rejection of options.

5.3 Assessment of the effects of the revised preferred supply options

The 300 constrained options have been refined through the option screening process. For the rdWRMP24, Southern Water has selected to 111 revised preferred options following the process set out **Section 1.4.3**, comprising of:

- 85 supply options comprising of:
  - Transfers between WRZs and water companies (21 interzonal transfers, 12 bulk export options, 16 bulk import options);
  - eleven desalination options (across four locations) in four WRZs;
  - thirteen groundwater options;
  - eight recycling options;
  - two storage options;
  - one asset enhancement and one improved treatment capacity.
- 10 generic drought options;
- 16 generic demand management and leakage options

SEA assessment framework tables have been completed for each of the preferred options and are presented in full in Error! Reference source not found.. It should be noted that options selected across all nine situations in the adaptive plan have been assessed through the SEA process.

The suite of preferred options assessed for the dWRMP24 and submitted in September 2023 has been updated for the rdWRMP24 as follows:

- the removal of options that are no longer required, or for clarity / consistency where bi-directional schemes are proposed;
- the addition of three new 'resilience options' comprising two new supply-side groundwater schemes and one new drought option;
- the inclusion of two WRMP19 options that were not explicitly noted previously;
- minor amendments to some supply-side network schemes (reflecting further engineering information);
- amendments to the first year and/or yield for some options;
- other minor amendments to reflect consultation responses.

The following sections (Section 5.4, 5.5 and 5.6) present a summary of the assessment of the preferred options organised by region. Within each section effects are summarised by WRZ. The effects are summarised for preferred options wholly within the WRZ and separately for those which act across WRZs (the interzonal options) where relevant. For each WRZ a summary is presented of the revised preferred options based on the information provided by Southern Water. Effects are presented as colour-coded visual evaluation (VE) summary matrices (Table 5-2) against each of the objectives in the SEA framework (Table 4-2**Error! Reference source not found.**). The colour coding of the assessment reflects a range from major

adverse effect in red through to major beneficial effects in dark green as shown in the legend below (consistent with the qualitive scoring matrix presented in Table 5-3.

Table 5-2 Visual evaluation matrix summary (post mitigation).

SEA topic	SEA objective	Construction effects		Operational effects		Commentary	Mitigation	Residual construction effects		Residual operational effects	
Biodiversity, flora and fauna	Protect and enhance biodiversity, priority species, vulnerable habitats and habitat connectivity (no loss and improve connectivity where possible)	0	-	0	-	etc	etc	0	0	0	-
Soil	etc										
Water	etc										

Table 5-3 SEA key.

+++	Significant Positive	-	Minor Negative
++	Moderate Positive	--	Moderate Negative
+	Minor Positive	---	Significant Negative
0	Neutral	?	Uncertain

5.4 Central area

5.4.1 Sussex North (SNZ) WRZ

Options wholly within the WRZ

The options within the WRZ are described in Table 5-4, whilst a summary of the assessment of effects (post mitigation) is set out in Table 5-5.

Table 5-4 Summary of options for SNZ.

Option name	Yield (Ml/d) (if applicable)	Description	Earliest year of implementation
Drought option: Pulborough Surface water (Phases 1 to 3) Drought Permit/Order (2025 onwards) (23Ml/d)	23	Pulborough Surface water (Phases 1 to 3) Drought permit/order (2025 onwards).	2026
Drought option: - demand side (SNZ): NEUBs	2.16	Non-essential use ban - SNZ WRZ.	2026
Drought option: Reduce transfer to other commercial customers - SNZ	0.11	Drought option: In the event of a drought, the Company would hold discussions with a commercial customer with regards to the resources position and their supply.	2027
Drought option: TUBs - SNZ	1.38	Temporary use bans - SNZ WRZ.	2026
Groundwater (SNZ): New borehole at Petworth (4Ml/d)	4	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.	2031
Recycling (SNZ): Littlehampton WTW with river discharge (15Ml/d)	15	This scheme proposes the transfer of treated effluent from Littlehampton WwTW to a new discharge point on the western River Rother upstream of the Pulborough Surface Water abstraction. This would support flows over the weir as the MRF is approached, therefore prolong production at Pulborough	2031

Option name	Yield (Ml/d) (if applicable)	Description	Earliest year of implementation
		during a drought. 20Ml/d represents the upper end of the reliable flow that could be expected from Ford WwTW. Once abstracted at Pulborough WSW this water would be used to meet demand in the Sussex North WRZ.	
Recycling (SNZ): Horsham with storage at Pulborough (11.5Ml/d)	6.8	New resource. This option is a new 9.5Ml/d water recycling plant producing a DO of 6.8Ml/d near Horsham WwTW and a transfer of the treated effluent to Church Farm reservoir, which feeds into Pulborough WSW. Process losses have been included.	2058
Storage (SNZ): River Adur Offline Reservoir (19.5Ml/d)	19.5	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.	2046
Bulk import (SNZ): Havant Thicket Reservoir to Pulborough (50Ml/d)	40	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.	2040
Bulk import (SNZ): SES to SNZ (10Ml/d)	10	Proposed new bi-directional transfer from SES Outwood To Southern Water Buchen Hill, Crawley. 10Ml/d transfer flow rate.	2034
Bulk import (SNZ): SES re-zoning (4Ml/d)	4	Extension of current re-zoning of supplies to SES water in SNZ beyond 2025 for up to 4Ml/d.	2026

Option name	Yield (Ml/d) (if applicable)	Description	Earliest year of implementation
Bulk import (SNZ): SEW RZ5 to Pulborough	10	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.	2040
Groundwater (SNZ): Petersfield refurbishment (1.6Ml/d)	1.6	The proposed scheme involves both borehole rehabilitation and work to improve the network.	2029
Groundwater (SNZ): Reinstate West Chiltington (3.1Ml/d)	3.12	The proposed scheme is to return an existing Southern Water groundwater site into supply.	2029

Table 5-5 Visual evaluation matrix summary (post mitigation) for SNZ.

WRZ	Option	Stages (post mitigation)	Biodiversity	Soils	Water			Air	Climatic Factors		Landscape	Historic Env	Population & Human Health		Material Assets	
					Resilience	Quality	Reliability		Carbon emissions	Climate change			Health/ well-being	Tourism/ recreation	Resource use	Built assets
Sussex North (SNZ)	Drought option: Pulborough Surface water (Phases 1 to 3) Drought Permit/Order (2025 onwards) (23Ml/d)	Construction (positive)	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Construction (negative)	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Operation (positive)	0	0	0	0	+	0	0	+	0	0	+	0	0	0
		Operation (negative)	--	0	0	--	0	0	0	-	-	0	0	-	-	0
Sussex North (SNZ)	Drought option: - demand side (SNZ): NEUBs	Construction (positive)	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Construction (negative)	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Operation (positive)	+	0	0	+	+	0	+	+	+	+	+	0	+	0
		Operation (negative)	0	-	0	0	0	0	0	0	-	-	---	--	0	0
Sussex North (SNZ)	Drought option: Reduce transfer to other commercial customers - SNZ	Construction (positive)	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Construction (negative)	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Operation (positive)	+	0	0	+	+	0	0	+	0	0	+	0	0	0
		Operation (negative)	0	0	0	0	-	0	0	0	0	0	-	-	0	0
Sussex North (SNZ)	Drought option: TUBs - SNZ	Construction (positive)	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Construction (negative)	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Operation (positive)	+	0	0	+	+	0	+	+	+	+	+	0	+	0
		Operation (negative)	0	0	0	0	0	0	0	0	-	-	--	-	0	0
Sussex North (SNZ)	Groundwater (SNZ): New borehole at Petworth (4Ml/d)	Construction (positive)	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Construction (negative)	0	-	0	0	0	0	-	0	--	0	0	-	-	-
		Operation (positive)	0	0	0	0	+	0	0	+	0	0	0	0	0	0

WRZ	Option	Stages (post mitigation)	Biodiversity	Soils	Water			Air	Climatic Factors		Landscape	Historic Env	Population & Human Health		Material Assets	
					Resilience	Quality	Reliability		Carbon emissions	Climate change			Health/ well-being	Tourism/ recreation	Resource use	Built assets
		Operation (negative)	-	0	0	---	0	0	0	-	--	0	0	0	0	0
Sussex North (SNZ)	Recycling (SNZ): Littlehampton WTW with river discharge (15Ml/d)	Construction (positive)	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Construction (negative)	-	-	--	0	0	-	--	0	-	--	-	-	-	-
		Operation (positive)	0	0	0	0	+	0	0	+	0	0	0	0	0	0
		Operation (negative)	--	0	0	--	0	0	--	0	0	0	0	0	0	0
Sussex North (SNZ)	Recycling (SNZ): Horsham with storage at Pulborough (11.5Ml/d)	Construction (positive)	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Construction (negative)	-	0	-	-	0	-	-	0	-	-	-	-	-	-
		Operation (positive)	0	0	0	0	+	0	0	0	0	0	0	0	0	0
		Operation (negative)	-	0	0	--	0	0	-	0	-	0	0	0	0	0
Sussex North (SNZ)	Storage (SNZ): River Adur Offline Reservoir (19.5Ml/d)	Construction (positive)	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Construction (negative)	-	--	-	-	0	-	0	0	-	-	-	-	-	-
		Operation (positive)	+	0	0	0	++	0	0	0	0	0	0	+	0	0
		Operation (negative)	--	0	-	--	0	0	-	-	--	0	0	0	0	0
Sussex North (SNZ)	Bulk import (SNZ): Havant Thicket Reservoir to Pulborough (50Ml/d)	Construction (positive)	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Construction (negative)	-	-	-	0	0	0	-	0	--	-	-	-	-	-
		Operation (positive)	0	0	0	0	++	0	0	0	0	0	0	0	0	0
		Operation (negative)	-	0	0	0	0	0	--	0	0	0	0	0	0	0
Sussex North (SNZ)	Bulk import (SNZ): SES to SNZ (10Ml/d)	Construction (positive)	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Construction (negative)	-	0	0	-	0	-	-	0	-	-	-	-	-	-
		Operation (positive)	0	0	0	0	+	0	0	0	0	0	0	0	0	0

WRZ	Option	Stages (post mitigation)	Biodiversity	Soils	Water			Air	Climatic Factors		Landscape	Historic Env	Population & Human Health		Material Assets	
					Resilience	Quality	Reliability		Carbon emissions	Climate change			Health/ well-being	Tourism/ recreation	Resource use	Built assets
		Operation (negative)	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sussex North (SNZ)	Bulk import (SNZ): SES re-zoning (4Ml/d)	Construction (positive)	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Construction (negative)	-	0	0	0	0	-	-	0	-	-	-	-	-	-
		Operation (positive)	0	0	0	0	+	0	0	0	0	0	0	0	0	0
		Operation (negative)	0	0	0	0	0	0	-	0	0	0	0	0	0	0
Sussex North (SNZ)	Bulk import (SNZ): SEW RZ5 to Pulborough	Construction (positive)	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Construction (negative)	--	0	-	0	0	-	-	0	--	-	-	-	-	-
		Operation (positive)	0	0	0	0	+	0	0	0	0	0	0	0	0	0
		Operation (negative)	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sussex North (SNZ)	Groundwater (SNZ): Petersfield refurbishment (1.6Ml/d)	Construction (positive)	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Construction (negative)	0	0	0	0	0	0	-	0	-	-	0	0	-	-
		Operation (positive)	0	0	0	0	+	0	0	0	0	0	+	0	0	0
		Operation (negative)	0	0	0	--	-	0	-	0	0	0	0	0	0	0
Sussex North (SNZ)	Groundwater (SNZ): Reinstate West Chiltington (3.1Ml/d)	Construction (positive)	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Construction (negative)	0	0	0	0	0	0	-	0	-	-	-	-	-	-
		Operation (positive)	0	0	0	0	+	0	0	0	0	0	+	0	0	0
		Operation (negative)	0	0	0	--	--	0	-	0	-	0	0	0	0	0

Construction effects

Four options (Drought option: Pulborough Surface water (Phases 1 to 3) Drought Permit/Order (2025 onwards) (23Ml/d), Drought option: - demand side (SNZ): NEUBs, Drought option: Reduce transfer to other commercial customers - SNZ and Drought option: TUBs - SNZ) were assessed as having a neutral effect against all objectives for the construction phase, as the nature of these options would involve operational changes only and no construction would be required for their implementation. The construction effects of the remaining ten options are described in the remainder of this subsection.

No positive effects or likely significant positive effects were identified from the assessment of construction phase impacts for the preferred options. No likely significant negative effects were identified from the assessment of construction phase impacts for the preferred options.

One of the options (Bulk import (SNZ): SEW RZ5 to Pulborough) was assessed as having a potentially moderate negative effect on the Biodiversity and Landscape SEA objectives, associated with the potential for construction works to affect designated and/or non-designated habitats, species, features and ancient woodland through direct land take, pollution, INNS transfer, noise and/or disturbance (e.g. vibration, dust). The HRA screened in Valley Ramsar/ SAC/SPA, The Mens SAC, Ebernoe Common SAC, and Singleton and Cocking Tunnels SAC for appropriate assessment but found that adverse effects will not occur or are clearly avoidable.

It was considered that one option (Storage (SNZ): River Adur Offline Reservoir (19.5Ml/d)) would have a moderate negative effect on the Soils, Geodiversity, Land Use SEA objective, due to the anticipated permanent loss of grade 3 (and grade 4) agricultural land for creation of a new reservoir.

One of the options (Recycling (SNZ): Littlehampton WTW with river discharge (15Ml/d)) was assessed as having a potentially moderate negative effect on the Water - Resilience SEA objective due to flood risk during construction, as approximately half of the option is located within Flood Zones 2 and 3; this option was also considered to have a moderate negative effect on the Carbon Emissions SEA objective, associated with the scale of embodied carbon and emissions from construction activities identified for the option infrastructure.

Three of the options (Groundwater (SNZ): New borehole at Petworth (4Ml/d), Bulk import (SNZ): Havant Thicket Reservoir to Pulborough (50Ml/d), and Bulk import (SNZ): SEW RZ5 to Pulborough), were assessed as having a moderate negative effect on the Landscape SEA objective, associated with construction activities for these options taking place within the designated landscape of the South Downs National Park.

Recycling (SNZ): Littlehampton WTW with river discharge (15Ml/d) was assessed a moderate negative for the Historic Environment SEA objective in recognition that pipeline routing should be considered to avoid crossing three Scheduled Monuments which is considered achievable.

All other negative construction effects for the preferred options were identified as minor.

Operational effects

All of the 14 preferred options were assessed as having a positive effect against the Water - Reliability SEA objective during the operation phase, as the anticipated additional water yield or reduction in water demand would help to deliver reliable and resilient water supplies. In-line with the potential for additional water supply capacity two of the preferred options (Storage (SNZ): River Adur Offline Reservoir (19.5Ml/d) and Bulk import (SNZ): Havant Thicket Reservoir to Pulborough (50Ml/d)) were considered to have a moderate positive effect for Water - Reliability, with the remaining options identified as having a minor positive effect for this SEA objective.

No other significant positive effects were identified during the assessment of the operation phase of the preferred options; however, minor positive effects were identified against some of the other SEA objectives. Six of the preferred options were identified as having a positive effect on the Climate Change SEA objective. Two drought options (Drought option: - demand side (SNZ): NEUBs and Drought option: TUBs - SNZ) were identified as having minor positive effects across a wider range of the SEA objectives related to Biodiversity,

Water - Quality and Reliability, Climatic Factors - Climate Change, Landscape, Historic Environment, Population & Human Health - Health & Wellbeing and Material Assets - Resource Use.

For the drought option Drought option: - demand side (SNZ): NEUBs significant negative effects were identified for the Health & Wellbeing SEA objective in the operation phase. The ban carries the risk of economic impacts on businesses that benefit directly or indirectly from certain water uses that would be prohibited under the ban (e.g. sports and leisure facilities). The ban may result in some business loss if the water-related operations have to be suspended. However, minor positive effects are also assessed for water savings which will help secure the supply of water to the communities in the WRZ. The drought option Drought option: TUBs - SNZ was identified as having a moderate negative effect against this SEA objective through potentially limiting water access during times of drought, compromising the sale of water consuming products and limiting the use of water.

For the Groundwater (SNZ): New borehole at Petworth (4Ml/d) option, significant negative effects were identified for the Water - Quality SEA objective, attributed to identification of WFD non-compliance for operation of a new borehole in the Hythe Formation aquifer under the option; the non-compliance relates to connectivity between the aquifer and overlying surface waters (Lower Greensand Arun & Western Streams waterbody), with impacts from abstraction considered to have adverse effects on existing low flows and the ability of relevant watercourses to support good ecological status.

Four other options (Drought option: Pulborough Surface water (Phases 1 to 3) Drought Permit/Order (2025 onwards) (23Ml/d), Recycling (SNZ): Littlehampton WTW with river discharge (15Ml/d), Recycling (SNZ): Horsham with storage at Pulborough (11.5Ml/d), Storage (SNZ): River Adur Offline Reservoir (19.5Ml/d)) were assessed to have moderate negative effects on the Water - Quality SEA objective during operation, due to the potential for WFD non-compliance (low confidence) associated with possible changes on the hydromorphology and physico-chemistry of relevant water bodies affecting aquatic habitats. Groundwater (SNZ): Reinstate West Chiltington (3.1Ml/d) was identified as having a moderate negative effect against the Water - Quality and the Water - Reliability SEA objectives.

Three options (Drought option: Pulborough Surface water (Phases 1 to 3) Drought Permit/Order (2025 onwards) (23Ml/d), Recycling (SNZ): Littlehampton WTW with river discharge (15Ml/d) and Storage (SNZ): River Adur Offline Reservoir (19.5Ml/d)) were assessed to have moderate negative effects on the Biodiversity SEA objective, attributed to various factors including reductions in flow resulting in adverse impacts on downstream flora and fauna (particularly during drought periods when ecosystems are under stress), and the potential for INNS transfer to sensitive downstream habitats associated with use of a proposed storage reservoir.

Two options (Recycling (SNZ): Littlehampton WTW with river discharge (15Ml/d), and Bulk import (SNZ): Havant Thicket Reservoir to Pulborough (50Ml/d)), were assessed as having moderate negative effects on the Carbon Emissions SEA objective, associated with operations for the transfer of treated effluent.

Two options (Groundwater (SNZ): New borehole at Petworth (4Ml/d) and Storage (SNZ): River Adur Offline Reservoir (19.5Ml/d)) were identified to have potential moderate negative effects on the Landscape SEA objective, associated with the location of operational infrastructure (a reinstated treatment works and a new reservoir) either within or within the setting of the designated landscapes of the South Downs National Park and the High Weald AONB.

Drought option: - demand side (SNZ): NEUBs was also identified as having a moderate negative effect against the Tourism & Recreation SEA objective through reducing the quantity of water made available for tourist attractions and water consuming recreational activities (swimming pools, watering sports pitches etc) during times of drought, which could dissuade tourists to the area for a brief period of time.

All other negative operation effects for the preferred options are identified as minor.

Interzonal transfer options

There is one interzonal transfer option (Interzonal transfer (SNZ-SWZ): Pulborough to Worthing) within the Sussex North WRZ. For this option the Sussex North WRZ is the source zone, whilst the Sussex Worthing WRZ is the recipient zone. The option is described in Table 5-6 whilst a summary of the assessment of its effects (post mitigation) is set out in Table 5-7.

Table 5-6 Summary of interzonal options (SNZ).

Option name	Yield (Ml/d) (if applicable)	Description	Earliest year of implementation
Interzonal transfer (SNZ-SWZ): Pulborough to Worthing	29.21	Additional pipeline to provide extra capacity along the existing transfer route between Sussex North and Sussex Worthing	2040

Table 5-7 Visual evaluation matrix summary (post mitigation) for SNZ interzonal transfers.

WRZ	Option	Stages (post mitigation)	Biodiversity	Soils	Water			Air	Climatic Factors		Landscape	Historic Env	Population & Human Health		Material Assets	
					Resilience	Quality	Reliability		Carbon emissions	Climate change			Health/ well-being	Tourism/ recreation	Resource use	Built assets
SNZ	Interzonal transfer (SNZ-SWZ): Pulborough to Worthing	Construction (positive)	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Construction (negative)	--	0	-	0	0	-	-	0	-	-	-	-	-	-
		Operation (positive)	0	0	0	0	++	0	0	0	0	0	0	0	0	0
		Operation (negative)	0	0	0	0	0	0	-	0	0	0	0	0	0	0

Construction effects

No positive or significant positive effects were identified for option Interzonal transfer (SNZ-SWZ): Pulborough to Worthing.

No significant negative effects were identified for option Interzonal transfer (SNZ-SWZ): Pulborough to Worthing during the construction phase, however, the option was assessed as having a moderate negative effect against the biodiversity SEA objective, due to potential for disturbance (noise, dust, air quality) on designated sites. The option is immediately adjacent to Parham Park SSSI whilst a further six SSSIs are within 1km of the option.

Minor negative effects were identified against the water resilience, air, carbon emissions, landscape, historic environment, health & wellbeing, tourism & recreation, resource use and built assets SEA objectives.

Operational effects

No significant positive or significant negative were identified for option Interzonal transfer (SNZ-SWZ): Pulborough to Worthing during the operational phase. However, a moderate positive effect was identified against the water reliability SEA objective (described in Section 5.4.2), whilst a minor negative effect was identified against the carbon emissions SEA objective.

5.4.2 Sussex Worthing (SWZ) WRZ

Options wholly within the WRZ

The options within the WRZ are described in Table 5-8, whilst a summary of the assessment of effects (post mitigation) is set out in Table 5-9.

Table 5-8 Summary of options for SWZ.

Option name	Yield (Ml/d) (if applicable)	Description	Earliest year of implementation
Desalination (SWZ): Tidal River Arun (10Ml/d)	8.34	This option proposes a desalination plant to treat seawater abstracted off the coast near Littlehampton to supply treated water to the Sussex Worthing WRZ. It is assumed that the water could be used during drought conditions to meet demand in Sussex Worthing WRZ. There is bi-directional transfer between Sussex Worthing WRZ and Sussex North WRZ which means this option could have result in additional benefit to Sussex North WRZ. This transfer would likely require additional connectivity between Perry Hill WSR and Tennants Hills WSR.	2046
Desalination (SWZ): Tidal River Arun (20Ml/d)	20	This option proposes a desalination plant to treat seawater abstracted off the coast near Littlehampton to supply treated water to the Sussex Worthing WRZ; however, is for a higher yield.	2041
Desalination (SWZ): Tidal River Arun (20Ml/d) Phase 2	20	This option proposes a second phase development of an additional 20Ml/d desalination capacity to treat estuarine water from the tidal River Arun to supply treated water to the Sussex Worthing WRZ. This option is contingent on the first phase 10Ml/d or 20Ml/d desalination plant options.	2050
Drought option - demand side (SWZ): NEUBs	1.58	Non-essential use ban - SWZ WRZ	2026
Drought option - demand side (SWZ): Reduce	0.07	Drought option: In the event of a drought, the Company would hold discussions with a commercial customer with regards to the resources position and their supply.	2027

Option name	Yield (Ml/d) (if applicable)	Description	Earliest year of implementation
transfer to other commercial customers			
Drought option - demand side (SWZ): TUBs	1.01	Temporary use bans - SWZ WRZ	2026
Treatment capacity (SWZ): Pulborough winter transfer stage 1 (2Ml/d)	2	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 Sussex Worthing WRZ to Sussex Brighton WRZ via Shoreham WSW, providing the additional 2Ml/d of water to Brighton WRZ 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.	2041

Table 5-9 Visual evaluation matrix summary (post mitigation) for SWZ.

WRZ	Option	Stages (post mitigation)	Biodiversity	Soils	Water			Air	Climatic Factors		Landscape	Historic Environment	Population & Human Health		Material Assets	
					Resilience	Quality	Reliability		Carbon emissions	Climate change			Health & well-being	Tourism & recreation	Resource use	Built assets
Sussex Worthing	Desalination (SWZ): Tidal River Arun (10Ml/d)	Construction (positive)	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Construction (negative)	--	--	-	-	0	-	--	0	-	-	-	-	-	-
		Operation (positive)	0	0	0	0	+	0	0	+	0	0	0	0	0	0
		Operation (negative)	--	0	-	--	0	-	--	0	-	0	0	0	-	0
Sussex Worthing	Desalination (SWZ): Tidal River Arun (20Ml/d)	Construction (positive)	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Construction (negative)	--	--	-	-	0	-	--	0	-	-	-	-	-	-
		Operation (positive)	0	0	0	0	+	0	0	+	0	0	0	0	0	0
		Operation (negative)	--	0	-	--	0	-	--	0	-	0	0	0	-	0
Sussex Worthing	Desalination (SWZ): Tidal River Arun (20Ml/d) Phase 2	Construction (positive)	0	0	0	0	0	0	0	0	0	0	0	0	0	0

WRZ	Option	Stages (post mitigation)	Biodiversity	Soils	Water			Air	Climatic Factors		Landscape	Historic Environment	Population & Human Health		Material Assets	
					Resilience	Quality	Reliability		Carbon emissions	Climate change			Health & well-being	Tourism & recreation	Resource use	Built assets
		Construction (negative)	--	--	-	-	0	-	--	0	-	-	-	-	-	-
		Operation (positive)	0	0	0	0	+	0	0	+	0	0	0	0	0	0
		Operation (negative)	--	0	-	--	0	-	--	0	-	0	0	0	-	0
Sussex Worthing	Drought option - demand side (SWZ): NEUBs	Construction (positive)	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Construction (negative)	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Operation (positive)	+	0	0	+	+	0	+	+	+	+	+	0	+	0
		Operation (negative)	0	-	0	0	0	0	0	0	-	-	---	--	0	0
Sussex Worthing	Drought option - demand side (SWZ): Reduce transfer to other commercial customers	Construction (positive)	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Construction (negative)	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Operation (positive)	+	0	0	+	+	0	0	+	0	0	+	0	0	0

WRZ	Option	Stages (post mitigation)	Biodiversity	Soils	Water			Air	Climatic Factors		Landscape	Historic Environment	Population & Human Health		Material Assets	
					Resilience	Quality	Reliability		Carbon emissions	Climate change			Health & well-being	Tourism & recreation	Resource use	Built assets
		Operation (negative)	0	0	0	0	-	0	0	0	0	0	-	-	0	0
Sussex Worthing	Drought option - demand side (SWZ): TUBs	Construction (positive)	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Construction (negative)	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Operation (positive)	+	0	0	+	+	0	+	+	+	+	+	0	+	0
		Operation (negative)	0	0	0	0	0	0	0	0	-	-	--	-	0	0
Sussex Worthing	Treatment capacity (SWZ): Pulborough winter transfer stage 1 (2Ml/d)	Construction (positive)	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Construction (negative)	-	0	0	-	0	-	-	0	-	-	-	-	-	-
		Operation (positive)	0	0	0	+	+	0	0	+	0	0	0	0	0	0
		Operation (negative)	0	0	0	0	0	0	-	0	0	0	0	0	0	0

Construction effects

No positive or likely significant positive effects were identified for construction.

No likely significant negative effects have been identified for construction.

Four options (Desalination (SWZ): Tidal River Arun (10Ml/d); Desalination (SWZ): Tidal River Arun (20Ml/d); and Desalination (SWZ): Tidal River Arun (20Ml/d) Phase 2and Treatment capacity (SWZ): Pulborough winter transfer stage 1 (2Ml/d)) were assessed as having a negative effect on the biodiversity SEA objective, with those option for the Arun desalination schemes determined as a moderate negative effect. This is associated with the potential for construction works to affect designated and/or non-designated habitats, species and features and ancient woodland through noise and/or disturbance (e.g. vibration, dust).

Moderate negative effects are also assessed for the Arun desalination schemes for the soil SEA objective due to the location of development on agricultural land assessed as BMV. All other negative construction effects for these options are identified as minor.

Three options (Drought option - demand side (SWZ): NEUBs, Reduce transfer to other commercial customers; and Drought option - demand side (SWZ): TUBs) were assessed as having neutral effects as they would involve no construction and would involve operational changes only.

Operational effects

No significant positive effects were identified for operation.

Positive effects were assessed for all options for the Water - reliability SEA objective, reflecting the positive impact on water resilience. Seven options were identified as having positive effects on climate change SEA objective. Two drought options (Drought option - demand side (SWZ): NEUBs and Drought option - demand side (SWZ): TUBs) were identified as having minor positive effects across a wider range of SEA objectives related to biodiversity, water quality and reliability, climatic factors - climate change, landscape, historic environment, population & human health - health & well-being and material assets - resource use.

For Drought option - demand side (SWZ): NEUBs, significant negative effects were identified for the Health and wellbeing SEA objective in the operation phase. The ban carries the risk of economic impacts on businesses that benefit directly or indirectly from certain water uses that would be prohibited under the ban (e.g. sports and leisure facilities). The ban may result in some business loss if the water-related operations have to be suspended. However, minor positive effects are also assessed for water savings which will help secure the supply of water to the communities in the WRZ. This is the only significant negative effect associated with any of the options. Drought option - demand side (SWZ): TUBs was identified as having moderate negative effects against this SEA objective through potentially limiting water access during times of drought, compromising the sale of water consuming products and limiting the use of water.

Moderate effects were assessed for the Arun desalination options (Desalination (SWZ): Tidal River Arun (10Ml/d); Desalination (SWZ): Tidal River Arun (20Ml/d); and Desalination (SWZ): Tidal River Arun (20Ml/d) Phase 2) for SEA objectives related to biodiversity and water quality. For biodiversity, moderate effects were identified in relation to the hypersaline discharge however the HRA appropriate assessment found no adverse effects on the integrity from operation. The water quality assessment reflects the findings of WFD assessment of potential non-compliance (with low confidence) for the Sussex waterbody related to hypersaline discharge.

Drought option - demand side (SWZ): NEUBs was identified as having a moderate negative effect against the population & human health - tourism & recreation SEA objective through reducing the quantity of water made available for tourist attractions and water consuming recreational activities (swimming pools, watering sports pitches etc) during times of drought, which could dissuade tourists to the area for a brief period of time.

All other residual negative effects were identified as minor.

Interzonal transfer options

There are four interzonal transfer options within the Sussex Worthing WRZ. For option Interzonal transfer (SNZ-SWZ): Pulborough to Worthing, the Sussex Worthing WRZ would be the recipient zone, whilst the Sussex North WRZ would be the source zone. A summary of this option is presented in Table 5-6 (Section 5.4.1), whilst a summary of the assessment of its effects (post mitigation) is set out in Table 5-7 (Section 5.4.1); in order to avoid undue duplication, these tables are not repeated here.

For two options (Interzonal transfer (SWZ-SBZ): Pulborough winter transfer stage 2 (4Ml/d) and Interzonal transfer (SWZ-SBZ): V6 valve additional capacity (13Ml/d)), the Sussex Worthing WRZ would be the source zone, whilst the Sussex Brighton WRZ would be the recipient zone (and reverse) meanwhile would involve a bi-directional transfer between the same zones. These options are described in Table 5-10 below, whilst a summary of the assessment of their effects (post mitigation) is set out in Table 5-11 below.

Table 5-10 Summary of interzonal options for SWZ

Option name	Yield (Ml/d) (if applicable)	Description	Earliest year of implementation
Interzonal transfer (SWZ-SBZ): Pulborough winter transfer stage 2 (4Ml/d)	3	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 Worthing to Brighton A WSR via Shoreham WSW, providing the additional 2Ml/d of water to Brighton WRZ during the summer and autumn of a drought year. This is Phase 2, which is to provide a transfer from Pulborough surface water abstraction to Sussex Brighton WRZ (Shoreham WSR) to allow groundwater sources in SBZ to be rested.	2041
Interzonal transfer (SBZ-SWZ): Brighton to Worthing	6.3	New bi-directional transfer between Sussex Worthing and Sussex Brighton Water Resource Zones.	2041
Interzonal transfer (SWZ-SBZ): V6 valve additional capacity (13Ml/d)	13	Trunk main at v6 valve (SWZ to SBZ) additional capacity (from 2026/27) (negates need for IZT_Har3)	2026

Table 5-11 Visual evaluation matrix summary (post mitigation) for SWZ interzonal transfers.

WRZ	Option	Stages (post mitigation)	Biodiversity	Soils	Water			Air	Climatic Factors		Landscape	Historic Environment	Population & Human Health		Material Assets	
					Resilience	Quality	Reliability		Carbon emissions	Climate change			Health & well-being	Tourism & recreation	Resource use	Built assets
Sussex Worthing (SWZ)	Interzonal transfer (SWZ-SBZ): Pulborough winter transfer stage 2 (4Ml/d)	Construction (positive)	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Construction (negative)	--	-	-	--	0	-	-	0	-	-	-	-	-	-
		Operation (positive)	0	0	0	+	+	0	0	+	0	0	0	0	0	0
		Operation (negative)	0	0	0	0	0	0	-	0	-	0	0	0	0	0
Sussex Worthing (SWZ)	Interzonal transfer (SBZ-SWZ): Brighton to Worthing	Construction (positive)	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Construction (negative)	--	-	-	-	0	-	-	-	-	-	-	-	-	-
		Operation (positive)	0	0	0	0	++	0	0	+	0	0	0	0	0	0
		Operation (negative)	0	0	0	0	0	0	-	0	0	0	0	0	0	0
Sussex Worthing (SWZ)	Interzonal transfer (SWZ-SBZ): V6 valve additional capacity (13Ml/d)	Construction (positive)	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Construction (negative)	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Operation (positive)	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Operation (negative)	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Construction effects

As described in Section 5.4.1 for option Interzonal transfer (SNZ-SWZ): Pulborough to Worthing, no significant positive effects (or positive effects of any kind) or significant negative effects were identified during the assessment of the construction phase.

Similarly, for options Interzonal transfer (SWZ-SBZ): Pulborough winter transfer stage 2 (4Ml/d) and Interzonal transfer (SBZ-SWZ): Brighton to Worthing (and reverse), no likely significant positive or positive effects were identified in the assessment of the construction phase.

No significant negative effects were identified.

Both options were assessed as having moderate negative effects against the biodiversity SEA objective. Both options were also assessed as having minor negative effects on the soils, geodiversity and land use, water resilience, carbon emissions, landscape, historic environment, health & wellbeing, tourism & recreation, resource use and built assets SEA objectives, whilst Interzonal transfer (SWZ-SBZ): Pulborough winter transfer stage 2 (4Ml/d) was also assessed as having a minor negative effect on the air SEA objective and Interzonal transfer (SBZ-SWZ): Brighton to Worthing (and reverse) were assessed as having a minor negative effect on the climate change SEA objective. Interzonal transfer (SBZ-SWZ): Brighton to Worthing (and reverse) were also assessed as having a minor negative effect on the water quality SEA objective.

Option Interzonal transfer (SWZ-SBZ): V6 valve additional capacity (13Ml/d) however, was assessed as having a neutral effect against all objectives during construction, due to it being an existing transfer.

Operational effects

As described in Section 5.4.1, for option Interzonal transfer (SNZ-SWZ): Pulborough to Worthing, no significant positive effects or significant negative effects were identified during the assessment of the operational phase, however, a moderate positive effect was identified against the water reliability SEA objective, associated with the increase transfer capacity, and associated improvement in the resilience of supply in the Sussex Worthing WRZ.

For Interzonal transfer (SWZ-SBZ): Pulborough winter transfer stage 2 (4Ml/d) Interzonal transfer (SWZ-SBZ): Worthing to Brighton no significant positive or in the assessment of the operational phase. However, Interzonal transfer (SBZ-SWZ): Brighton to Worthing was assessed as having a moderate positive effect against the water reliability SEA objective, which is attributed to the volume of the transfer and associated positive effect on water resource resilience. Option Interzonal transfer (SWZ-SBZ): Pulborough winter transfer stage 2 (4Ml/d) was assessed as having a minor positive effect against this objective.

No significant negative effects were identified. For these options (Interzonal transfer (SWZ-SBZ): Pulborough winter transfer stage 2 (4Ml/d) and Interzonal transfer (SBZ-SWZ): Brighton to Worthing (and reverse)) a minor positive effect was identified against the climate change SEA objective, whilst for option Interzonal transfer (SWZ-SBZ): Pulborough winter transfer stage 2 (4Ml/d) a minor positive effect was also identified against the water quality SEA objectives. For both options, minor negative effects were identified against the carbon emissions SEA objective, whilst for Interzonal transfer (SBZ-SWZ): Brighton to Worthing (and reverse) a minor negative effect was identified against the air SEA objective, and for option Interzonal transfer (SWZ-SBZ): Pulborough winter transfer stage 2 (4Ml/d) a minor negative effect was identified against the landscape SEA objective.

Option Interzonal transfer (SWZ-SBZ): V6 valve additional capacity (13Ml/d) however, was assessed as having a neutral effect against all objectives during operation, due to it being an existing transfer.

5.4.3 Sussex Brighton (SBZ) WRZ

Options wholly within the WRZ

The options within the WRZ are described in Table 5-12, whilst a summary of the assessment of effects (post mitigation) is set out in Table 5-13.

Table 5-12 Summary of options for SBZ.

Option name	Yield (Ml/d) (if applicable)	Description	Earliest year of implementation
Drought option: NEUBs - SBZ	2.84	Non-essential use ban - SBZ WRZ.	2026
Drought option - demand side (SBZ): Reduce transfer to other commercial customers	0.16	Drought Option: In the event of a drought, the Company would hold discussions with a commercial customer with regards to the resources position and their supply.	2027
Drought option - demand side (SBZ): TUBs	1.82	Temporary use bans - SBZ WRZ	2026
Bulk import (SBZ): SEW to Rottingdean (20Ml/d)	10.42	This option is for a pipeline to transfer flow from SEW Barcombe WSW to Rottingdean (20Ml/d)	2066
Groundwater (SBZ): Lewes Road (3.5Ml/d)	3.5	Lewes Road is a well and audit system that has been out of supply for over 10 years due to poor water quality. The scheme would refurbish the water supply works and add additional water treatment. It would also increase pump capacity and WSR connectivity so that Lewes Road groundwater source works can pump to its Middle or High WSR (output to the Low WSR is currently constrained by the header tanks at Goldstone). The current demand constraint is approximately 2.3Ml/d (PDO). If the	2031

Option name	Yield (Ml/d) (if applicable)	Description	Earliest year of implementation
		scheme is introduced, the constraint becomes pump capacity; scheme output is approximately 3.9Ml/d under severe drought conditions.	

Table 5-13 Visual evaluation matrix summary (post mitigation) for SBZ.

WRZ	Option	Stages (post mitigation)	Biodiversity	Soils	Water			Air	Climatic Factors		Landscape	Historic Environment	Population & Human Health		Material Assets	
					Resilience	Quality	Reliability		Carbon emissions	Climate change			Health & well-being	Tourism & recreation	Resource use	Built assets
Sussex Brighton (SBZ)	Drought option: NEUBs - SBZ	Construction (positive)	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Construction (negative)	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Operation (positive)	+	0	0	+	+	0	+	+	+	+	+	0	+	0
		Operation (negative)	0	-	0	0	0	0	0	0	-	-	---	--	0	0
Sussex Brighton (SBZ)	Drought option - demand side (SBZ): Reduce transfer to other commercial customers	Construction (positive)	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Construction (negative)	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Operation (positive)	+	0	0	+	+	0	0	+	0	0	+	0	0	0
		Operation (negative)	0	0	0	0	-	0	0	0	0	0	-	-	0	0
Sussex Brighton (SBZ)	Drought option - demand side (SBZ): TUBs	Construction (positive)	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Construction (negative)	0	0	0	0	0	0	0	0	0	0	0	0	0	0

WRZ	Option	Stages (post mitigation)	Biodiversity	Soils	Water			Air	Climatic Factors		Landscape	Historic Environment	Population & Human Health		Material Assets	
					Resilience	Quality	Reliability		Carbon emissions	Climate change			Health & well-being	Tourism & recreation	Resource use	Built assets
		Operation (positive)	+	0	0	+	+	0	+	+	+	+	+	0	+	0
		Operation (negative)	0	0	0	0	0	0	0	0	-	-	--	-	0	0
Sussex Brighton (SBZ)	Bulk import (SBZ): SEW to Rottingdean (20Ml/d)	Construction (positive)	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Construction (negative)	--	0	-	-	0	-	-	0	-	-	-	-	-	-
		Operation (positive)	0	0	0	0	+	0	0	0	0	0	0	0	0	0
		Operation (negative)	0	0	0	0	0	0	-	0	0	0	0	0	0	0
Sussex Brighton (SBZ)	Groundwater (SBZ): Lewes Road (3.5Ml/d)	Construction (positive)	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Construction (negative)	0	0	0	0	0	-	-	0	0	-	-	-	-	-
		Operation (positive)	0	0	0	0	+	0	0	+	0	0	0	0	0	0
		Operation (negative)	-	0	0	--	0	0	-	-	0	0	0	0	0	0

Construction effects

No positive effects or likely significant positive effects were identified from the assessment of construction phase impacts for the preferred options.

No likely significant negative effects were identified from the assessment of construction phase impacts for the preferred options.

One option (Bulk import (SBZ): SEW to Rottingdean (20Ml/d)) was assessed as having potentially moderate negative effects on the Biodiversity SEA objective, associated with the potential for construction works to affect designated and/or non-designated habitats, species features and through direct land take, noise and/or disturbance (e.g. vibration, dust). The option would pass through Lewes Brooks SSSI. Measures such as realignment of the pipeline or use of trenchless techniques would help to avoid direct impacts on Lewes Brooks SSSI. More broadly, best practice methods will need to be implemented to minimise disturbance effects and habitat loss, with habitat to be reinstated on completion, or if unavoidable, compensatory habitat to be considered to replace damaged or lost habitat. All other negative construction effects for the preferred options were identified as minor.

Three options (Drought option - demand side (SBZ): NEUBs, Drought option - demand side (SBZ): Reduce transfer to other commercial customers and Drought option - demand side (SBZ): TUBs) were assessed as having neutral effects against all objectives for the construction phase as the nature of these options would involve operational changes only and no construction would be required for their implementation.

Operational effects

No likely significant positive effects were identified from the assessment of operation phase impacts for the preferred options.

All of the preferred options were assessed as having a positive effect against the Water - Reliability SEA objective during the operation phase, as the anticipated additional water yield or reduction in water demand would help to deliver reliable and resilient water supplies.

Minor positive effects were identified against some of the other SEA objectives. Four of the preferred options were identified as having a positive effect on the Climate Change SEA objective. Two drought options (Drought option - demand side (SBZ): NEUBs and Drought option - demand side (SBZ): TUBs) were identified as having minor positive effects across a wider range of the SEA objectives related to Biodiversity, Water - Quality and Reliability, Climatic Factors - Climate Change, Landscape, Historic Environment, Population & Human Health - Health & Wellbeing and Material Assets - Resource Use.

For Drought option - demand side (SBZ): NEUBs significant negative effects were identified for the Health & Wellbeing SEA objective in the operation phase. The ban carries the risk of economic impacts on businesses that benefit directly or indirectly from certain water uses that would be prohibited under the ban (e.g. sports and leisure facilities). The ban may result in some business loss if the water-related operations have to be suspended. However, minor positive effects are also assessed for water savings which will help secure the supply of water to the communities in the WRZ. Drought option - demand side (SBZ): TUBs was identified as having a moderate negative effect against this SEA objective through potentially limiting water access during times of drought, compromising the sale of water consuming products and limiting the use of water.

No other significant negative effects were identified during the assessment of the operation phase of the preferred options, although moderate negative effects were determined for individual options against two other SEA objectives. Option Groundwater (SBZ): Lewes Road (3.5Ml/d) was considered to have a potential moderate negative effect against the Water - Quality SEA objective during operation, due to the potential for WFD non-compliance (low confidence) as the option aims to increase abstraction of water from the Brighton Chalk Block WFD groundwater body, which may impact groundwater levels and availability. Drought option: NEUBs - SBZ was also identified as having a moderate negative effect against the Tourism & Recreation SEA objective through reducing the quantity of water made available for tourist attractions and water

consuming recreational activities (swimming pools, watering sports pitches etc) during times of drought, which could dissuade tourists to the area for a brief period of time.

All other negative operation effects for the preferred options are identified as minor.

Interzonal transfer options

There are three interzonal transfer options within the Sussex Brighton WRZ (Interzonal transfer (SWZ-SBZ): Pulborough winter transfer stage 2 (4Ml/d), Interzonal transfer (SWZ-SBZ): V6 valve additional capacity (13Ml/d) and Interzonal transfer (SBZ-SWZ): Brighton to Worthing (and reverse)). As described in Section 5.4.2, all of these options would involve a transfer from the Sussex Worthing WRZ to the Sussex Brighton WRZ (for option Interzonal transfer (SBZ-SWZ): Brighton to Worthing, this would be bi-directional). A summary of these options is presented in Table 5-10 (Section 5.4.2), whilst a summary of the assessment of their effects (post mitigation) is set out in Table 5-11 (Section 5.4.2); in order to avoid undue duplication, these tables are not repeated here.

Construction effects

As described in Section 5.4.2, for option Interzonal transfer (SWZ-SBZ): V6 valve additional capacity (13Ml/d) all objectives were assessed as neutral, whilst for options Interzonal transfer (SWZ-SBZ): Pulborough winter transfer stage 2 (4Ml/d) and Interzonal transfer (SBZ-SWZ): Brighton to Worthing (and reverse) no likely significant positive effects (or positive effects of any kind) were identified in the construction phase.

No significant negative effects were identified during the assessment of the construction phase. However, moderate negative effects were identified against the biodiversity SEA objective (for option Interzonal transfer (SWZ-SBZ): Pulborough winter transfer stage 2 (4Ml/d) this is due to the pipeline route within the Sussex Brighton WRZ crossing the Adur Estuary SSSI, whilst for option Interzonal transfer (SBZ-SWZ): Brighton to Worthing (and the reverse) this was due to the pipeline route crossing the Stanmer Park/Coldean LNR and being adjacent to ancient woodland with associated potential for loss/disturbance (noise, dust, air quality) to this site and potential disturbance at others (although reduced/mitigated or potentially avoidable through mitigation/best practice). Option Interzonal transfer (SWZ-SBZ): Pulborough winter transfer stage 2 (4Ml/d) was also assessed as having a moderate negative effect on the water quality SEA objective (due to the pipeline construction route crossing waterbodies within the Sussex Brighton WRZ, including rivers).

Operational effects

As described in Section 5.4.2, for Interzonal transfer (SWZ-SBZ): V6 valve additional capacity (13Ml/d) all objectives were assessed as neutral during the operational phase, whilst for options Interzonal transfer (SWZ-SBZ): Pulborough winter transfer stage 2 (4Ml/d) and Interzonal transfer (SWZ-SBZ): Worthing to Brighton (and reverse), no significant positive effects were assessed.

However, Interzonal transfer (SWZ-SBZ): Worthing to Brighton (and the reverse option) were assessed as having a moderate positive effect against the water reliability SEA objective, which is attributed to the volume of the transfer and associated positive effect on water resource resilience (in both the Sussex Brighton and Sussex Worthing WRZs).

No significant negative effects were identified.

5.5 Western area

5.5.1 Hampshire Kingsclere (HKZ) WRZ

Options wholly within the WRZ

The options within the WRZ are described in Table 5-14, whilst a summary of the assessment of effects (post mitigation) is set out in Table 5-15.

Table 5-14 Summary of options for HKZ.

Option name	Yield (Ml/d) (if applicable)	Description	Earliest year of implementation
Drought option - demand side (HKZ): NEUBs	0.13	Non-essential use ban - HKZ WRZ.	2035
Drought option - demand side (HKZ): TUBs	0.06	Temporary use bans - HKZ WRZ.	2035
Groundwater (HKZ): Remove constraints at Newbury to increase yield (1.2Ml/d)	1.2	The scheme is located within the Hampshire Kingsclere resource group (which consists of and is served by Kingsclere and Newbury WSWs). The scheme will increase the yield of the Newbury source within the existing licence by removing the present constraint imposed by mains leaving the site. This option will involve the construction of a dedicated, 7.1 km 300mm DN300 pipe from Newbury water supply works (WSW) and additional pumps and treatment facilities to increase the supply to Beacon Hill WSR. Additional high-lift pumping capacity would be required at Newbury. Newbury WSW abstracts water from the underlying chalk aquifer. It is considered that the River Enbourne will not be affected by the increased abstractions due to its perched nature above the London Clay.	2028

Table 5-15 Visual evaluation matrix summary (post mitigation) for HKZ.

WRZ	Option	Stages (post mitigation)	Biodiversity	Soils	Water			Air	Climatic Factors		Landscape	Historic Environment	Population & Human Health		Material Assets	
					Resilience	Quality	Reliability		Carbon emissions	Climate change			Health & well-being	Tourism & recreation	Resource use	Built assets
Hampshire Kingsclere (HKZ)	Drought option - demand side (HKZ): NEUBs	Construction (positive)	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Construction (negative)	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Operation (positive)	+	0	0	+	+	0	+	+	+	+	+	0	+	0
		Operation (negative)	0	-	0	0	0	0	0	0	-	-	---	--	0	0
Hampshire Kingsclere (HKZ)	Drought option - demand side (HKZ): TUBs	Construction (positive)	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Construction (negative)	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Operation (positive)	+	0	0	+	+	0	+	+	+	+	+	0	+	0
		Operation (negative)	0	0	0	0	0	0	0	0	-	-	--	-	0	0
Hampshire Kingsclere (HKZ)	Groundwater (HKZ): Remove constraints at Newbury to increase yield (1.2Ml/d)	Construction (positive)	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Construction (negative)	--	0	-	0	0	-	-	0	--	-	-	-	-	-
		Operation (positive)	0	0	0	+	+	0	0	0	0	0	0	0	0	0
		Operation (negative)	0	0	0	0	0	0	-	-	0	0	0	0	0	0

Construction effects

None of the three options were identified as having significant positive or negative effects during their respective construction phases. No positive effects were identified for any of the options within the construction phase.

Two options (Drought option - demand side (HKZ): NEUBs and Drought option - demand side (HKZ): TUBs) were also assessed as having no negative effects during the construction phase, as they would involve no construction and would involve operational changes only.

The remaining option, Groundwater (HKZ): Remove constraints at Newbury to increase yield (1.2Ml/d), has been assessed as having a moderate negative effect against the biodiversity and landscape SEA objectives. A moderate negative effect has been assessed against the biodiversity SEA objective associated with the potential for construction works to affect designated and/or non-designated habitats, species and features and ancient woodland through noise and/or disturbance (e.g. vibration, dust). The option would be within close proximity to Highclere Park SSSI and Burghclere Beacon SSSI, and would cross SSSI impact risk zones where pipeline development is highlighted as being a risk to the sensitive features for which the SSSI's are notified. The route also passes through ancient woodland. However, measures to minimise impacts and careful routing, is likely to reduce or avoid the potential impacts on these features. The option would also lie entirely within the North Wessex Downs AONB and would have temporary negative effects on landscape character during the construction phase, therefore a moderate negative effect has been assessed against the landscape SEA objective.

No other significant or moderate negative effects were identified during the assessment of the construction phase of the options; however, a range of minor negative effects were identified against the water resilience, air, carbon emissions, historic environment, health and wellbeing, tourism and recreation, resource use and built asset SEA objectives.

Operational effects

No significant positive effects were identified during assessment of the three options for the operation phase. However, a range of minor positive effects were identified against the biodiversity, water quality, water reliability, carbon emissions, climate change, landscape, historic environment, health and wellbeing, and resource use SEA objectives.

For Drought option - demand side (HKZ): NEUBs, significant negative effects were identified for the health and wellbeing SEA objective during the operation phase. The ban carries the risk of economic impacts on businesses that benefit directly or indirectly from certain water uses that would be prohibited under the ban (e.g. sports and leisure facilities). The ban may result in some business loss if the water-related operations have to be suspended. However, minor positive effects are also assessed for water savings which will help secure the supply of water to the communities in the WRZ.

No other significant negative effects were identified during the assessment of the operational phase of the options; however, a range of minor and moderate negative effects were identified against the soils, geodiversity, land use, water reliability, carbon emissions, climate change, landscape, historic environment, health and wellbeing, and tourism and recreation SEA objectives.

Interzonal transfer options

There is one interzonal transfer option (Interzonal transfer (HAZ-HKZ): Andover to Kingsclere bi-directional (10Ml/d)) within the Hampshire Kingsclere Zone. For this option the Hampshire Andover WRZ would be the source zone, whilst the Hampshire Kingsclere WRZ would be the recipient zone (however, it is noted that this transfer is reversible/bi-directional). A summary of this option is presented in Table 5-18 (Section 5.5.2), whilst a summary of the assessment of its effects (post mitigation) is set out in Table 5-19 (Section 5.5.2); in order to avoid undue duplication, these tables are not repeated here.

Construction effects

As described in Section 5.5.2, for Interzonal transfer (HAZ-HKZ): Andover to Kingsclere bi-directional (10Ml/d) no significant positive effects (or positive effects of any kind) were identified.

No significant negative effects were identified during the assessment of the construction phase. It is noted that a moderate negative effect was assessed against the landscape SEA objective, due to much of the works being situated within the North Wessex Downs AONB (although effects are not expected to be significant when accounting for mitigation (temporary screening), including sections within the Hampshire Kingsclere WRZ.

Operational effects

As described in Section 5.5.2 for Interzonal transfer (HAZ-HKZ): Andover to Kingsclere bi-directional (10Ml/d) no significant positive effects or significant negative effects were identified in the assessment of the operational phase.

5.5.2 Hampshire Andover (HAZ) WRZ

Options wholly within the WRZ

The options within the WRZ are described in Table 5-16, whilst a summary of the assessment of effects (post mitigation) is set out in Table 5-17.

Table 5-16 Summary of options for HAZ.

Option name	Yield (Ml/d) (if applicable)	Description	Earliest year of implementation
Drought option - demand side (HAZ): NEUBs	0.48	Non-essential use ban - HAZ WRZ.	2029
Drought option - demand side (HAZ): Reduce transfer to other commercial customers	0.03	Drought option: In the event of a drought, the Company would hold discussions with a commercial customer with regards to the resources position and their supply.	2029
Drought option: TUBs - HAZ	0.2	Temporary use bans - HAZ WRZ.	2029
Groundwater (HAZ): Recommissi on Chilbolton (0.5Ml/d)	0.5	Chilbolton WSW, a groundwater source, was decommissioned in 2011 due to high nitrate concerns. The boreholes and booster pumps to move water through the site are the only remaining assets on site. A catchment management solution is currently being progressed to allow the site to return to service by 2035. The site can be brought back into service earlier by installing nitrate treatment. There is no run to waste facility at the site and waste will need to be transferred to a suitable WwTW and discharged under existing consents. Nitrate waste stream to be disposed of by tankering. The site can provide up to 0.49Ml/d with	2073

Option name	Yield (Ml/d) (if applicable)	Description	Earliest year of implementation
		an expected delivery by 2029-30. It will also need a connection with HSW to offset the use of drought permits/orders in Hampshire. The option provides limited benefit but requires considerable infrastructure improvements.	

Table 5-17 Visual evaluation matrix summary (post mitigation) for HAZ.

WRZ	Option	Stages (post mitigation)	Biodiversity	Soils	Water			Air	Climatic Factors		Landscape	Historic Environment	Population & Human Health		Material Assets	
					Resilience	Quality	Reliability		Carbon emissions	Climate change			Health & well-being	Tourism & recreation	Resource use	Built assets
Hampshire Andover (HAZ)	Drought option - demand side (HAZ): NEUBs	Construction (positive)	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Construction (negative)	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Operation (positive)	+	0	0	+	+	0	+	+	+	+	+	0	+	0
		Operation (negative)	0	-	0	0	0	0	0	0	-	-	---	--	0	0
Hampshire Andover (HAZ)	Drought option - demand side (HAZ): Reduce transfer to other commercial customers	Construction (positive)	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Construction (negative)	0	0	0	0	0	0	0	0	0	0	0	0	0	0

WRZ	Option	Stages (post mitigation)	Biodiversity	Soils	Water			Air	Climatic Factors		Landscape	Historic Environment	Population & Human Health		Material Assets	
					Resilience	Quality	Reliability		Carbon emissions	Climate change			Health & well-being	Tourism & recreation	Resource use	Built assets
		Operation (positive)	+	0	0	+	+	0	0	+	0	0	+	0	0	0
		Operation (negative)	0	0	0	0	-	0	0	0	0	0	-	-	0	0
Hampshire Andover (HAZ)	Drought option: TUBs - HAZ	Construction (positive)	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Construction (negative)	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Operation (positive)	+	0	0	+	+	0	+	+	+	+	+	0	+	0
		Operation (negative)	0	0	0	0	0	0	0	0	-	-	--	-	0	0
Hampshire Andover (HAZ)	Groundwater (HAZ): Recommission Chilbolton (0.5Ml/d)	Construction (positive)	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Construction (negative)	0	-	0	0	0	-	-	0	-	-	-	-	--	0
		Operation (positive)	0	0	0	0	+	0	0	+	0	0	+	0	0	0
		Operation (negative)	0	0	0	-	0	-	-	-	-	-	-	0	0	0

Construction effects

None of the four options were identified as having significant positive or negative effects during their respective construction phases. No positive effects were identified for any of the options within the construction phase.

Of the four options, three (Drought option - demand side (HAZ): NEUBs, Drought option - demand side (HAZ): Reduce transfer to other commercial customers, and Drought option: TUBs - HAZ) were also assessed as having no negative effects during the construction phase, as they would involve no construction and would involve operational changes only.

The remaining option Groundwater (HAZ): Recommission Chilbolton (0.5Ml/d), has been assessed as having one moderate negative effect against the resource use SEA objective for the construction phase. Minor negative effects were also identified for this option against the biodiversity, soils, air, carbon emissions, landscape, historic environment, health and wellbeing, and tourism and recreation, SEA objectives.

Operational effects

No significant positive effects were identified during assessment of the four options for the operation phase. However, a range of minor positive effects were identified against the biodiversity, water quality, water reliability, carbon emissions, climate change, landscape, historic environment, health and wellbeing, and resource use SEA objectives.

For Drought option - demand side (HAZ): NEUBs, significant negative effects were identified for the health and wellbeing SEA objective during the operation phase. The ban carries the risk of economic impacts on businesses that benefit directly or indirectly from certain water uses that would be prohibited under the ban (e.g. sports and leisure facilities). The ban may result in some business loss if the water-related operations have to be suspended. However, minor positive effects are also assessed for water savings which will help secure the supply of water to the communities in the WRZ.

No other significant negative effects were identified during the assessment of the operational phase of the options; however, a range of minor and moderate negative effects were identified against the soils, geodiversity, land use, water quality, water reliability, air, carbon emissions, climate change, landscape, historic environment, health and wellbeing, and tourism and recreation SEA objectives.

Interzonal transfer options

There are two interzonal transfer options within the Hampshire Andover WRZ. For Interzonal transfer (HWZ-HAZ): Winchester to Andover bi-directional (15Ml/d), the Hampshire Winchester WRZ would be the source zone, whilst the Hampshire Andover WRZ would be the recipient zone. A summary of this option is presented in Table 5-26 (Section 5.5.5), whilst a summary of the assessment of its effects (post mitigation) is set out in Table 5-27 (Section 5.5.5); in order to avoid undue duplication, these tables are not repeated here.

For Interzonal transfer (HAZ-HKZ): Andover to Kingsclere bi-directional (10Ml/d) the Hampshire Andover WRZ would be the source zone, whilst the Hampshire Kingsclere WRZ would be the recipient zone (however, it is noted that this transfer is reversible/bi-directional). This option is described in Table 5-18 below, whilst a summary of the assessment of its effects (post mitigation) is set out in Table 5-19 below.

Table 5-18 Summary of interzonal options for HAZ.

Option name	Yield (Ml/d) (if applicable)	Description	Earliest year of implementation
Interzonal transfer (HAZ-HKZ): Andover to Kingsclere bi-directional (10Ml/d)	6.68	Transfer from Otterbourne to Andover to Kingsclere. This scheme is designed to support network improvements needed for UTMRD transfer to Hampshire and/or the strategic scheme from IOW/South Hampshire.	2050

Table 5-19 Visual evaluation matrix summary (post mitigation) for HAZ interzonal transfers.

WRZ	Option	Stages (post mitigation)	Biodiversity	Soils	Water			Air	Climatic Factors		Landscape	Historic Environment	Population & Human Health		Material Assets	
					Resilience	Quality	Reliability		Carbon emissions	Climate change			Health & well-being	Tourism & recreation	Resource use	Built assets
Hampshire Andover (HAZ)	Interzonal transfer (HAZ-HKZ): Andover to Kingsclere bi-directional (10Ml/d)	Construction (positive)	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Construction (negative)	-	0	-	0	0	-	-	0	--	-	-	-	-	-
		Operation (positive)	0	0	0	0	+	0	0	0	0	0	0	0	0	0
		Operation (negative)	0	0	0	0	0	0	-	0	0	0	0	0	0	0

Construction effects

As described in Section 5.5.5 for option Interzonal transfer (HWZ-HAZ): Winchester to Andover bi-directional (15Ml/d) no likely significant positive effects (or positive effects of any kind) or significant negative effects were identified in the assessment of the construction phase.

Similarly for option Interzonal transfer (HAZ-HKZ): Andover to Kingsclere bi-directional (10Ml/d) no significant positive effects (or positive effects of any kind) or significant negative effects were identified during the assessment of the construction phase. However, a moderate negative effect was assessed against the landscape SEA objective, due to much of the works being partially situated within the North Wessex Downs AONB (although effects are not expected to be significant when accounting for mitigation (temporary screening), including sections within the Hampshire Andover WRZ. Minor negative effects were identified against the biodiversity, water resilience, air, carbon emissions, historic environment, health & wellbeing, tourism & recreation, resource use and built assets SEA objectives.

Operational effects

As described in Section 5.5.5 for Interzonal transfer (HWZ-HAZ): Winchester to Andover bi-directional (15Ml/d) Interzonal transfer (HWZ-HAZ): Winchester to Andover bi-directional (15Ml/d) no likely significant positive effects (or positive effects of any kind) or likely significant negative effects were identified in the assessment of the operational phase.

Similarly, for Interzonal transfer (HAZ-HKZ): Andover to Kingsclere bi-directional (10Ml/d) no likely significant positive effects or likely significant negative effects were identified in the assessment of the operational phase, with only a minor positive effect against the water reliability SEA objective and minor negative effect against the carbon emissions SEA objective being identified in the assessment.

5.5.3 Isle of Wight (IOW) WRZ

Options wholly within the WRZ

The options within the WRZ are described in Table 5-20, whilst a summary of the assessment of effects (post mitigation) is set out in Table 5-21.

Table 5-20 Summary of options for IOW.

Option name	Yield (Ml/d) (if applicable)	Description	Earliest year of implementation
Drought option - demand side (IOW): NEUBs	0.99	Non-essential use ban - IOW WRZ	2026
Drought option - demand side (IOW): Reduce transfer to other commercial customers	0.07	Drought option: In the event of a drought, the Company would hold discussions with a commercial customer with regards to the resources position and their supply.	2027
Drought option - demand side (IOW): TUBs	0.42	Temporary use bans - IOW WRZ	2026
Groundwater (IOW): New boreholes at Newchurch (LGS) (1.9Ml/d)	1.95	This option proposes replacing all 3 Lower Greensand boreholes on site so that the source can operate to its licenced capacity. Currently BH4 is non-operational, BH1 and BH2 are operational but at reduced capacity due to screen-dewatering. No additional treatment is proposed. Total Scheme output would be 4.5Ml/d.	2037
Recycling (IOW): Sandown (8.5Ml/d)	8.5	This option proposes the transfer of treated effluent from Sandown WwTW (currently discharged to sea), to support flows in the Eastern River Yar upstream of the Sandown WSW abstraction at Burnt House. Treated water in excess of the local demand will be transferred through a new transfer pipeline to a service reservoir near Newport, for supply to much of the island. This option is reliant on the WSR enlargements carried out in IZT_CSM Cross-Solent upgrade. (2) Option 2 also includes upgrades to Sandown WSW to achieve the extra flow.	2031

Table 5-21 Visual evaluation matrix summary (post mitigation) for IOW.

WRZ	Option	Stages (post mitigation)	Biodiversity	Soils	Water			Air	Climatic Factors		Landscape	Historic Environment	Population & Human Health		Material Assets	
					Resilience	Quality	Reliability		Carbon emissions	Climate change			Health & well-being	Tourism & recreation	Resource use	Built assets
Isle of Wight (IOW)	Drought option - demand side (IOW): NEUBs	Construction (positive)	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Construction (negative)	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Operation (positive)	+	0	0	+	+	0	+	+	+	+	+	0	+	0
		Operation (negative)	0	-	0	0	0	0	0	0	-	-	---	--	0	0
Isle of Wight (IOW)	Drought option - demand side (IOW): Reduce transfer to other commercial customers	Construction (positive)	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Construction (negative)	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Operation (positive)	+	0	0	+	+	0	0	+	0	0	+	0	0	0
		Operation (negative)	0	0	0	0	-	0	0	0	0	0	-	-	0	0
Isle of Wight (IOW)	Drought option - demand side (IOW): TUBs	Construction (positive)	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Construction (negative)	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Operation (positive)	+	0	0	+	+	0	+	+	+	+	+	0	+	0

WRZ	Option	Stages (post mitigation)	Biodiversity	Soils	Water			Air	Climatic Factors		Landscape	Historic Environment	Population & Human Health		Material Assets	
					Resilience	Quality	Reliability		Carbon emissions	Climate change			Health & well-being	Tourism & recreation	Resource use	Built assets
		Operation (negative)	0	0	0	0	0	0	0	0	-	-	--	-	0	0
Isle of Wight (IOW)	Groundwater (IOW): New boreholes at Newchurch (LGS) (1.9Ml/d)	Construction (positive)	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Construction (negative)	-	0	0	0	0	-	-	0	-	0	-	0	-	-
		Operation (positive)	0	0	0	0	+	0	0	+	0	0	0	0	0	0
		Operation (negative)	-	0	0	--	0	0	-	-	0	0	0	0	0	0
Isle of Wight (IOW)	Recycling (IOW): Sandown (8.5Ml/d)	Construction (positive)	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Construction (negative)	--	-	-	0	0	-	-	0	-	-	-	-	-	-
		Operation (positive)	0	0	0	+	+	0	0	+	0	0	0	0	+	0
		Operation (negative)	-	0	0	--	0	0	-	0	0	0	0	0	0	0

Construction effects

None of the five options were identified as having positive or likely significant positive effects during their respective construction phases.

Four options (Drought option - demand side (IOW): NEUBs, Drought option - demand side (IOW): Reduce transfer to other commercial customers, and Drought option - demand side (IOW): TUBs) were assessed as having neutral effects, as they would involve no construction and would involve operational changes only.

None of the five options were identified as having significant negative effects during their respective construction phases

Two options (Groundwater (IOW): New boreholes at Newchurch (LGS) (1.9Ml/d), and Recycling (IOW): Sandown (8.5Ml/d)) have been assessed as having a range of minor negative effects against the biodiversity, soils, geodiversity and land use, water resilience, air, carbon emissions, landscape, historic environment, health and wellbeing, tourism and recreation, resource use and built asset SEA objectives during the construction phase.

All of these options were assessed as having a negative or potentially negative effect on the biodiversity SEA objective, associated with the potential for construction works to affect designated and/or non-designated habitats, species and features through either direct land take, noise and/or disturbance (e.g. vibration, dust). Recycling (IOW): Sandown (8.5Ml/d) was assessed as having a moderate negative effect against the biodiversity SEA objective during construction as the option would be within close proximity to America Wood SSSI and Lake Allotments SSSI, and would cross SSSI impact risk zones where pipeline development is highlighted as being a risk to the sensitive features for which the SSSI's are notified. With regards to European sites, the HRA found that construction adverse effects will not occur or are almost certainly avoidable.

Operational effects

No significant positive effects were identified during assessment of the five options for the operational phase. However, a range of minor positive effects were identified against the biodiversity, water quality, water reliability, carbon emissions, climate change, landscape, historic environment, health and wellbeing, tourism and recreation, and resource use SEA objectives during operation.

For Drought option - demand side (IOW): NEUBs, significant negative effects were identified for the health and wellbeing SEA objective during the operation phase. The ban carries the risk of economic impacts on businesses that benefit directly or indirectly from certain water uses that would be prohibited under the ban (e.g. sports and leisure facilities). The ban may result in some business loss if the water-related operations have to be suspended. However, minor positive effects are also assessed for water savings which will help secure the supply of water to the communities in the WRZ. Drought option - demand side (IOW): TUBs was identified as having moderate negative effects against this SEA objective through potentially limiting water access during times of drought, compromising the sale of water consuming products and limiting the use of water.

For Groundwater (IOW): New boreholes at Newchurch (LGS) (1.9Ml/d), and Recycling (IOW): Sandown (8.5Ml/d) moderate effects in the operation phase were identified for the Water Quality SEA objective linked to the findings of the WFD (2023) assessment which identified WFD non-compliance (with low confidence) in relation to the Eastern Yar (Lower) and IOW Lower Greensand (in respect of Groundwater (IOW): New boreholes at Newchurch (LGS) (1.9Ml/d)); and the Eastern Yar (lower) (in respect of Recycling (IOW): Sandown (8.5Ml/d)).

Drought option - demand side (IOW): NEUBs was identified as having a moderate negative effect against the population & human health - tourism & recreation SEA objective through reducing the quantity of water made available for tourist attractions and water consuming recreational activities (swimming pools, watering sports pitches etc) during times of drought, which could dissuade tourists to the area for a brief period of time.

All other negative construction effects for these options were identified as minor.

5.5.4 Hampshire Rural (HRZ) WRZ

Options wholly within the WRZ

The options within the WRZ are described in Table 5-22, whilst a summary of the assessment of effects (post mitigation) is set out in Table 5-23.

Table 5-22 Summary of options for HRZ.

Option name	Yield (Ml/d) (if applicable)	Description	Earliest year of implementation
Drought option - demand side (HRZ): NEUBs	0.21	Non-essential use ban - HRZ WRZ.	2026
Drought option - demand side (HRZ): TUBs	0.09	Temporary use bans - HRZ WRZ.	2026
Groundwater (HRZ): New boreholes at Romsey (4.8Ml/d)	4.8	The existing boreholes and well/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 and recover DO on site. Total source output on delivery of the scheme would be 13.7Ml/d. No additional treatment is required. Replacement borehole locations are distant from existing borehole locations and require new pipelines to connect to the WSW.	2031
Groundwater (HRZ): Remove constraints at Kings Sombourne (2.5Ml/d)	2.5	This option involves recovering DO through the development of a new borehole and pump capacity to increase the yield from the current 1.5Ml/d to the licensed capacity of 4Ml/d providing a net benefit of 2.5Ml/d. The network is also being reviewed to ensure there are no capacity constraints.	2031

Table 5-23 Visual evaluation matrix summary (post mitigation) for HRZ.

WRZ	Option	Stages (post mitigation)	Biodiversity	Soils	Water			Air	Climatic Factors		Landscape	Historic Environment	Population & Human Health		Material Assets	
					Resilience	Quality	Reliability		Carbon emissions	Climate change			Health & well-being	Tourism & recreation	Resource use	Built assets
Hampshire Rural (HRZ)	Drought option - demand side (HRZ): NEUBs	Construction (positive)	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Construction (negative)	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Operation (positive)	+	0	0	+	+	0	+	+	+	+	+	0	+	0
		Operation (negative)	0	-	0	0	0	0	0	0	-	-	---	--	0	0
Hampshire Rural (HRZ)	Drought option - demand side (HRZ): TUBs	Construction (positive)	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Construction (negative)	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Operation (positive)	+	0	0	+	+	0	+	+	+	+	+	0	+	0
		Operation (negative)	0	0	0	0	0	0	0	0	-	-	--	-	0	0
Hampshire Rural (HRZ)	Groundwater (HRZ): New boreholes at Romsey (4.8Ml/d)	Construction (positive)	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Construction (negative)	-	-	0	0	0	-	-	0	-	-	-	-	-	-
		Operation (positive)	0	0	0	0	+	0	0	+	0	0	0	0	0	0
		Operation (negative)	-	0	0	0	0	0	-	-	-	0	0	0	0	0
Hampshire Rural (HRZ)	Groundwater (HRZ): Remove constraints at Kings Sombourne (2.5Ml/d)	Construction (positive)	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Construction (negative)	0	-	---	-	0	-	-	0	-	-	0	-	-	-
		Operation (positive)	0	0	0	0	+	0	0	+	0	0	+	0	0	0
		Operation (negative)	0	-	0	-	0	0	-	-	-	-	0	-	0	0

Construction effects

No positive effects or significant positive effects were identified within the construction phase for any of the options. No negative effects were identified for Drought option - demand side (HRZ): NEUBs and Drought option - demand side (HRZ): TUBs. One significant negative effect was identified for Groundwater (HRZ): Remove constraints at Kings Sombourne (2.5Ml/d) against the water resilience SEA objective. This is due to the whole site being located within Flood Zones 2 and 3 therefore the construction works will be at high risk of flooding.

Groundwater (HRZ): New boreholes at Romsey (4.8Ml/d) was assessed as having minor negative effects against the biodiversity, soils, geodiversity and land use, air, carbon emissions, landscape, historic environment, health and wellbeing, tourism and recreation, resource use and built asset SEA objectives reflecting the location of the option in relation to various designated assets, the scale of construction works and expected use of resources. Groundwater (HRZ): Remove constraints at Kings Sombourne (2.5Ml/d) was assessed as having minor negative effects against the soils, water quality, air, carbon emissions, landscape, historic environment, tourism and recreation, resource use and built asset SEA objectives.

The remaining options (Drought option - demand side (HRZ): NEUBs and Drought option - demand side (HRZ): TUBs) were also assessed as having neutral effects during the construction phase, as they would involve operational changes only.

Operational effects

No significant positive effects were identified during assessment of the four options for the operation phase. However, a range of minor positive effects were identified against the biodiversity, water quality, water reliability, carbon emissions, climate change, landscape, historic environment, health and wellbeing, and resource use SEA objectives.

For Drought option - demand side (HRZ): NEUBs, significant negative effects were identified for the health and wellbeing SEA objective during the operation phase. The ban carries the risk of economic impacts on businesses that benefit directly or indirectly from certain water uses that would be prohibited under the ban (e.g. sports and leisure facilities). The ban may result in some business loss if the water-related operations have to be suspended. However, minor positive effects are also assessed for water savings which will help secure the supply of water to the communities in the WRZ. The Drought option - demand side (HRZ): TUBs was identified as having a moderate negative effect against this SEA objective through potentially limiting water access during times of drought, compromising the sale of water consuming products and limiting the use of water.

No other significant negative effects were identified during the assessment of the operational phase of the options. However, a range of minor effects were identified against the biodiversity, soils, geodiversity, land use, water quality, carbon emissions, climate change, landscape, historic environment, and tourism and recreation SEA objectives.

Interzonal transfer options

There is one interzonal transfer option (Interzonal transfer (HRZ-HSW): Romsey Town and Broadlands valve bi-directional) within the Hampshire Rural WRZ. This option would enable bi-directional transfers between the Hampshire Southampton West WRZ and the Hampshire Rural WRZ. A summary of this option is presented in **Table 5-34** (Section 5.5.7), whilst a summary of the assessment of its effects (post mitigation) is set out in Table 5-35 (Section 5.5.7); in order to avoid undue duplication, these tables are not repeated here.

Construction effects

As described in Section 5.5.7, for Interzonal transfer (HRZ-HSW): Romsey Town and Broadlands valve bi-directional, no likely significant positive effects (or positive effects of any kind) or likely significant negative effects were identified during the assessment of the construction phase, with only minor negative effects identified.

Operational effects

As described in Section 5.5.7 for Interzonal transfer (HRZ-HSW): Romsey Town and Broadlands valve bi-directional, no likely significant positive effects or likely significant negative effects were identified in the assessment of the operational phase, with only minor effects identified.

5.5.5 Hampshire Winchester (HWZ) WRZ

Options wholly within the WRZ

The options within the WRZ are described in Table 5-24Table 5-24, whilst a summary of the assessment of effects (post mitigation) is set out in Table 5-25.

Table 5-24 Summary of options for HWZ.

Option name	Yield (Ml/d) (if applicable)	Description	Earliest year of implementation
Drought option - demand side (HWZ): NEUBs	0.57	Non-essential use ban - HWZ WRZ.	2029
Drought option - demand side (HWZ): Reduce transfer to other commercial customers	0.05	Drought option: In the event of a drought, the Company would hold discussions with a commercial customer with regards to the resources position and their supply.	2029
Drought option - demand side (HWZ): TUBs	0.24	Temporary use bans - HWZ WRZ.	2029

Table 5-25 Visual evaluation matrix summary (post mitigation) for HWZ.

WRZ	Option	Stages (post mitigation)	Biodiversity	Soils	Water			Air	Climatic Factors		Landscape	Historic Environment	Population & Human Health		Material Assets	
					Resilience	Quality	Reliability		Carbon emissions	Climate change			Health & well-being	Tourism & recreation	Resource use	Built assets
Hampshire Winchester (HWZ)	Drought option - demand side (HWZ): NEUBs	Construction (positive)	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Construction (negative)	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Operation (positive)	+	0	0	+	+	0	+	+	+	+	+	0	+	0
		Operation (negative)	0	-	0	0	0	0	0	0	-	-	---	--	0	0
Hampshire Winchester (HWZ)	Drought option - demand side (HWZ): Reduce transfer to other commercial customers	Construction (positive)	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Construction (negative)	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Operation (positive)	+	0	0	+	+	0	0	+	0	0	+	0	0	0
		Operation (negative)	0	0	0	0	-	0	0	0	0	0	-	-	0	0
Hampshire Winchester (HWZ)	Drought option - demand side (HWZ): TUBs	Construction (positive)	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Construction (negative)	0	0	0	0	0	0	0	0	0	0	0	0	0	0

WRZ	Option	Stages (post mitigation)	Biodiversity	Soils	Water			Air	Climatic Factors		Landscape	Historic Environment	Population & Human Health		Material Assets	
					Resilience	Quality	Reliability		Carbon emissions	Climate change			Health & well-being	Tourism & recreation	Resource use	Built assets
		Operation (positive)	+	0	0	+	+	0	+	+	+	+	+	0	+	0
		Operation (negative)	0	0	0	0	0	0	0	0	-	-	--	-	0	0

Construction effects

All three of the options had neutral effects identified as no construction is required in order to implement use of water reduction methods during periods of drought.

Operational effects

No significant positive effects were identified for these options.

All the options were assessed as having a minor positive effect against SEA objectives related to biodiversity, water quality and reliability, climatic factors - climate change, landscape, historic environment, population & human health - health & well-being and material assets - resource use. Two of the options (Drought option - demand side (HWZ): NEUBs and Drought option - demand side (HWZ): TUBs) were also identified as having positive effects against the climatic factors - carbon emissions SEA objective.

Positive effects were identified for the options as they will help to reduce the demand for water during times of drought through encouraging customers to use less water using hosepipe bans.

For Drought option - demand side (HWZ): NEUBs significant negative effects were identified for the Health and wellbeing SEA objective in the operation phase. The ban carries the risk of economic impacts on businesses that benefit directly or indirectly from certain water uses that would be prohibited under the ban (e.g. sports and leisure facilities). The ban may result in some business loss if the water-related operations have to be suspended. However, minor positive effects are also assessed for water savings which will help secure the supply of water to the communities in the WRZ. This is the only significant negative effect associated with any of the options. Drought option - demand side (HWZ): TUBs was identified as having a moderate negative effect against this SEA objective through potentially limiting water access during times of drought, compromising the sale of water consuming products and limiting the use of water based on the temporary use ban powers. Drought option - demand side (HWZ): Reduce transfer to other commercial customers scored as having a minor negative effect against this SEA objective due to the reasons identified for the other options but noting that the potential for this option to provide negative effects is considerably more constrained.

Drought option - demand side (HWZ): NEUBs was assessed as having a minor negative effect against the soils, geodiversity, land use SEA objective due to it potentially making it harder to manage soils during periods of drought by limiting the amount of water that could be used for such purposes.

Drought option - demand side (HWZ): Reduce transfer to other commercial customers scored a minor negative against the water - reliability SEA objective, due to potentially reducing the supply of water to consumer customers, potentially compromising the reliability of the supply of water to such customers.

Two options (Drought option - demand side (HWZ): NEUBs and Drought option - demand side (HWZ): TUBs) were assessed as having a minor negative effect against the landscape and historic environment SEA objectives due to potentially limiting the amount of water available to water gardens and grounds that are important to local landscapes and some heritage assets.

All of the options were identified as having either a moderate negative effect (Drought option - demand side (HWZ): NEUBs) or minor negative effect (Drought option - demand side (HWZ): Reduce transfer to other commercial customers and Drought option - demand side (HWZ): TUBs) against the population & human health - tourism & recreation SEA objective through reducing the quantity of water made available for tourist attractions and water consuming recreational activities (swimming pools, watering sports pitches etc) during times of drought, which could dissuade tourists to the area for a brief period of time.

Interzonal transfer options

There are three interzonal transfer options within the Hampshire Winchester WRZ (Winchester to Andover bi-directional (15Ml/d), T2ST Option B and T2ST Option C).

For Interzonal transfer (HWZ-HAZ): Winchester to Andover bi-directional (15Ml/d) the Hampshire Winchester WRZ would be the source zone, whilst the Hampshire Andover WRZ would be the recipient zone. This option is described in Table 5-26 below, whilst a summary of the assessment of its effects (post mitigation) is set out in Table 5-27 below.

For T2ST Option B and T2ST Option C the Hampshire Winchester WRZ would be the recipient zone. This option is described in Table 5-26 below, whilst a summary of the assessment of its effects (post mitigation) is set out in Table 5-27 below.

Table 5-26 Summary of interzonal options for HWZ.

Option name	Yield (Ml/d) (if applicable)	Description	Earliest year of implementation
Interzonal transfer (HWZ-HAZ): Winchester to Andover bi-directional (15Ml/d)	10.62	Transfer from Otterbourne to Andover to Kingsclere. This scheme is designed to support network improvements and/or the strategic scheme from IOW/South Hampshire.	2040
T2ST Option B	95	A transfer of water from Thames Water to Southern Water's Hampshire area helping to improve resilience through better connectivity. The transfer is dependent on the prior development of new water resource sources namely the Severn to Thames Transfer (STT) or the South East Strategic Reservoir Option (SESRO).	2040
T2ST Option C	95	A transfer of water from Thames Water to Southern Water's Hampshire area helping to improve resilience through better connectivity. The transfer is dependent on the prior development of new water resource sources namely the Severn to Thames Transfer (STT) or the South East Strategic Reservoir Option (SESRO).	2040

Table 5-27 Visual evaluation matrix summary (post mitigation) for HWZ interzonal transfers.

WRZ	Option	Stages (post mitigation)	Biodiversity	Soils	Water			Air	Climatic Factors		Landscape	Historic Environment	Population & Human Health		Material Assets	
					Resilience	Quality	Reliability		Carbon emissions	Climate change			Health & well-being	Tourism & recreation	Resource use	Built assets
Hampshire Winchester (HWZ)	Interzonal transfer (HWZ-HAZ): Winchester to Andover bi-directional (15Ml/d)	Construction (positive)	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Construction (negative)	--	-	-	0	0	-	-	0	-	-	-	-	-	-
		Operation (positive)	0	0	0	0	+	0	0	0	0	0	0	0	0	0
		Operation (negative)	0	0	0	0	0	0	-	0	0	0	0	0	0	0
Hampshire Winchester (HWZ)	T2ST Option B - Central route via Newbury (West of Newbury and remaining west of the A34, to Winchester) The T2ST route begins at a new Water Treatment Works (WTW) to be located at the SESRO/STT site and ends at Yew Hill Water Supply Reservoir (WSR)	Construction (positive)	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Construction (negative)	--	-	-	-	0	-	-	0	-	-	-	-	-	-
		Operation (positive)	0	0	0	0	+++	0	0	+	0	0	0	0	0	0
		Operation (negative)	0	0	-	0	0	0	---	0	-	0	-	0	0	0
		Construction (positive)	0	0	0	0	0	0	0	0	0	0	0	0	0	0

WRZ	Option	Stages (post mitigation)	Biodiversity	Soils	Water			Air	Climatic Factors		Landscape	Historic Environment	Population & Human Health		Material Assets	
					Resilience	Quality	Reliability		Carbon emissions	Climate change			Health & well-being	Tourism & recreation	Resource use	Built assets
Hampshire Winchester (HWZ)	T2ST Option C - Central route via Newbury (West of Newbury and then crossing east over the A34, to Winchester) The T2ST route begins at a new Water Treatment Works (WTW) to be located at the SESRO/STT site and ends at Yew Hill Water Supply Reservoir (WSR).	Construction (negative)	--	-	-	-	0	-	-	0	-	-	-	-	-	-
		Operation (positive)	0	0	0	0	+++	0	0	+	0	0	0	0	0	0
		Operation (negative)	0	0	-	0	0	0	---	0	-	0	-	0	0	0

Construction effects

As described in Section 5.5.6 for Interzonal transfer (HSE-HWZ): Otterbourne WSW to Yew Hill bi-directional, no significant positive or significant negative effects were identified in the assessment of the construction phase.

For Interzonal transfer (HWZ-HAZ): Winchester to Andover bi-directional (15Ml/d), T2ST Option B and T2ST Option C no significant positive effects (or positive effects of any kind) or significant negative effects were identified during the assessment of the construction phase. However, for all three options a moderate negative effect was assessed against the biodiversity SEA objective. For Interzonal transfer (HWZ-HAZ): Winchester to Andover bi-directional (15Ml/d) this is due to the pipeline route within the Hampshire Winchester Zone crossing the crosses the River Test SSSI and the Bransbury Common SSSI and associated potential for loss/disturbance (noise, dust, air quality) to these sites and potential disturbance at others (although reduced/avoided through mitigation/best practice). T2ST Option B and T2ST Option C this is due to the option corridor bisecting the following rivers and designations: Benhem Park and Speen Moor LWS; River Lambourn SAC & SSSI; Kennet Valley Alderwoods SAC & SSSI and GWDTE; River Kennet SSSI; River Test SSSI and GWDTE; East Aston Common SSSI and GWDTE. This has potential for disturbance effects on these sites during the construction phase (although reduced/avoided through mitigation/best practice).

Minor negative effects were also identified for all three options against the soil's geodiversity and land use, water resilience, air, carbon emissions, landscape, historic environment, health & wellbeing, tourism & recreation, resource use and built assets SEA objectives. Additionally, for T2ST Option B and T2ST Option C minor negative effects were identified against water quality in the construction stage.

Operational effects

As described in Section 5.5.6 for Interzonal transfer (HSE-HWZ): Otterbourne WSW to Yew Hill bi-directional no significant positive or significant negative effects were identified in the assessment of the operational phase.

Similarly, for Interzonal transfer (HWZ-HAZ): Winchester to Andover bi-directional (15Ml/d) no significant positive effects or significant negative effects were identified in the assessment of the operational phase, with only a minor positive effect against the water reliability SEA objective and minor negative effect against the carbon emissions SEA objective being identified in the assessment.

For T2ST Option B and T2ST Option C a significant positive effect was identified against the SEA objective for water reliability. However, a significant negative effect was identified against SEA objective for carbon emissions this is due to the carbon generated from operational activities, e.g. pumping stations. For both options minor negative effects were also identified against the water resilience, landscape and health and wellbeing SEA objectives.

5.5.6 Hampshire Southampton East (HSE) WRZ

Options wholly within the WRZ

The options within the WRZ are described in Table 5-28Table , whilst a summary of the assessment of effects (post mitigation) is set out in Table 5-29.

Table 5-28 Summary of options for HSE.

Option name	Yield (Ml/d) (if applicable)	Description	Earliest ear of implementation
Drought option - supply side (HSE): Candover (22Ml/d)	14.37	The option would allow up to 27Ml/d and 3750Ml/year (average of 20.8Ml/d over 6 months) to be abstracted from the Preston Candover boreholes. Abstraction would be increased over a period of several days up to the full required discharge rate so as to prevent a sudden increase in flow in the River Itchen. Abstraction and discharges will only be permitted when flows in the River Itchen at Allbrook and Highbridge are at or below a trigger flow of 220Ml/d. 2Ml/d environmental support (within the limits above) at the existing discharge to the Candover Stream. Operated during, and potentially after, discharges to the River Itchen.	2026
Drought option - demand side (HSE): NEUBs	3.09	Non-essential use ban - HSE WRZ	2026
Drought option - supply side (HSE): Lower Itchen	28	Drought order pertaining to the sources collectively known as the Lower Itchen sources. These include Itchen Groundwater (including Twyford Moors) and surface water abstraction, Twyford groundwater abstraction and Portsmouth Water's Gaters Mill surface water abstraction on the Lower Itchen. The Lower Itchen drought order would enable Southern Water to increase abstraction from the River Itchen at these sources.	2026
Drought option - demand side (HSE): Reduce transfer to other commercial customers	0.2	Drought option: In the event of a drought, the Company would hold discussions with a commercial customer with regards to the resources position and their supply.	2027

Option name	Yield (Ml/d) (if applicable)	Description	Earliest ear of implementation
Drought option - demand side (HSE): TUBs	1.31	Temporary use bans - HSE WRZ	2026
Bulk import (HSE): PWC Source A to Otterbourne WSW (21Ml/d)	21	A new additional potable water transfer of 21Ml/d capacity using a new pipeline from Portsmouth Water Source A to Otterbourne. This scheme is dependent on development of Havant Thicket reservoir to provide the water.	2032
Bulk import (HSE): Havant Thicket Reservoir to Otterbourne WSW (90Ml/d)	90	A new raw water transfer (Pumping Station, Pipeline & Break Pressure tank) between Havant Thicket Reservoir and Otterbourne WSW. The capacity of the first section is for 90Ml/d to the mid point and a possible connection to Portsmouth Water.	2035
Recycling (HSE): Recharge of Havant Thicket from recycled water from Budds Farm (60Ml/d)	60	60Ml/d of recycled water will be sent to Otterbourne via Havant Thicket Reservoir. Budds Farm WWTW transfer to new Water Recycling Plant then transfer to Havant Thicket. Direct raw water transfer from Havant Thicket to Otterbourne for treatment.	2035

Table 5-29 Visual evaluation matrix summary (post mitigation) for HSE.

WRZ	Option	Stages (post mitigation)	Biodiversity	Soils	Water			Air	Climatic Factors		Landscape	Historic Environment	Population & Human Health		Material Assets	
					Resilience	Quality	Reliability		Carbon emissions	Climate change			Health & well-being	Tourism & recreation	Resource use	Built assets
Hampshire Southampton East (HSE)	Drought option - supply side (HSE): Candover (22Ml/d)	Construction (positive)	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Construction (negative)	-	0	-	0	0	-	-	0	-	-	-	-	-	-
		Operation (positive)	0	0	0	0	+	0	0	+	0	0	0	0	0	0
		Operation (negative)	---/?	0	0	-	0	0	-	-	0	0	0	0	0	0
Hampshire Southampton East (HSE)	Drought option - demand side (HSE): NEUBs	Construction (positive)	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Construction (negative)	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Operation (positive)	+	0	0	+	+	0	+	+	+	+	+	0	+	0
		Operation (negative)	0	-	0	0	0	0	0	0	-	-	---	--	0	0
	Drought option - supply side (HSE): Lower Itchen	Construction (positive)	0	0	0	0	0	0	0	0	0	0	0	0	0	0

WRZ	Option	Stages (post mitigation)	Biodiversity	Soils	Water			Air	Climatic Factors		Landscape	Historic Environment	Population & Human Health		Material Assets	
					Resilience	Quality	Reliability		Carbon emissions	Climate change			Health & well-being	Tourism & recreation	Resource use	Built assets
Hampshire Southampton East (HSE)		Construction (negative)	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Operation (positive)	0	0	0	0	++	0	0	0	0	0	++ +	0	0	0
		Operation (negative)	---/?	0	0	--	0	0	0	-	-	0	0	0	-	0
Hampshire Southampton East (HSE)	Drought option - demand side (HSE): Reduce transfer to other commercial customers	Construction (positive)	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Construction (negative)	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Operation (positive)	+	0	0	+	+	0	0	+	0	0	+	0	0	0
		Operation (negative)	0	0	0	0	-	0	0	0	0	0	-	-	0	0
Hampshire Southampton East (HSE)	Drought option - demand side (HSE): TUBs	Construction (positive)	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Construction (negative)	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Operation (positive)	+	0	0	+	+	0	+	+	+	+	+	0	+	0

WRZ	Option	Stages (post mitigation)	Biodiversity	Soils	Water			Air	Climatic Factors		Landscape	Historic Environment	Population & Human Health		Material Assets	
					Resilience	Quality	Reliability		Carbon emissions	Climate change			Health & well-being	Tourism & recreation	Resource use	Built assets
		Operation (negative)	0	0	0	0	0	0	0	0	-	-	--	-	0	0
Hampshire Southampton East (HSE)	Bulk import (HSE): PWC Source A to Otterbourne WSW (21Ml/d)	Construction (positive)	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Construction (negative)	-	-	-	-	0	-	-	0	-	--	-	-	-	-
		Operation (positive)	0	0	0	0	+	0	0	0	0	0	0	0	0	0
		Operation (negative)	0	0	0	0	0	0	-	0	0	0	0	0	0	0
Hampshire Southampton East (HSE)	Bulk import (HSE): Havant Thicket Reservoir to Otterbourne WSW (90Ml/d)	Construction (positive)	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Construction (negative)	--	-	-	0	0	-	-	0	-	-	-	-	-	-
		Operation (positive)	0	0	0	0	+++	0	0	0	0	0	0	0	0	0
		Operation (negative)	-	0	0	0	0	0	--	0	0	0	0	0	0	0
	Recycling (HSE): Recharge of Havant Thicket from	Construction (positive)	0	0	0	0	0	0	0	0	0	0	0	0	0	0

WRZ	Option	Stages (post mitigation)	Biodiversity	Soils	Water			Air	Climatic Factors		Landscape	Historic Environment	Population & Human Health		Material Assets	
					Resilience	Quality	Reliability		Carbon emissions	Climate change			Health & well-being	Tourism & recreation	Resource use	Built assets
Hampshire Southampton East (HSE)	recycled water from Budds Farm (60Ml/d)	Construction (negative)	--	0	-	0	0	-	-	0	-	-	-	-	-	-
		Operation (positive)	0	0	0	0	+++	0	0	+	0	0	0	0	0	0
		Operation (negative)	-	0	-	--	0	0	-	-	-	0	0	0	0	0

Construction effects

None of the options were identified as having positive or significant positive effects during their respective construction phases.

No significant negative effects were identified for any of the options within the construction phase.

Three of the preferred options requiring construction were assessed as having a negative or potentially negative effect on the biodiversity SEA objective, associated with the potential for construction works to affect designated and/or non-designated habitats, species and features through either direct land take, noise and/or disturbance. Bulk import (HSE): Havant Thicket Reservoir to Otterbourne WSW (90Ml/d) was assessed as having moderate negative effects against the biodiversity SEA objective reflecting the option location partially within the River Itchen SSSI and proximity to five other SSSIs and ancient woodland. However, measures to minimise impacts and reinstatement/compensation, and careful routing, is likely to reduce or avoid the potential impacts on these features. With regards to Recycling (HSE): Recharge of Havant Thicket from recycled water from Budds Farm (60Ml/d) moderate negative effects were assessed in relation to the proximity to Langstone Harbour SSSI, ancient woodland, Solent Maritime SAC and Chichester and Langstone Spa and Ramsar. The HRA concluded that the mitigation measures identified through the SRO gated process undertaken for the option provides certainty that there will be no adverse effects. Mitigation measures and careful routing will reduce or avoid impacts on the SSSI and ancient woodland.

Bulk import (HSE): PWC Source A to Otterbourne WSW (21Ml/d) was assessed as having a moderate negative effect against the historic environment SEA objective. This is due to this option being in close proximity to several listed buildings and Scheduled Monuments and Conservation Areas, alongside potentially compromising yet undiscovered archaeological assets. Option routing should be considered to avoid heritage assets, where possible. Best practice measures will likely be implemented to minimise effects on setting during construction.

No other significant or moderate negative effects were identified during the assessment of the construction phase of the options; however, a range of minor negative effects were identified against the biodiversity, soils, geodiversity, land use, water resilience, water quality, air, carbon emissions, landscape, historic environment, health and wellbeing, tourism and recreation, resource use and built asset SEA objectives.

Operational effects

Two of the options (Bulk import (HSE): Havant Thicket Reservoir to Otterbourne WSW (90Ml/d) and Recycling (HSE): Recharge of Havant Thicket from recycled water from Budds Farm (60Ml/d)) were identified as having significant positive effects on the water reliability SEA objective. This relates to the creation of a new raw water transfer station and pipeline, which would provide more water to consumers in a reliable manner (for option Bulk import (HSE): Havant Thicket Reservoir to Otterbourne WSW (90Ml/d). , Recycling (HSE): Recharge of Havant Thicket from recycled water from Budds Farm (60Ml/d) was also assessed as having a significant positive effect attributed to the scale of the anticipated additional water yield (60 Ml/d) that would be provided by treating wastewater from Budds Farm WTW to a very high standard and using this recycled water to recharge Havant Thicket Reservoir during the operation of this option.

Drought option - supply side (HSE): Lower Itchen) was assessed as having a significant positive effect against the health and wellbeing SEA objective. This is due to the option providing drought permits that would provide additional yield, helping to maintain essential public water supplies during drought conditions, and would therefore help maintain public health and wellbeing. Drought option - supply side (HSE): Lower Itchen was assessed as having a moderate positive effect against this SEA objective through the resilience of the water supplies likely being improved by both options providing 38Ml/d of new water supply.

No further significant positive or moderate positive effects were identified. Some minor positive effects were across a wider range of the SEA objectives related to Biodiversity, Water - Quality and Reliability, Climatic Factors - Climate Change, Landscape, Historic Environment, Population & Human Health - Health & Wellbeing and Material Assets - Resource Use

Two drought options (Drought option - supply side (HSE): Candover (22Ml/d), and Drought option - supply side (HSE): Lower Itchen) were identified as having significant negative effects with uncertainty against the biodiversity SEA objective. This is in relation to the impacts on the River Itchen SAC. For Drought option - supply side (HSE): Candover (22Ml/d) a programme of mitigation and monitoring has been agreed which will likely address adverse effects. For Drought option - supply side (HSE): Lower Itchen Lower Itchen Drought Order Mitigation Package provide mitigation measures to increase resilience.

Drought option - demand side (HSE): NEUBs was assessed as having a significant negative effect against the health and wellbeing SEA objective through the non-essential use ban the option would create potentially economic impacts on businesses that benefit directly or indirectly from certain water uses that would be prohibited under the ban (e.g. sports and leisure facilities). The ban could therefore potentially result in the loss of businesses if the water-related operations must be suspended. Drought option - demand side (HSE): TUBs was identified as having a moderate negative effect against this SEA objective through potentially limiting water access during times of drought, compromising the sale of water consuming products and limiting the use of water. Recycling (HSE): Recharge of Havant Thicket from recycled water from Budds Farm (60Ml/d) was assessed as having moderate negative effects on the water quality SEA objective due to the findings of WFD non-compliant (with low confidence).

No other significant negative effects were identified during the assessment of the operational phase of the options.

Interzonal transfer options

There are two interzonal transfer options within the Hampshire Southampton East WRZ. These are Bulk export (HSE): Otterbourne WSW to PWC Source A (45Ml/d), and Interzonal transfer (HSE-HWZ): Otterbourne WSW to Yew Hill bi-directional.

Bulk export (HSE): Otterbourne WSW to PWC Source A (45Ml/d) would enable a bi-directional transfer between the Hampshire Southampton West WRZ and the Hampshire Southampton East WRZ. A summary of this option is presented in **Table 5-34** (5.5.7), whilst a summary of the assessment of its effects (post mitigation) is set out in Table 5-35 (Section 5.5.7); in order to avoid undue duplication, these tables are not repeated here.

For Interzonal transfer (HSE-HWZ): Otterbourne WSW to Yew Hill bi-directional the Hampshire Southampton East WRZ would be the source zone, whilst the Hampshire Winchester WRZ would be the recipient zone. This option is described in Table 5-30 below, whilst a summary of the assessment of its effects (post mitigation) is set out in Table 5-31 below.

Table 5-30 Summary of interzonal options for HSE.

Option name	Yield (Ml/d) (if applicable)	Description	Earliest year of implementation
Interzonal transfer (HSE-HWZ): Otterbourne WSW to Yew Hill bi-directional	24.81	Transfer from Otterbourne to Andover to Kingsclere WRZs. This scheme is designed to support network improvements needed for UTMRD transfer to Hampshire and/or the strategic scheme from IOW/South Hampshire.	2031

Table 5-31 Visual evaluation matrix summary (post mitigation) for HSE interzonal transfers.

WRZ	Option	Stages (post mitigation)	Biodiversity	Soils	Water			Air	Climatic Factors		Landscape	Historic Environment	Population & Human Health		Material Assets	
					Resilience	Quality	Reliability		Carbon emissions	Climate change			Health & well-being	Tourism & recreation	Resource use	Built assets
Hampshire Southampton East (HSE)	Interzonal transfer (HSE-HWZ): Otterbourne WSW to Yew Hill bi-directional	Construction (positive)	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Construction (negative)	-	0	0	0	0	-	-	0	-	-	-	-	-	-
		Operation (positive)	0	0	0	0	+	0	0	0	0	0	0	0	0	0
		Operation (negative)	0	0	0	0	0	0	-	0	0	0	0	0	0	0

Construction effects

As described in Section 5.5.7 Bulk export (HSE): Otterbourne WSW to PWC Source A (45Ml/d) shows no likely significant positive effects (or positive effects of any kind) or likely significant negative effects were identified in the assessment of the construction phase.

A moderate negative effect was assessed for Bulk export (HSE): Otterbourne WSW to PWC Source A (45Ml/d) against the biodiversity SEA objective, due to crossings of woodland including Ancient Woodland and also priority habitats, including within the Hampshire Southampton East WRZ, and the associated potential for loss/disturbance (noise, dust, air quality) to these sites and potential disturbance at others (although effects would not be significant when accounting for mitigation/best practice, including pipeline alignment or trenches). The HRA screened in River Itchen SAC, Solent Maritime SAC, Emer Bog SAC, Mottisfont Bats SAC, Solent and Southampton Water SPA/Ramsar, and Solent and Dorset Coast SPA for construction effects but the appropriate assessment notes that adverse effects will not occur or are clearly avoidable.

Similarly for Interzonal transfer (HSE-HWZ): Otterbourne WSW to Yew Hill bi-directional no significant positive effects (or positive effects of any kind) or significant negative effects were identified in the assessment of the construction phase. Minor negative effects were identified against the carbon emissions, landscape, health & wellbeing, resource use and built assets SEA objectives. Minor negative effects were also identified against the biodiversity, air, historic environment and tourism & recreation SEA objectives during construction.

Operational effects

As described in Section 5.5.7 Bulk export (HSE): Otterbourne WSW to PWC Source A (45Ml/d) was assessed as having a significant positive effect against the water reliability SEA objective, reflecting the significant transfer capacity that it would provide, thereby increasing the resilience of supply. As highlighted in Section 5.5.7, no other significant positive or significant negative effects were identified in the assessment of the operational phase of Bulk export (HSE): Otterbourne WSW to PWC Source A (45Ml/d).

For Interzonal transfer (HSE-HWZ): Otterbourne WSW to Yew Hill bi-directional, no likely significant positive or significant negative effects were identified in the assessment of the operational phase. However, a minor positive effect on the water reliability SEA objective and a minor negative effect on the carbon emissions SEA objective, was assessed whilst a minor negative effect on the water resilience SEA objective was also assessed.

5.5.7 Hampshire Southampton West (HSW) WRZ

Options wholly within the WRZ

The options within the WRZ are described in Table 5-32, whilst a summary of the assessment of effects (post mitigation) is set out in Table 5-33.

Table 5-32 Summary of options for HSW.

Option name	Yield (Ml/d) (if applicable)	Description	Earliest year of implementation
Drought option - demand side (HSW): NEUBs	1.1	Non-essential use ban - HSW WRZ.	2026
Drought option: Reduce transfer to other commercial customers - HSW	0.07	Drought option: In the event of a drought, the Company would hold discussions with a commercial customer with regards to the resources position and their supply.	2027
Drought option - supply side (HSW): River Test (80Ml/d)	75	Test Surface Water Drought Order (from 2027 onwards).	2026
Drought option - demand side (HSW): TUBs	0.47	Temporary use bans - HSW WRZ.	2026
Groundwater (HSW): Test MAR (5.5Ml/d)	5.5	This option is a Managed Aquifer Recharge (MAR) scheme. It would provide recharge of the confined chalk aquifer from mains water in winter months, with subsequent onsite abstraction from the same aquifer in summer/autumn critical low flow periods. Treatment is available on site and it is assumed that there is sufficient treatment capacity for the abstracted water. The scheme assumes an extended pilot trial period to prove the viability of yield and water quality, with subsequent development of the MAR scheme. Expected DO from the developed scheme is ~5Ml/d. The pilot scheme assumes 1 No. abstraction/recharge borehole and 1 No. monitoring borehole, each 250m deep. For the duration of the trial, abstracted water will run to waste (River Test). The developed scheme will comprise a total of 5 No. boreholes at 250m depth; 3 No. abstraction/recharge boreholes and 2 No. monitoring boreholes, inclusive of those used in the pilot scheme. Abstracted water from the developed scheme will be treated onsite as required, before entering supply. The	2042

Option name	Yield (Ml/d) (if applicable)	Description	Earliest year of implementation
		suggested WTW site boundary may not support a DO of 5Ml/d. It is understood that Southern Water own adjacent land to the north of the River Test, and it is proposed that 1 No. abstraction/recharge borehole and 1 No. monitoring borehole be located on this land in order to achieve the desired scheme DO. Groundwater from the confined chalk aquifer is expected to be under artesian pressure and therefore gate valves would be required on all boreholes. Pumped recharge from mains water supply would also be required to overcome artesian pressure.	
Drought option - supply side (HSW): Sea tankering from Norway (45Ml/d)	45	This option considers the import of water from a third-party source into the Southern Water network to either; directly increase supply to Hampshire Southampton East (HSE) and Hampshire Southampton West (HSW) or indirectly support HSE/HSW by increasing supply on the IOW to reduce reliance on transfer from the mainland. Water would be sourced from a hydroelectric plant in Norway, which is currently being discharged to the sea. Food grade tankers, ranging in capacity from 19Ml to 45Ml, would be deployed with the possibility of supply being increased to 180Ml/d within two years. There is an eight-day turnaround time and as such eight vessels will therefore be required to maintain a constant supply.	2031

Table 5-33 Visual evaluation matrix summary (post mitigation) for HSW.

WRZ	Option	Stages (post mitigation)	Biodiversity	Soils	Water			Air	Climatic Factors		Landscape	Historic Environment	Population & Human Health		Material Assets	
					Resilience	Quality	Reliability		Carbon emissions	Climate change			Health & well-being	Tourism & recreation	Resource use	Built assets
Hampshire Southampton West (HSW)	Drought option - demand side (HSW): NEUBs	Construction (positive)	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Construction (negative)	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Operation (positive)	+	0	0	+	+	0	+	+	+	+	+	0	+	0
		Operation (negative)	0	-	0	0	0	0	0	0	-	-	---	--	0	0
Hampshire Southampton West (HSW)	Drought option: Reduce transfer to other commercial customers - HSW	Construction (positive)	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Construction (negative)	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Operation (positive)	+	0	0	+	+	0	0	+	0	0	+	0	0	0
		Operation (negative)	0	0	0	0	-	0	0	0	0	0	-	-	0	0
Hampshire Southampton West (HSW)	Drought option - supply side (HSW): River Test (80Ml/d)	Construction (positive)	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Construction (negative)	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Operation (positive)	0	0	0	0	+++	0	0	0	0	0	+	0	0	0

WRZ	Option	Stages (post mitigation)	Biodiversity	Soils	Water			Air	Climatic Factors		Landscape	Historic Environment	Population & Human Health		Material Assets	
					Resilience	Quality	Reliability		Carbon emissions	Climate change			Health & well-being	Tourism & recreation	Resource use	Built assets
		Operation (negative)	--	0	0	-	0	0	-	-	0	0	0	0	0	0
Hampshire Southampton West (HSW)	Drought option - demand side (HSW): TUBs	Construction (positive)	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Construction (negative)	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Operation (positive)	+	0	0	+	+	0	+	+	+	+	+	0	+	0
		Operation (negative)	0	0	0	0	0	0	0	0	-	-	--	-	0	0
Hampshire Southampton West (HSW)	Groundwater (HSW): Test MAR (5.5Ml/d)	Construction (positive)	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Construction (negative)	-	0	-	0	0	-	-	-	-	-	-	-	-	-
		Operation (positive)	0	0	0	+	+	0	0	+	0	0	0	0	0	0
		Operation (negative)	0	0	-	0	0	0	-	-	0	0	0	0	0	0
Hampshire Southampton West (HSW)	Drought option - supply side (HSW): Sea tankering from Norway (45Ml/d)	Construction (positive)	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Construction (negative)	-	0	--	-	0	--	-	0	--	--	0	--	-	-

WRZ	Option	Stages (post mitigation)	Biodiversity	Soils	Water			Air	Climatic Factors		Landscape	Historic Environment	Population & Human Health		Material Assets	
					Resilience	Quality	Reliability		Carbon emissions	Climate change			Health & well-being	Tourism & recreation	Resource use	Built assets
		Operation (positive)	0	0	0	0	++	0	0	+	0	0	++	0	0	0
		Operation (negative)	--	0	-	0	0	0	--	0	-	0	0	0	0	0

Construction effects

Four of the six preferred options (Drought option - demand side (HSW): NEUBs, Drought option: Reduce transfer to other commercial customers - HSW, Drought option - supply side (HSW): River Test (80Ml/d) and Drought option - demand side (HSW): TUBs) were assessed as having neutral effects against all objectives for the construction phase as the nature of these options would involve operational changes only and no construction would be required for their implementation.

No positive effects or likely significant positive effects were identified from the construction works associated with Groundwater (HSW): Test MAR (5.5Ml/d) or Drought option - supply side (HSW): Sea tankering from Norway (45Ml/d).

No likely significant negative effects were identified from construction works expected for Groundwater (HSW): Test MAR (5.5Ml/d). The potential for minor negative effects from construction activities were identified for this option against the majority of SEA objectives, proportionate to the proximity of the option to various designated assets, the scale of construction works and expected use of resources.

Moderate negative effects were also identified for Drought option - supply side (HSW): Sea tankering from Norway (45Ml/d) against the water resilience, air, landscape, historic environment and tourism and recreation SEA objectives. Minor negative effects were identified against water quality, carbon emissions, and material assets SEA objectives.

Operational effects

A significant positive effect was identified for Drought option - supply side (HSW): River Test in terms of water reliability. Moderate positive effects were identified for Drought option - supply side (HSW): Sea tankering from Norway (45Ml/d) against the water reliability and health and wellbeing SEA objectives during the operational phase.

The other four preferred options (Drought option - demand side (HSW): NEUBs, Drought option: Reduce transfer to other commercial customers - HSW, Drought option - demand side (HSW): TUBs, and Groundwater (HSW): Test MAR (5.5Ml/d)) were assessed as having a minor positive effect against the Water - Reliability SEA objective during the operation phase, attributed to the additional water yield or reduction in water demand that would help to deliver reliable and resilient water supplies.

Four of the preferred options were identified as having a positive effect on the Water - Quality SEA objective and the Climate Change SEA objective. Two drought options (Drought option - demand side (HSW): NEUBs and Drought option - demand side (HSW): TUBs) were identified as having minor positive effects across a wider range of the SEA objectives related to Biodiversity, Water - Quality and Reliability, Climatic Factors - Climate Change, Landscape, Historic Environment, Population & Human Health - Health & Wellbeing and Material Assets - Resource Use.

For Drought option - demand side (HSW): NEUBs significant negative effects were identified for the Health & Wellbeing SEA objective in the operation phase. The ban carries the risk of economic impacts on businesses that benefit directly or indirectly from certain water uses that would be prohibited under the ban (e.g. sports and leisure facilities). The ban may result in some business loss if the water-related operations have to be suspended. However, minor positive effects are also assessed for water savings which will help secure the supply of water to the communities in the WRZ. Drought option - demand side (HSW): TUBs was identified as having a moderate negative effect against this SEA objective through potentially limiting water access during times of drought, compromising the sale of water consuming products and limiting the use of water.

No other significant negative effects were identified during the assessment of the operation phase for the preferred options; however, moderate negative effects were determined for individual options against two other SEA objectives. Drought option - supply side (HSW): River Test (80Ml/d) was assessed to have a moderate negative effect against the Biodiversity SEA objective during operation, based on uncertainties arising from a paucity of ecological evidence to determine potential impacts on designated sites (i.e. the

River Test SSSI). Drought option - demand side (HSW): NEUBs was also identified as having a moderate negative effect against the Tourism & Recreation SEA objective through reducing the quantity of water made available for tourist attractions and water consuming recreational activities (swimming pools, watering sports pitches etc) during times of drought, which could dissuade tourists to the area for a brief period of time. Drought option - supply side (HSW): Sea tankering from Norway (45Ml/d) was identified as having a moderate negative effect against the biodiversity and carbon emissions SEA objective during the operational phase.

All other negative operation effects for the preferred options are identified as minor.

Interzonal transfer options

There are three interzonal transfer options within the Hampshire Southampton West Zone; these are Bulk export (HSE): Otterbourne WSW to PWC Source A (45Ml/d), Interzonal transfer (HRZ-HSW): Romsey Town and Broadlands valve bi-directional and Interzonal transfer (HSE-HSW): Yew Hill WSW to River Test WSW bi-directional (60Ml/d)

Bulk export (HSE): Otterbourne WSW to PWC Source A (45Ml/d) would enable a bi-directional transfer between the Hampshire Southampton West WRZ and the Hampshire Southampton East WRZ. A summary of this option is presented in **Table 5-34** below, whilst a summary of the assessment of its effects (post mitigation) is set out in Table 5-35 below.

Interzonal transfer (HRZ-HSW): Romsey Town and Broadlands valve bi-directional would enable bi-directional transfers between the Hampshire Southampton West WRZ and the Hampshire Rural WRZ. A summary of this option is presented in **Table 5-34** below, whilst a summary of the assessment of its effects (post mitigation) is set out in Table 5-35 below.

Interzonal transfer (HSE-HSW): Yew Hill WSW to River Test WSW bi-directional (60Ml/d) has been redesigned such that the link is now between HSW and HWZ and connects to the Andover Link Main. A summary of this option is presented in **Table 5-34** below, whilst a summary of the assessment of its effects (post mitigation) is set out in Table 5-35 below.

Table 5-34 Summary of interzonal options for HSW.

Option name	Yield (Ml/d) (if applicable)	Description	Earliest year of implementation
Bulk export (HSE): Otterbourne WSW to PWC Source A (45Ml/d)	45	The scheme is a potable 90Ml/d bi-directional transfer from Test Surface Water WSW to Otterbourne WSW. 22h/d operation assumed.	2040
Interzonal transfer (HRZ-HSW): Romsey Town and Broadlands valve bi-directional	3.1	Development and upgrade of existing transfer between Romsey Town & Broadlands valve (HSW-HRZ). This option involves installing a new booster station with 5Ml/d flow capacity to an existing transfer to allow bi-directional flow.	2026
Interzonal transfer (HSE-HSW): Yew Hill WSW to River Test WSW bi-directional (60Ml/d)	58	Yew Hill to Rownans Southampton Link Main	2031

Table 5-35 Visual evaluation matrix summary (post mitigation) for HSW interzonal transfers.

WRZ	Option	Stages (post mitigation)	Biodiversity	Soils	Water			Air	Climatic Factors		Landscape	Historic Environment	Population & Human Health		Material Assets	
					Resilience	Quality	Reliability		Carbon emissions	Climate change			Health & well-being	Tourism & recreation	Resource use	Built assets
Hampshire Southampton West (HSW)	Bulk export (HSE): Otterbourne WSW to PWC Source A (45Ml/d)	Construction (positive)	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Construction (negative)	--	0	-	0	0	-	-	0	-	-	-	-	-	-
		Operation (positive)	0	0	0	0	++	0	0	0	0	0	0	0	0	0
		Operation (negative)	0	0	0	0	0	0	--	0	0	0	0	0	0	0
Hampshire Southampton West (HSW)	Interzonal transfer (HRZ-HSW): Romsey Town and Broadlands valve bi-directional	Construction (positive)	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Construction (negative)	-	0	-	0	0	0	-	0	-	0	0	0	-	0
		Operation (positive)	0	0	0	0	+	0	0	0	0	0	0	0	0	0
		Operation (negative)	0	0	-	0	0	0	-	0	0	0	0	0	0	0
Hampshire Southampton West (HSW)	Interzonal transfer (HSE-HSW): Yew Hill WSW to River Test WSW bi-directional (60Ml/d)	Construction (positive)	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Construction (negative)	-	--	--	-	-	-	--	0	-	-	-	-	--	-
		Operation (positive)	0	0	0	0	+++	0	0	+	0	0	+	0	0	0

WRZ	Option	Stages (post mitigation)	Biodiversity	Soils	Water			Air	Climatic Factors		Landscape	Historic Environment	Population & Human Health		Material Assets	
					Resilience	Quality	Reliability		Carbon emissions	Climate change			Health & well-being	Tourism & recreation	Resource use	Built assets
		Operation (negative)	0	0	0	-	0	0	-	0	-	0	0	0	0	0

Construction effects

For Bulk export (HSE): Otterbourne WSW to PWC Source A (45Ml/d), Interzonal transfer (HRZ-HSW): Romsey Town and Broadlands valve bi-directional, and Interzonal transfer (HSE-HSW): Yew Hill WSW to River Test WSW bi-directional (60Ml/d) no significant positive effects (or positive effects of any kind) were identified in the assessment of the construction phase.

No likely significant negative effects were identified in the assessment of the construction phase. However, for option Bulk export (HSE): Otterbourne WSW to PWC Source A (45Ml/d) a moderate negative effect was assessed against the biodiversity SEA objective, due to crossings of woodland including Ancient Woodland and also priority habitats including within the Hampshire Southampton West WRZ and associated potential for loss/disturbance (noise, dust, air quality) to these sites and potential disturbance at others (although effects would not be significant when accounting for mitigation/best practice). The HRA screened in River Itchen SAC, Solent Maritime SAC, Emer Bog SAC, Mottisfont Bats SAC, Solent and Southampton Water SPA/Ramsar, and Solent and Dorset Coast SPA for construction effects but the appropriate assessment notes that adverse effects will not occur or are clearly avoidable.

Interzonal transfer (HRZ-HSW): Romsey Town and Broadlands valve bi-directional was assessed as having a minor negative effect against this objective. Both options (Interzonal transfer (HRZ-HSW): Romsey Town and Broadlands valve bi-directional and Bulk export (HSE): Otterbourne WSW to PWC Source A (45Ml/d)) were assessed as also having minor negative effects on the water resilience, landscape, and resource use SEA objectives, whilst Bulk export (HSE): Otterbourne WSW to PWC Source A (45Ml/d) was also assessed as having minor negative effects on the air, historic environment, health & wellbeing, tourism & recreation and built assets SEA objectives.

Moderate negative effects were identified for Interzonal transfer (HSE-HSW): Yew Hill WSW to River Test WSW bi-directional (60Ml/d) against the soils, geodiversity and land use, water resilience, carbon emissions and resource use SEA objectives. Minor negative effects were also identified against the biodiversity, water quality and reliability, air, landscape, historic environment, health and wellbeing, tourism and recreation and built assets SEA objectives for the construction phase.

Operational effects

Interzonal transfer (HSE-HSW): Yew Hill WSW to River Test WSW bi-directional (60Ml/d) was assessed as having a significant positive effect against the water reliability SEA objective, reflecting the significant transfer capacity that it would provide, thereby increasing the resilience of supply. No other significant positive or significant negative effects were identified in the assessment of the three options; however, a moderate negative effect was identified against the carbon emissions SEA objective for Bulk export (HSE): Otterbourne WSW to PWC Source A (45Ml/d), reflecting the option's estimated operational emissions.

For Interzonal transfer (HRZ-HSW): Romsey Town and Broadlands valve bi-directional, a minor positive effect was identified against the water reliability SEA objective, whilst minor negative effects were identified against the water resilience and carbon emissions SEA objectives.

For Interzonal transfer (HSE-HSW): Yew Hill WSW to River Test WSW bi-directional (60Ml/d) minor negative effects were identified against the water quality carbon emissions, and landscape SEA objectives.

5.6 Eastern area

5.6.1 Kent Medway East (KME) WRZ

Options wholly within the WRZ

The options within the WRZ are described in Table 5-36, whilst a summary of the assessment of effects (post mitigation) is set out in Table 5-37.

Table 5-36 Summary of options for KME.

Option name	Yield (Ml/d) (if applicable)	Description	Earliest year of implementation
Drought option - demand side (KME): NEUBs	0.8	Non-essential use ban - KMW WRZ	2026
Drought option - demand side (KME): TUBs	0.29	Temporary use bans - KMW WRZ	2026
Desalination (KME): Isle of Sheppey (10Ml/d) phase 2	10	The Isle of Sheppy Desalination options comprise a suite of modular options that represent different sizes of desalination plant that could be developed in one or more phases. This particular option proposes a second phase developing an additional 10Ml/d desalination capacity and is contingent on the 10Ml/d or 20Ml/d first phase options.	2063
Desalination (KME): Isle of Sheppey 20Ml/d	20	The Isle of Sheppey Desalination options comprise a suite of modular options that represent different sizes of desalination plant that could be developed in one or more phases. This particular option proposes a first phase, developing a 20Ml/d desalination capacity.	2041
Groundwater (KME): Recommission Gravesend (2.7Ml/d)	2.7	Gravesend source is a well and adit system that was decommissioned in 2007 due to high nitrate levels. A new nitrate treatment plant was constructed on site in 2006. A Source Investigation & Optimisation Study (SIOS) suggested that the nitrate problem was likely to be a faulty nitrate monitor. The report recommended the source could be recommissioned through a) Undertaking 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 b) Recalibration	2031

Option name	Yield (Ml/d) (if applicable)	Description	Earliest year of implementation
		or repair of the online raw water nitrate monitor, c) Modify the headworks to the satellite well chamber to facilitate improved access. Refurbishment of the existing nitrate plant will also be required. Scheme Output: 5Ml/d	
Recycling (KME): Sittingbourne Industrial Water Reuse (7.5Mld)	7.5	This option is to use a water recycling scheme to unlock additional volume in an existing industrial borehole licence to increase the scope of the licence trading. The existing industrial user currently utilises the groundwater in its paper/board making processes. It has been assumed at this stage that the reverse osmosis wastewater can be discharged through Sittingbourne WwTW existing outfall.	2031
Drought option - demand side (KME): Reduce transfer to other commercial customers	0.1	Drought Option: In the event of a drought, the Company would hold discussions with a commercial customer with regards to the resources position and their supply.	2027

Table 5-37 Visual evaluation matrix summary (post mitigation) for KME.

WRZ	Option	Stages (post mitigation)	Biodiversity	Soils	Water			Air	Climatic Factors		Landscape	Historic Environment	Population & Human Health		Material Assets	
					Resilience	Quality	Reliability		Carbon emissions	Climate change			Health & well-being	Tourism & recreation	Resource use	Built assets
Kent Medway East	Drought option - demand side (KME): NEUBs	Construction (positive)	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Construction (negative)	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Operation (positive)	+	0	0	+	+	0	+	+	+	+	+	0	+	0
		Operation (negative)	0	-	0	0	0	0	0	0	-	-	---	--	0	0
Kent Medway East	Drought option - demand side (KME): TUBs	Construction (positive)	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Construction (negative)	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Operation (positive)	+	0	0	+	+	0	+	+	+	+	+	0	+	0
		Operation (negative)	0	0	0	0	0	0	0	0	-	-	--	-	0	0
Kent Medway East	Desalination (KME): Isle of Sheppey (10Ml/d) phase 2	Construction (positive)	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Construction (negative)	--	0	-	-	0	-	--	0	-	-	-	-	-	-
		Operation (positive)	0	0	0	0	+	0	0	+	0	0	0	0	0	0

WRZ	Option	Stages (post mitigation)	Biodiversity	Soils	Water			Air	Climatic Factors		Landscape	Historic Environment	Population & Human Health		Material Assets	
					Resilience	Quality	Reliability		Carbon emissions	Climate change			Health & well-being	Tourism & recreation	Resource use	Built assets
		Operation (negative)	---/?	0	0	--	0	-	--	0	-	0	0	0	-	0
Kent Medway East	Desalination (KME): Isle of Sheppey 20Ml/d	Construction (positive)	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Construction (negative)	--	0	-	-	0	-	--	0	-	-	-	-	-	-
		Operation (positive)	0	0	0	0	+	0	0	+	0	0	0	0	0	0
		Operation (negative)	---/?	0	0	--	0	-	--	0	-	0	0	0	-	0
Kent Medway East	Groundwater (KME): Recommission Gravesend (2.7Ml/d)	Construction (positive)	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Construction (negative)	0	0	0	-	0	0	0	0	0	0	0	0	0	0
		Operation (positive)	0	0	0	0	+	0	0	+	0	0	0	0	0	0
		Operation (negative)	0	0	0	---	0	0	-	-	0	0	0	0	0	0
Kent Medway East	Recycling (KME): Sittingbourne Industrial Water Reuse (7.5Mld)	Construction (positive)	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Construction (negative)	-	-	-	-	0	-	-	0	-	-	-	-	-	-

WRZ	Option	Stages (post mitigation)	Biodiversity	Soils	Water			Air	Climatic Factors		Landscape	Historic Environment	Population & Human Health		Material Assets	
					Resilience	Quality	Reliability		Carbon emissions	Climate change			Health & well-being	Tourism & recreation	Resource use	Built assets
		Operation (positive)	0	0	0	0	+	0	0	0	0	0	0	0	0	0
		Operation (negative)	---/?	0	0	0	0	0	-	0	0	0	0	0	0	0
Kent Medway East	Drought option - demand side (KME): Reduce transfer to other commercial customers	Construction (positive)	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Construction (negative)	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Operation (positive)	+	0	0	+	+	0	0	+	0	0	+	0	0	0
		Operation (negative)	0	0	0	0	-	0	0	0	0	0	-	-	0	0

Construction effects

All four of the preferred supply options requiring construction were assessed as having a negative or potentially negative effect on the biodiversity SEA objective, associated with the potential for construction works to affect designated and/or non-designated habitats, species and features through either direct land take, noise and/or disturbance (e.g. vibration, dust). Two options related to the Isle of Sheppey desalination scheme (Desalination (KME): Isle of Sheppey (10Ml/d) phase 2 and Desalination (KME): Isle of Sheppey 20Ml/d) were assessed as having a moderate negative effect on the biodiversity SEA objective. This effect was assessed because the option pipeline passes through Medway and Estuary Marshes SSSI, is adjacent to The Swale SSSI and includes ancient woodland. However, measures to minimise impacts and reinstatement/compensation, and careful routing, is likely to reduce or avoid the potential impacts on these features. The HRA appropriate assessment found that construction effects on the integrity of The Swale SPA/Ramsar, Medway Estuary and Marshes SPA/Ramsar, Thames Estuary and Marshes SPA/Ramsar, Outer Thames Estuary SPA, Benfleet and Southend Marshes SPA/Ramsar, Essex Estuaries SAC, and Foulness (Mid-Essex Coast Phase 5) SPA/Ramsar are avoidable with established measures. As such construction is likely to have a moderate negative effect. All other negative construction effects for these options were identified as minor with the application of mitigation measures.

Three options (Drought option - demand side (KME): NEUBs; Drought option - demand side (KME): TUBs; Drought option - demand side (KMW): Reduce transfer to other commercial customers) were assessed as having neutral effects as they would involve no construction and would involve operational changes only.

Operational effects

No significant positive effects were identified for these options.

Positive effects were assessed for all options for the Water - reliability SEA objective, reflecting the positive impact on water resilience. Six options were identified as having positive effects on climate change SEA objective. Two drought options (Drought option - demand side (KME): NEUBs; Drought option - demand side (KME): TUBs) were identified as having minor positive effects across a wider range of SEA objectives related to biodiversity, water quality and reliability, climatic factors - climate change, landscape, historic environment, population & human health - health & well-being and material assets - resource use.

Significant negative effects with some uncertainty were assessed for the biodiversity objective for the Isle of Sheppey desalination plant options (Desalination (KME): Isle of Sheppey (10Ml/d) phase 2 and Desalination (KME): Isle of Sheppey 20Ml/d) in relation to the hypersaline discharge from the outfall and potential for effects on the Medway Estuary and Marshes SPA and Ramsar and Thames Estuary and Marshes SPA and Ramsar. Whilst the appropriate assessment notes that adverse effects are likely avoidable based on proxy data and evidence from similar sites / schemes, the operation of the scheme may affect the supporting habitats of the qualifying features, although evidence from elsewhere indicates that the zone of environmental change will be small and could be minimised further by appropriate location of the outfall (taking account of local hydrodynamics) and operational practice. However, there are residual uncertainties that cannot be resolved at the plan level. For The Swale SPA and Ramsar, the appropriate assessment notes that the designated site will have a low exposure to operational effects due to its location relative to the outfall. For the Outer Thames Estuary SPA the appropriate assessment notes that adverse effects are almost certainly avoidable based on proxy data and evidence from similar sites / schemes. Given the residual uncertainty in relation to Medway Estuary and Marshes SPA and Ramsar and Thames Estuary and Marshes SPA and Ramsar significant effects with uncertainty are identified for the operation phase. Recycling (KME): Sittingbourne Industrial Water Reuse (7.5Mld) was also identified as having significant negative effects with uncertainty against the biodiversity objective. This relates to the location of the outfall. The HRA appropriate assessment notes that for The Swale SPA and Ramsar aspects, there was a conclusion of no adverse effects for this scheme at WRMP2019 and there have been no substantive amendments in either the scheme or the environmental baseline to alter this conclusion. The HRA notes that the principal issue relates the potential effects on Milton Creek as 'functional habitat' and small reductions in non-saline inputs into the

Swale via Milton Creek. The HRA notes this is likely to be inconsequential but aspects of this can only be confirmed with the benefit of project-level survey and modelling, hence minor residual uncertainties remain for these sites.

Significant negative effects were assessed for Groundwater (KME): Recommission Gravesend (2.7Ml/d) in respect of the Water Quality SEA objective. This reflects the findings of the WFD assessment which confirms WFD non-compliance (with medium confidence) in relation to the Hastings Beds Cuckmere and Pevensey Levels waterbodies. The WFD notes that connectivity between the aquifer and overlying surface waters is likely to be high due to the permeable nature of the solid and superficial geology, and the proximity of watercourses. The assessment notes that flows are already lower than the requirement to support good ecological status whilst increased abstraction will reduce the surplus in the water balance potentially leading to deterioration. Significant negative effects are therefore assessed.

Moderate negative effects were assessed for the Isle of Sheppey desalination options (Desalination (KME): Isle of Sheppey (10Ml/d) phase 2 and Desalination (KME): Isle of Sheppey 20Ml/d;) for the SEA objective related to water quality. The assessment reflects the findings of WFD assessment of potential non-compliance (with low confidence) for the Medway and Swale waterbodies regarding hypersaline discharge. Moderate negative effects were also identified for the Carbon emissions SEA objective.

For Drought option - demand side (KME): NEUBs significant negative effects were identified for the Health and wellbeing SEA objective in the operation phase. The ban carries the risk of economic impacts on businesses that benefit directly or indirectly from certain water uses that would be prohibited under the ban (e.g. sports and leisure facilities). The ban may result in some business loss if the water-related operations have to be suspended. However, minor positive effects are also assessed for water savings which will help secure the supply of water to the communities in the WRZ. Drought option - demand side (KME): TUBs was identified as having moderate negative effects against this SEA objective through potentially limiting water access during times of drought, compromising the sale of water consuming products and limiting the use of water.

Drought option - demand side (KME): NEUBs was identified as having a moderate negative effect against the population & human health - tourism & recreation SEA objective through reducing the quantity of water made available for tourist attractions and water consuming recreational activities (swimming pools, watering sports pitches etc) during times of drought, which could dissuade tourists to the area for a brief period of time.

All other residual negative effects were identified as minor.

Interzonal transfer options

There are two interzonal transfer options within the Kent Medway East WRZ. Interzonal transfer (KME-KTZ): KME-KTZ bi-directional (15.8Ml/d) would involve conditioning of an existing main to enable bi-directional transfers (and specifically from Kent Thanet WRZ to Kent Medway East WRZ). A summary of this option is presented in Table 5-44 (Section 5.6.3), whilst a summary of the assessment of its effects (post mitigation) is set out in Table 5-45 (Section 5.6.3); in order to avoid undue duplication, these tables are not repeated here.

Interzonal transfer (KTZ-KME): Utilise full existing transfer capacity (9Ml/d) would support transfer from Kent Medway East WRZ to Kent Thanet WRZ and is described in Table 5-38 below, whilst a summary of the assessment of its effects (post mitigation) is set out in Table 5-39 below.

Table 5-38 Summary of interzonal options for KME.

Option name	Yield (Ml/d) (if applicable)	Description	Earliest year of implementation
Interzonal transfer (KTZ-KME): Utilise full existing transfer capacity (9Ml/d)	2.88	The current operational transfer from Kent Medway East to Kent Thanet is limited to the output from Faversham4 WSW. This option enables flows from the Faversham3 groundwater source to be directed, via an existing main, towards Selling WSW. A soakaway is installed at Faversham4 to allow for reconditioning of the existing main and the addition of UV treatment at Faversham4 permits disinfection of the Faversham3 flows.	2040

Table 5-39 Visual evaluation matrix summary (post mitigation) for KME interzonal transfers.

WRZ	Option	Stages (post mitigation)	Biodiversity	Soils	Water			Air	Climatic Factors		Landscape	Historic Environment	Population & Human Health		Material Assets	
					Resilience	Quality	Reliability		Carbon emissions	Climate change			Health & well-being	Tourism & recreation	Resource use	Built assets
Kent Medway East (KME)	Interzonal transfer (KTZ-KME): Utilise full existing transfer capacity (9Ml/d)	Construction (positive)	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Construction (negative)	-	-	0	0	0	-	-	0	-	-	-	-	-	-
		Operation (positive)	0	0	0	0	++	0	0	0	0	0	0	0	0	0
		Operation (negative)	-	-	0	0	0	0	-	0	-	0	0	0	0	0

Construction effects

As described in Section 5.6.3, no significant positive effects (or positive effects of any kind) or significant negative effects were identified during the assessment of the construction phase of Interzonal transfer (KME-KTZ): KME-KTZ bi-directional (15.8Ml/d). However, it is noted that a moderate negative effect was assessed against the water quality SEA objective due to the potential for contamination to water bodies, including main rivers, which the pipeline crosses, including within the Kent Medway East WRZ.

Similarly, no significant positive or positive effects in any form, and no significant negative effects were identified in the assessment of the construction phase of Interzonal transfer (KTZ-KME): Utilise full existing transfer capacity (9Ml/d). However, the option was assessed as having minor negative effects on the biodiversity, soils, geodiversity and land use, air, carbon emissions, landscape, historic environment, health & wellbeing, tourism & recreation, resource use and built assets SEA objectives during the construction phase.

Operational effects

As described in Section 5.6.3, for Interzonal transfer (KME-KTZ): KME-KTZ bi-directional (15.8Ml/d) no significant positive effects or significant negative effects were identified during the assessment of the operational phase, with only minor effects being identified in the assessment.

Similarly, for Interzonal transfer (KTZ-KME): Utilise full existing transfer capacity (9Ml/d) no significant positive effects or significant negative effects were identified in the assessment of the operational phase. However, a moderate positive effect was identified against the water reliability SEA objective, as the option would transfer of water to areas of deficit (bi-directional) without requiring abstraction. Additionally, minor negative effects were identified against the biodiversity, soils, geodiversity and land use, carbon emissions and landscape objectives.

5.6.2 Kent Medway West (KMW) WRZ

Options wholly within the WRZ

The options within the WRZ are described in Table 5-40, whilst a summary of the assessment of effects (post mitigation) is set out in Table 5-41.

Table 5-40 Summary of options for KMW.

Option name	Yield (Ml/d) (if applicable)	Description	Earliest year of implementation
Drought option - demand side (KMW): NEUBs	0.51	Non-essential use ban - KMW WRZ	2026
Drought option - demand side (KMW): TUBs	0.18	Temporary use bans - KMW WRZ	2026
Desalination (KMW): Thames Estuary (10Ml/d)	10	The Thames Estuary Desalination Options are a modular suite of options to develop a desalination plant of differing capacities that could be developed in one or more phases. The plant would be developed on the Swanscombe Peninsula. Treated water would be transferred to Singlewell WSR for distribution to the Kent Medway WRZ and the plant would combine discharge with Swanscombe WwTW's existing outfall. This option represents a potential first phase development of a 10Ml/d capacity desalination plant.	2041
Desalination (KMW): Thames Estuary (10Ml/d) Phase 2	10	The Thames Estuary Desalination Options are a modular suite of options to develop a desalination plant of differing capacities that could be developed in one or more phases. This option represents a potential second phase development of a 10Ml/d capacity desalination plant contingent on one of the first phase 10Ml/d or 20Ml/d capacity options (Swa10 or Swa20).	2041
Desalination (KMW): Thames Estuary (20Ml/d)	20	The Thames Estuary Desalination Options are a modular suite of options to develop a desalination plant of differing capacities that could be developed in one or more phases. This option represents a potential first phase development of a 20Ml/d capacity desalination plant.	2040
Desalination (KMW): Thames Estuary (20Ml/d) Phase 2	20	The Thames Estuary Desalination Options are a modular suite of options to develop a desalination plant of differing capacities that could be developed in one or more phases. This option represents a potential second phase development of a	2040

Option name	Yield (Ml/d) (if applicable)	Description	Earliest year of implementation
		20Ml/d capacity desalination plant contingent on one of the first phase 10Ml/d or 20Ml/d capacity options.	
Recycling (KMW): Medway WTW to lake (14Ml/d)	14	This option involves the transfer of 18Ml/d of treated effluent from Aylesford WWTW to near Rochester WSW's raw water storage reservoir Eccles Lake.	2031
Drought option - supply side (KMW): River Medway Scheme 1-4 (17Ml/d)	17	There are four sub-options involving a change in MRF and the release factor from the reservoir: (1) 2nd Dry Winter, MRF 150Ml/d, RF 1:1 (2) 3rd Dry Winter, MRF 150Ml/d RF, 1:0 (3) The following Summer, MRF 275Ml/d RF, 1:0 (4) The following Autumn MRF None, RF 0:0, Springfield abstracts without releases from Bewl Water. Normal compensation releases continue. Bewl Water is a pumped storage reservoir with abstractions from the River Teise at Smallbridge and the River Medway near Maidstone. The Permit may take the form of authorisations to allow increased re-filling and conservation of existing storage of Bewl. The precise conditions applied for will depend upon the severity and timing of each drought.	2026
Asset enhancement (KMW): Remove network constraint at Longfield (13Ml/d)	13.3	System simulation modelling has identified that the KMW Water Resource Zone Deployable Output appears to constrained due to a network capacity issue between Nursted and SEW RZ6 Service Reservoirs. There is also a flow limitation between Cobham and Singlewell Service Reservoirs which restricts the movement of water from the River Medway Scheme. This scheme would undertake further network modelling to remove these network constraints to allow currently locked-in deployable output to be used to support the restricted parts of the network. The potential solutions would be to: • Validate the network constraint through updated and further exploration and validation of the Pywr System model to determine the	2026

Option name	Yield (Ml/d) (if applicable)	Description	Earliest year of implementation
		optimal solution • If required, upgrade new transfer valve and/or booster (Northfleet Nurstead WBS) station Between Northfleet WSW and Nurstead Meopham WSR. • If required, upgrade water treatment process at Longfield WSW (upgrade to Amazon Filtraiton) to allow source to produce higher output up to licence and historical limit (~7Ml/d) • Increase capacity water main and, if required, an upgraded Booster station at Singlewell or Cobham WSRs	
Drought option - demand side (KMW): Reduce transfer to other commercial customers	0.09	In the event of a drought, the Company would hold discussions with a commercial customer with regards to the resources position and their supply.	2027

Table 5-41 Visual evaluation matrix summary (post mitigation) for KMW.

WRZ	Option	Stages (post mitigation)	Biodiversity	Soils	Water			Air	Climatic Factors		Landscape	Historic Environment	Population & Human Health		Material Assets	
					Resilience	Quality	Reliability		Carbon emissions	Climate change			Health & well-being	Tourism & recreation	Resource use	Built assets
Kent Medway West	Drought option - demand side (KMW): NEUBs	Construction (positive)	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Construction (negative)	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Operation (positive)	+	0	0	+	+	0	+	+	+	+	+	0	+	0
		Operation (negative)	0	-	0	0	0	0	0	0	-	-	---	--	0	0
Kent Medway West	Drought option - demand side (KMW): TUBs	Construction (positive)	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Construction (negative)	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Operation (positive)	+	0	0	+	+	0	+	+	+	+	+	0	+	0
		Operation (negative)	0	0	0	0	0	0	0	0	-	-	--	-	0	0
Kent Medway West	Desalination (KMW): Thames Estuary (10Ml/d)	Construction (positive)	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Construction (negative)	--	-	-	-	0	-	-	0	-	-	-	-	-	-
		Operation (positive)	0	0	0	0	+	0	0	+	0	0	0	0	0	0

WRZ	Option	Stages (post mitigation)	Biodiversity	Soils	Water			Air	Climatic Factors		Landscape	Historic Environment	Population & Human Health		Material Assets	
					Resilience	Quality	Reliability		Carbon emissions	Climate change			Health & well-being	Tourism & recreation	Resource use	Built assets
		Operation (negative)	---/?	0	-	--	0	-	-	0	-	0	0	0	-	0
Kent Medway West	Desalination (KMW): Thames Estuary (10Ml/d) Phase 2	Construction (positive)	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Construction (negative)	--	-	-	-	0	-	-	0	-	-	-	-	-	-
		Operation (positive)	0	0	0	0	+	0	0	+	0	0	0	0	0	0
		Operation (negative)	---/?	0	-	--	0	-	-	0	-	0	0	0	-	0
Kent Medway West	Desalination (KMW): Thames Estuary (20Ml/d)	Construction (positive)	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Construction (negative)	--	-	-	-	0	-	-	0	-	-	-	-	-	-
		Operation (positive)	0	0	0	0	+	0	0	+	0	0	0	0	0	0
		Operation (negative)	---/?	0	-	--	0	-	-	0	-	0	0	0	-	0
Kent Medway West	Desalination (KMW): Thames Estuary (20Ml/d) Phase 2	Construction (positive)	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Construction (negative)	--	-	-	-	0	-	-	0	-	-	-	-	-	-
		Operation (positive)	0	0	0	0	+	0	0	+	0	0	0	0	0	0

WRZ	Option	Stages (post mitigation)	Biodiversity	Soils	Water			Air	Climatic Factors		Landscape	Historic Environment	Population & Human Health		Material Assets	
					Resilience	Quality	Reliability		Carbon emissions	Climate change			Health & well-being	Tourism & recreation	Resource use	Built assets
		Operation (negative)	---/?	0	-	--	0	-	-	0	-	0	0	0	-	0
Kent Medway West	Recycling (KMW): Medway WTW to lake (14Ml/d)	Construction (positive)	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Construction (negative)	-	-	-	--	0	-	-	0	-	-	-	-	-	-
		Operation (positive)	0	0	0	0	+	0	0	0	0	0	0	0	0	0
		Operation (negative)	-	0	0	--	0	0	-	0	0	0	0	0	0	0
Kent Medway West	Drought option - supply side (KMW): River Medway Scheme 1-4 (17Ml/d)	Construction (positive)	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Construction (negative)	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Operation (positive)	0	0	0	0	++	0	0	0	0	0	0	0	0	0
		Operation (negative)	-	0	0	-	0	0	0	-	0	0	0	0	0	0
Kent Medway West	Asset enhancement (KMW): Remove network constraint at Longfield (13Ml/d)	Construction (positive)	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Construction (negative)	-	-	-	0	0	-	-	0	-	-	-	-	-	-
		Operation (positive)	0	0	0	0	+	0	0	0	0	0	0	0	0	0

WRZ	Option	Stages (post mitigation)	Biodiversity	Soils	Water			Air	Climatic Factors		Landscape	Historic Environment	Population & Human Health		Material Assets	
					Resilience	Quality	Reliability		Carbon emissions	Climate change			Health & well-being	Tourism & recreation	Resource use	Built assets
		Operation (negative)	0	0	0	--	0	0	-	0	0	0	0	0	0	0
Kent Medway West	Drought option - demand side (KMW): Reduce transfer to other commercial customers	Construction (positive)	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Construction (negative)	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Operation (positive)	+	0	0	+	+	0	0	+	0	0	+	0	0	0
		Operation (negative)	0	0	0	0	-	0	0	0	0	0	-	-	0	0

Construction effects

No positive or likely significant positive effects were identified for construction.

No likely significant negative effects have been identified for construction.

All six of the preferred supply options requiring construction were assessed as having a negative or potentially negative effect on the biodiversity SEA objective, associated with the potential for construction works to affect designated and/or non-designated habitats, species and features through either direct land take, noise and/or disturbance (e.g. vibration, dust). Four options related to the River Thames desalination scheme (Desalination (KMW): Thames Estuary (10Ml/d); Desalination (KMW): Thames Estuary (10Ml/d) Phase 2; Desalination (KMW): Thames Estuary (20Ml/d); and Desalination (KMW): Thames Estuary (20Ml/d) Phase 2) were assessed as having a moderate negative effect on the biodiversity SEA objective. This effect was assessed because the option would involve works within the Swanscombe Peninsula SSSI. As such construction of the option is likely to have a moderate negative effect on these areas following application of mitigation measures to minimise loss and reinstatement/compensation of any habitats lost.

For Recycling (KMW): Medway WTW to lake (14Ml/d) moderate effects in the construction phase were identified for the Water Quality SEA objective linked to the findings of the WFD assessment which identified WFD non-compliance (with low confidence) for Eccles Lake. All other negative construction effects for these options were identified as minor.

Four options (Drought option - demand side (KMW): NEUBs; Drought option - demand side (KMW): TUBs; Drought option - supply side (KMW): River Medway Scheme 1-4 (17Ml/d); and Drought option - demand side (KMW): Reduce transfer to other commercial customers) were assessed as having neutral effects as they would involve no construction and would involve operational changes only.

Operational effects

Positive effects were assessed for all options for the Water - reliability SEA objective, reflecting the positive impact on water resilience. Seven options were identified as having positive effects on climate change SEA objective. Two drought options (Drought option - demand side (KMW): NEUBs; Drought option - demand side (KMW): TUBs) were identified as having minor positive effects across a wider range of SEA objectives related to biodiversity, water quality and reliability, climatic factors - climate change, landscape, historic environment, population & human health - health & well-being and material assets - resource use.

Significant negative effects with some uncertainty were assessed for the biodiversity objective for the River Thames desalination options (Desalination (KMW): Thames Estuary (10Ml/d); Desalination (KMW): Thames Estuary (10Ml/d) Phase 2; Desalination (KMW): Thames Estuary (20Ml/d); and Desalination (KMW): Thames Estuary (20Ml/d) Phase 2) in relation to the hypersaline discharge from the outfall into the River Thames and potential for effects on the Thames Estuary and Marshes SPA and Ramsar. The HRA identifies that adverse effects on the Thames Estuary and Marshes SPA and Ramsar are likely avoidable based on proxy data and evidence from similar sites/schemes. The operation of the scheme may affect the supporting habitats of the qualifying features, although evidence from elsewhere indicates that the zone of environmental change will be small and could be minimised further by appropriate location of the outfall (taking account of local hydrodynamics) and operational practice. However, there are residual uncertainties that cannot be resolved at the plan level. Therefore, significant negative effects with uncertainty are identified for these options.

For Drought option - demand side (KMW): NEUBs significant negative effects were identified for the Health and wellbeing SEA objective in the operation phase. The ban carries the risk of economic impacts on businesses that benefit directly or indirectly from certain water uses that would be prohibited under the ban (e.g. sports and leisure facilities). The ban may result in some business loss if the water-related operations have to be suspended. However, minor positive effects are also assessed for water savings which will help secure the supply of water to the communities in the WRZ. This is the only significant negative effect associated with any of the options. Drought option - demand side (KMW): TUBs was identified as having

moderate negative effects against this SEA objective through potentially limiting water access during times of drought, compromising the sale of water consuming products and limiting the use of water.

Moderate effects were assessed for the River Thames desalination options (Desalination (KMW): Thames Estuary (10Ml/d); Desalination (KMW): Thames Estuary (10Ml/d) Phase 2; Desalination (KMW): Thames Estuary (20Ml/d); and Desalination (KMW): Thames Estuary (20Ml/d) Phase 2) for the SEA objective related to water quality. The assessment reflects the findings of WFD assessment of potential non-compliance (with low confidence) for the Thames Middle waterbody related to the hypersaline discharge.

Drought option - demand side (KMW): NEUBs was identified as having a moderate negative effect against the population and human health - tourism & recreation SEA objective through reducing the quantity of water made available for tourist attractions and water consuming recreational activities (swimming pools, watering sports pitches etc) during times of drought, which could dissuade tourists to the area for a brief period of time.

All other residual negative effects were identified as minor.

5.6.3 Kent Thanet (KTZ) WRZ

Options wholly within the WRZ

The options within the WRZ are described in Table 5-42, whilst a summary of the assessment of effects (post mitigation) is set out in Table 5-43.

Table 5-42 Summary of options for KTZ.

Option name	Yield (Ml/d) (if applicable)	Description	Earliest year of implementation
Drought option - demand side (KTZ): NEUBs	0.51	Non-essential use ban - KTZ WRZ.	2026
Drought option - demand side (KTZ): TUBs	0.18	Temporary use bans - KTZ WRZ.	2026
Bulk import (KTZ): SEW Kingston to Near Canterbury (2Ml/d)	2	A 2Ml/d import from SEW Kingston Southern Water to Southern Water Canterbury WSW.	2026
Desalination (KTZ): East Thanet (20Ml/d)	20	The East Thanet Desalination Options are a modular suite of options to develop a desalination plant of differing capacities near to the North Thanet Coast and could be developed in one or more phases. The plant would supply potable desalinated water to the Kent Thanet WRZ. This option represents a potential first phase development of a 20Ml/d capacity desalination plant.	2041
Desalination (KTZ): East Thanet (20Ml/d) Phase 2	20	The East Thanet Desalination Options are a modular suite of options to develop a desalination plant of differing capacities near to the North Thanet Coast and could be developed in one or more phases. The plant would supply potable desalinated water to the Kent Thanet WRZ. This option represents a potential second phase development of a 20Ml/d capacity desalination plant contingent on one of the first phase 20Ml/d option.	2051
Bulk import (KTZ): SEW Canterbury to Near	20	Bi-directional transfer between South East Water RZ8 and Kent Thanet WRZ in the vicinity of Southern Water's Canterbury WS. Indirectly supplied from Broad Oak Reservoir. Maximum capacity of 20Ml/d.	2050

Option name	Yield (Ml/d) (if applicable)	Description	Earliest year of implementation
Canterbury (20Ml/d)			
Drought option - demand side (KTZ): Reduce transfer to other commercial customers	0.1	Drought Option: In the event of a drought, the Company would hold discussions with a commercial customer with regards to the resources position and their supply.	2027

Table 5-43 Visual evaluation matrix summary (post mitigation) for KTZ.

WRZ	Option	Stages (post mitigation)	Biodiversity	Soils	Water			Air	Climatic Factors		Landscape	Historic Environment	Population & Human Health		Material Assets	
					Resilience	Quality	Reliability		Carbon emissions	Climate change			Health & well-being	Tourism & recreation	Resource use	Built assets
Kent Thanet (KTZ)	Drought option - demand side (KTZ): NEUBs	Construction (positive)	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Construction (negative)	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Operation (positive)	+	0	0	+	+	0	+	+	+	+	+	0	+	0
		Operation (negative)	0	-	0	0	0	0	0	0	-	-	---	--	0	0
Kent Thanet (KTZ)	Drought option - demand side (KTZ): TUBs	Construction (positive)	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Construction (negative)	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Operation (positive)	+	0	0	+	0	0	+	+	+	+	+	0	+	0
		Operation (negative)	0	0	0	0	0	0	0	0	-	-	--	-	0	0
Kent Thanet (KTZ)	Bulk import (KTZ): SEW Kingston to Near Canterbury (2Ml/d)	Construction (positive)	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Construction (negative)	--	-	-	0	0	-	-	0	-	-	-	-	-	-
		Operation (positive)	0	0	0	0	+	0	0	0	0	0	0	0	0	0

WRZ	Option	Stages (post mitigation)	Biodiversity	Soils	Water			Air	Climatic Factors		Landscape	Historic Environment	Population & Human Health		Material Assets	
					Resilience	Quality	Reliability		Carbon emissions	Climate change			Health & well-being	Tourism & recreation	Resource use	Built assets
		Operation (negative)	0	0	0	0	0	0	-	0	0	0	0	0	0	0
Kent Thanet (KTZ)	Desalination (KTZ): East Thanet (20Ml/d)	Construction (positive)	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Construction (negative)	---/?	-	-	-	0	-	--	0	-	-	-	0	-	-
		Operation (positive)	0	0	0	0	+	0	0	0	0	0	0	0	0	0
		Operation (negative)	---/?	0	0	--	0	0	--	0	0	0	0	0	-	0
Kent Thanet (KTZ)	Desalination (KTZ): East Thanet (20Ml/d) Phase 2	Construction (positive)	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Construction (negative)	--	-	-	-	0	-	--	0	-	-	-	0	-	-
		Operation (positive)	0	0	0	0	+	0	0	0	0	0	0	0	0	0
		Operation (negative)	---/?	0	0	--	0	0	--	0	0	0	0	0	-	0
Kent Thanet (KTZ)	Bulk import (KTZ): SEW Canterbury to Near Canterbury (20Ml/d)	Construction (positive)	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Construction (negative)	-	0	-	-	0	-	-	0	-	-	-	-	-	-
		Operation (positive)	0	0	0	0	+	0	0	0	0	0	0	0	0	0

WRZ	Option	Stages (post mitigation)	Biodiversity	Soils	Water			Air	Climatic Factors		Landscape	Historic Environment	Population & Human Health		Material Assets	
					Resilience	Quality	Reliability		Carbon emissions	Climate change			Health & well-being	Tourism & recreation	Resource use	Built assets
		Operation (negative)	0	0	0	0	0	0	-	0	0	0	0	0	0	0
Kent Thanet (KTZ)	Drought option - demand side (KTZ): Reduce transfer to other commercial customers	Construction (positive)	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Construction (negative)	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Operation (positive)	+	0	0	+	+	0	0	+	0	0	+	0	0	0
		Operation (negative)	0	0	0	0	-	0	0	0	0	0	-	-	0	0

Construction effects

No significant positive effects or positive effects are identified for the options during the construction phase.

Desalination (KTZ): East Thanet (20Ml/d) was assessed as having a significant negative effect with uncertainties during the construction phase. This is due to the option constructing a new desalination plant and associated pipeline that would be located within the Thanet Coast SSSI, run through the SSSI impact zones associated with the Sandwich Bay to Hacklinge Marshes SSSI, and has the potential to impact upon the Thanet Coast MCZ, which could also affect the Thanet Coast SAC. The HRA appropriate assessment ruled out adverse effects on the Thanet Coast SAC. However, the appropriate assessment notes that with regards to the Outer Thames Estuary SPA, the outfall will be located within the site, and for Margate and Long Sands SAC, the outfall for the plant is likely to be located in or close to this site (although location outside the site will be possible). There are some uncertainties that can only be resolved with detailed design (e.g. sediment deposition and hydrodynamics may be affected if the pipeline is not buried), but these appear avoidable or mitigatable, such that adverse effects on integrity do not appear to be an unavoidable outcome of the option. Some uncertainty remains.

No other significant effects were identified during the assessment of the construction phase of the options. The East Thanet desalination options (Desalination (KTZ): East Thanet (20Ml/d) and Desalination (KTZ): East Thanet (20Ml/d) Phase 2) were identified as having moderate effects on carbon emissions reflecting the carbon generated from materials used to construct the new infrastructure (embodied carbon) and construction activities. The relative carbon scale identified that the option has moderate construction carbon emissions (relative to other WRSE Regional Plan options).

Minor negative effects were identified against the biodiversity, soils, geodiversity, land use, water resilience, water quality, air, carbon emissions, landscape, historic environment, health and wellbeing, tourism and recreation and resource use SEA objectives.

Operational effects

No significant positive effects were identified in the operation stage.

Six options were identified as providing a minor positive effect against the water reliability SEA objective through improving consumers ability to access water resources. Three options (Drought option - demand side (KTZ): NEUBs, Drought option - demand side (KTZ): TUBs and Drought option - demand side (KTZ): Reduce transfer to other commercial customers) scored as having a minor positive effect against the climate change SEA objective, with the rest of the options scoring neutral.

Further minor positive effects were identified for the drought options against the biodiversity, water quality, carbon emissions, landscape, historic environment and resource use SEA objective.

The East Thanet desalination options (Desalination (KTZ): East Thanet (20Ml/d)and Desalination (KTZ): East Thanet (20Ml/d) Phase 2) were assessed as resulting in significant negative effects with uncertainties against the biodiversity SEA objective in relation to the location of the outfall and potential for effects on the Outer Thames Estuary SPA and Margate and Long Sands SAC. The HRA notes that adverse effects are likely avoidable based on proxy data and evidence from similar sites / schemes. However, there are inevitably some uncertainties due that can only be resolved with detailed design (e.g. sediment deposition and hydrodynamics may be affected if the pipeline is not buried), but these appear avoidable or mitigatable, such that adverse effects on integrity do not appear to be an unavoidable outcome of the option. Given the residual uncertainty, significant effects with uncertainty are identified for the operation phase.

For Drought option - demand side (KTZ): NEUBs significant negative effects were identified for the health and well-being SEA objective in the operation phase. The ban carries the risk of economic impacts on businesses that benefit directly or indirectly from certain water uses that would be prohibited under the ban (e.g. sports and leisure facilities). The ban may result in some business loss if the water-related operations have to be suspended. However, minor positive effects are also assessed for water savings which will help

secure the supply of water to the communities in the WRZ. Drought option - demand side (KTZ): TUBs was identified as having moderate negative effects against this SEA objective through potentially limiting water access during times of drought, compromising the sale of water consuming products and limiting the use of water.

No other significant negative effects were identified. Moderate effects were assessed for the East Thanet desalination options (Desalination (KTZ): East Thanet (20Ml/d) and Desalination (KTZ): East Thanet (20Ml/d) Phase 2) for the SEA objective related to water quality. The assessment reflects the findings of WFD assessment of potential non-compliance (with low confidence) for the Kent North waterbodies regarding hypersaline discharge. These options were also identified as having moderate effects on carbon emissions reflecting the carbon generated from operation of the desalination plane. The relative carbon scale identified that the option has moderate operational carbon emissions (relative to other WRSE Regional Plan options).

All other residual effects were identified as minor.

Interzonal transfer options

There are two interzonal transfer options within the Kent Thanet WRZ. Interzonal transfer (KTZ-KME): Utilise full existing transfer capacity (9Ml/d) would support transfer from Kent Medway East WRZ to Kent Thanet WRZ and summary of this option is presented in Table 5-38 (Section 5.6.1), whilst a summary of the assessment of its effects (post mitigation) is set out in Table 5-39 (Section 5.6.1); in order to avoid undue duplication, these tables are not repeated here.

Interzonal transfer (KME-KTZ): KME-KTZ bi-directional (15.8Ml/d) would involve conditioning of an existing main to enable bi-directional transfers (and specifically from Kent Thanet WRZ to Kent Medway WRZ) and is described in Table 5-44 below, whilst a summary of the assessment of its effects (post mitigation) is set out in Table 5-45 below.

Table 5-44 Summary of interzonal options for KTZ.

Option name	Yield (Ml/d) (if applicable)	Description	Earliest year of implementation
Interzonal transfer (KME-KTZ): KME-KTZ bi-directional (15.8Ml/d)	11.22	Conditioning of existing (KTZ-KME): Existing transfer main to enable bi-directional transfers (and specifically from Kent Thanet to Kent Medway). It is not thought that any additional pipeline would be required, although this is dependent on the existing main being structurally sound.	2026

Table 5-45 Visual evaluation matrix summary (post mitigation) for KTZ interzonal transfers.

WRZ	Option	Stages (post mitigation)	Biodiversity	Soils	Water			Air	Climatic Factors		Landscape	Historic Environment	Population & Human Health		Material Assets	
					Resilience	Quality	Reliability		Carbon emissions	Climate change			Health & well-being	Tourism & recreation	Resource use	Built assets
Kent Thanet (KTZ)	Interzonal transfer (KME-KTZ): KME-KTZ bi-directional (15.8Ml/d)	Construction (positive)	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Construction (negative)	-	-	-	--	0	-	-	0	-	-	-	-	-	-
		Operation (positive)	0	0	0	0	+	0	0	0	0	0	0	0	0	0
		Operation (negative)	0	0	0	0	0	0	-	0	-	0	0	0	0	0

Construction effects

As described in Section 5.6.1 for Interzonal transfer (KTZ-KME): Utilise full existing transfer capacity (9Ml/d) no significant positive effects (or positive effects of any kind) or significant negative effects were identified during the assessment of the construction phase.

Similarly, no significant positive effects (or positive effects of any kind) or significant negative effects were identified during the assessment of the construction phase of Interzonal transfer (KME-KTZ): KME-KTZ bi-directional (15.8Ml/d). However, a moderate negative effect was identified against the water quality SEA objective, due to the potential for contamination to water bodies, including main rivers, which the pipeline crosses, including within the Kent Thanet WRZ. Additionally, the option was assessed as having minor negative effects on the biodiversity, soils, geodiversity and land use, water resilience, air, carbon emissions, landscape, historic environment, health & wellbeing, tourism & recreation, resource use and built assets SEA objectives during the construction phase.

Operational effects

As described in Section 5.6.1 for Interzonal transfer (KTZ-KME): Utilise full existing transfer capacity (9Ml/d) no significant positive effects or significant negative effects were identified in the assessment of the operational phase. However, a moderate positive effect was identified against the water reliability SEA objective, as the option would transfer of water to areas of deficit (bi-directional) without requiring abstraction.

For Interzonal transfer (KME-KTZ): KME-KTZ bi-directional (15.8Ml/d), no significant positive or significant negative were in the assessment of the operational phase. However, a minor positive effect was identified against the water reliability SEA objective, whilst minor negative effects were identified against the carbon emissions and landscape SEA objectives.

5.6.4 Sussex Hastings (SHZ) WRZ

Options wholly within the WRZ

The options within the WRZ are described in Table 5-46, whilst a summary of the assessment of effects (post mitigation) is set out in Table 5-47.

Table 5-46 Summary of options for SHZ.

Option name	Yield (Ml/d) (if applicable)	Description	Earliest year of implementation
Drought option - demand side (SHZ): NEUBs	0.24	Non-essential use ban - SHZ WRZ	2026
Drought option - demand side (SHZ): TUBs	0.09	Temporary use bans - SHZ WRZ	2026
Groundwater (SHZ): Reconfigure Rye Wells (1.5Ml/d)	1.5	Brede groundwater source is a well & adit system that is over 100 years old, and has reached the end of its asset life. It abstracts from the Ashdown Beds. 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. Scheme output is 1.5Ml/d. There is an existing surface water WSW on site and no further treatment is required.	2036
Recycling (SHZ): Tonbridge to Bewl (5.7Ml/d)	5.7	New resource. This option is a new 8Ml/d water recycling plant producing a DO of 5.7Ml/d near Tunbridge WwTW and a transfer of the treated water to Bewl reservoir, which feeds into Darwell reservoir. Process losses have been included.	2036
Recycling (SHZ): Hastings to Darwell (15.3Ml/d)	15.3	This option is a new 21.5Ml/d water recycling plant producing a DO of 15.3Ml/d near Bexhill and Hastings WwTW and a transfer of the treated effluent to Darwell reservoir, which feeds into the Hastings Area. Process losses have been included.	2051
Bulk export (SHZ): SEW RZ8 to Rye	5.56	A new bi-directional Transfer between SEW Kingsnorth and Southern Water Brede WSW with a capacity of 10Ml/d.	2075
Bulk export (SHZ): Rye to SEW RZ8	10	A new bi-directional Transfer between SEW Kingsnorth and Southern Water Brede WSW with a capacity of 10Ml/d.	2050

Option name	Yield (Ml/d) (if applicable)	Description	Earliest year of implementation
Drought option - demand side (SHZ): Reduce transfer to other commercial customers	0.05	In the event of a drought, the Company would hold discussions with a commercial customer with regards to the resources position and their supply.	2027
Storage (SHZ): Raising Bewl Reservoir 0.4m (3Ml/d)	3	The scheme involves the raising of Bewl Water, by 0.4m to increase storage and yield. The major works for raising Bewl to higher TWL levels will include: Raising the dam crest and building a new wave wall; Raising the overflow and valve chamber shafts and many ancillary works around the perimeter of the reservoir.	2061

Table 5-47 Visual evaluation matrix summary (post mitigation) for SHZ.

WRZ	Option	Stages (post mitigation)	Biodiversity	Soils	Water			Air	Climatic Factors		Landscape	Historic Environment	Population & Human Health		Material Assets	
					Resilience	Quality	Reliability		Carbon emissions	Climate change			Health & well-being	Tourism & recreation	Resource use	Built assets
Sussex Hastings (SHZ)	Drought option - demand side (SHZ): NEUBs	Construction (positive)	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Construction (negative)	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Operation (positive)	+	0	0	+	+	0	+	+	+	+	+	0	+	0
		Operation (negative)	0	-	0	0	0	0	0	0	-	-	---	--	0	0
Sussex Hastings (SHZ)	Drought option - demand side (SHZ): TUBs	Construction (positive)	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Construction (negative)	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Operation (positive)	+	0	0	+	+	0	+	+	+	+	+	0	+	0
		Operation (negative)	0	0	0	0	0	0	0	0	-	-	--	-	0	0
Sussex Hastings (SHZ)	Groundwater (SHZ): Reconfigure Rye Wells (1.5Ml/d)	Construction (positive)	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Construction (negative)	-	0	0	-	0	-	-	0	-	0	-	0	-	0
		Operation (positive)	0	0	0	0	+	0	0	+	0	0	0	0	0	0

WRZ	Option	Stages (post mitigation)	Biodiversity	Soils	Water			Air	Climatic Factors		Landscape	Historic Environment	Population & Human Health		Material Assets	
					Resilience	Quality	Reliability		Carbon emissions	Climate change			Health & well-being	Tourism & recreation	Resource use	Built assets
		Operation (negative)	0	0	0	0	0	0	-	-	0	0	0	0	0	0
Sussex Hastings (SHZ)	Recycling (SHZ): Tonbridge to Bewl (5.7Ml/d)	Construction (positive)	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Construction (negative)	-	0	-	-	0	-	-	0	-	-	--	--	-	-
		Operation (positive)	0	0	0	0	+	0	0	0	0	0	0	0	0	0
		Operation (negative)	0	0	0	0	0	0	-	0	-	0	0	0	0	0
Sussex Hastings (SHZ)	Recycling (SHZ): Hastings to Darwell (15.3Ml/d)	Construction (positive)	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Construction (negative)	-	-	-	--	0	-	-	0	-	-	-	-	-	-
		Operation (positive)	0	0	0	+	+	0	0	0	0	0	0	0	0	0
		Operation (negative)	0	0	0	--	0	0	-	0	0	0	0	0	0	0
Sussex Hastings (SHZ)	Bulk export (SHZ): Rye to SEW Kingsnorth	Construction (positive)	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Construction (negative)	--	0	-	0	0	-	-	0	-	-	-	-	-	-

WRZ	Option	Stages (post mitigation)	Biodiversity	Soils	Water			Air	Climatic Factors		Landscape	Historic Environment	Population & Human Health		Material Assets	
					Resilience	Quality	Reliability		Carbon emissions	Climate change			Health & well-being	Tourism & recreation	Resource use	Built assets
		Operation (positive)	0	0	0	0	+	0	0	0	0	0	0	0	0	0
		Operation (negative)	0	0	0	0	0	0	-	0	0	0	0	0	0	0
Sussex Hastings (SHZ)	Bulk import (SHZ): SEW to Rye (10Ml/d)	Construction (positive)	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Construction (negative)	--	0	-	0	0	-	-	0	-	-	-	-	-	-
		Operation (positive)	0	0	0	0	+	0	0	0	0	0	0	0	0	0
		Operation (negative)	0	0	0	0	0	0	-	0	0	0	0	0	0	0
Sussex Hastings (SHZ)	Drought option - demand side (SHZ): Reduce transfer to other commercial customers	Construction (positive)	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Construction (negative)	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Operation (positive)	+	0	0	+	+	0	0	+	0	0	+	0	0	0
		Operation (negative)	0	0	0	0	-	0	0	0	0	0	-	-	0	0
		Construction (positive)	0	0	0	0	0	0	0	0	0	0	0	0	0	0

WRZ	Option	Stages (post mitigation)	Biodiversity	Soils	Water			Air	Climatic Factors		Landscape	Historic Environment	Population & Human Health		Material Assets	
					Resilience	Quality	Reliability		Carbon emissions	Climate change			Health & well-being	Tourism & recreation	Resource use	Built assets
Sussex Hastings (SHZ)	Storage (SHZ): Raising Bewl Reservoir 0.4m (3Ml/d)	Construction (negative)	-	-	-	--	0	-	-	0	-	-	-	-	-	-
		Operation (positive)	0	0	0	0	+	0	0	+	0	0	0	0	0	0
		Operation (negative)	0	0	0	--	0	0	-	0	-	0	0	0	0	0

Construction effects

None of the options were identified as having positive or likely significant positive effects in the construction phase.

Three options (Drought option - demand side (SHZ): NEUBs, Drought option - demand side (SHZ): TUBs, and Drought option - demand side (SHZ): Reduce transfer to other commercial customers) were assessed as neutral effects during the construction phase, as they would involve operational changes only.

No significant negative effects were identified in the construction phase.

Bulk export (SHZ): SEW RZ8 to Rye (and the reverse option) were assessed as having a moderate negative effect on the biodiversity SEA objective as it would be situated within close proximity to two SSSIs Leasam Heronry Wood and Brede Pit which, may be subject to disturbance effects from noise and dust on important species during construction. The options would also cross SSSI impact risk zone for Dungeness, Romney Marsh and Rye Bay SSSI where all planning applications have been highlighted as being a risk to the sensitive features for which the SSSI is notified. The HRA appropriate assessment notes that adverse effects on Dungeness SAC and Dungeness, Romney Marsh and Rye Bay SPA will not occur or are clearly avoidable with scheme level measures.

Option Recycling (SHZ): Hastings to Darwell (15.3Ml/d) has been assessed as having a moderate negative effect on the water quality SEA objective as the option would overlay nitrate vulnerable zones, the Hastings Beds Cuckmere and Pevensey Levels, and Kent Weald Eastern - Rother WFD groundwater bodies. The option also intersects several surface water bodies, including main rivers, therefore there is potential for leaks and spills during construction that could contaminate the water environment which could be mitigated. Storage (SHZ): Raising Bewl Reservoir 0.4m (3Ml/d) was also identified as having moderate effects for the Water Quality SEA objective linked to the findings of the WFD assessment which identified WFD non-compliance (with low confidence) for Bewl water and Eccles Lake respectively.

Recycling (SHZ): Tunbridge Wells with Bewl (3.6Ml/d) was assessed as having moderate negative effects on the health and wellbeing and tourism and recreation SEA objectives. This reflects the location in relation to a large number of facilities and services including play and sport facilities, which will likely be affected during construction.

No other moderate negative effects were identified during the assessment of the construction phase of the options. Groundwater (SHZ): Reconfigure Rye Wells (1.5Ml/d), Recycling (SHZ): Hastings to Darwell (15.3Ml/d), and Storage (SHZ): Raising Bewl Reservoir 0.4m (3Ml/d) were assessed as having a range of minor negative effects against the biodiversity, soils, geodiversity and land use, water resilience, air, carbon emissions, landscape, historic environment, health and wellbeing, tourism and recreation, resource use and built asset SEA objectives during the construction phase.

Operational effects

No significant positive effects were identified during assessment of the seven options for the operation phase. However, a range of minor positive effects were identified against the biodiversity, water quality, water reliability, carbon emissions, climate change, landscape, historic environment, health and wellbeing, and resource use SEA objectives.

For Drought option - demand side (SHZ): NEUBs, significant negative effects were identified for the health and wellbeing SEA objective during the operation phase. The ban carries the risk of economic impacts on businesses that benefit directly or indirectly from certain water uses that would be prohibited under the ban (e.g. sports and leisure facilities). The ban may result in some business loss if the water-related operations have to be suspended. However, minor positive effects are also assessed for water savings which will help secure the supply of water to the communities in the WRZ. The Drought option - demand side (SHZ): TUBs was identified as having a moderate negative effect against this SEA objective through potentially limiting

water access during times of drought, compromising the sale of water consuming products and limiting the use of water.

Recycling (SHZ): Hastings to Darwell (15.3Ml/d) and Storage (SHZ): Raising Bewl Reservoir 0.4m (3Ml/d) were identified as having moderate negative effects on water quality in the operation phase. This relates to the findings of the WFD assessment which confirms WFD non-compliance (with low confidence) for regarding discharge into Darwell Reservoir (Recycling (SHZ): Hastings to Darwell (15.3Ml/d)) and Bewl water (Storage (SHZ): Raising Bewl Reservoir 0.4m (3Ml/d)).

A range of minor negative effects were also identified against the biodiversity, soils, geodiversity, land use, water quality, water reliability, landscape, historic environment, health and wellbeing, and tourism and recreation SEA objectives.

5.7 Assessment of the Effects of the Preferred Demand Management Options

Demand management is a key component of Southern Water's long-term water resources management strategy and will deliver significant benefits in all three supply areas (in terms of water resources, resilience and minimising the need for (and effects from) new supply options). Southern Water established a target of reducing average per capita consumption (PCC) across the operational area to 100l/h/d as part of the Target 100 (T100) commitment in WRMP19 which was reflected in the demand management option assessment in the SEA of Southern Water's WRMP19.

Revised household demand forecasts taking into account recent changes such as COVID_19, regulator feedback and further customer engagement has led to a refinement of the demand management options considered in WRMP19. Southern Water has identified seven 'catalysts' that are planned workstreams that will bring about a change in behaviour and practices among household customers, non-household customers and developers. These are summarised below.

1. **Communication and marketing**: Southern Water will use a sustained and multi-pronged awareness campaign to highlight the financial, social and environmental benefits of using less water. Southern Water will use this campaign to:
    a. Build awareness around water scarcity in the South East and the need to use water wisely
    b. Establish a water efficient culture as the norm
    c. Celebrate and encourage behaviour change.
2. **Deploy smart meters:** Southern Water are currently trialling 1,500 smart meters. Smart meters can record and transmit consumption data in near real-time and the information can facilitate proactive engagement with customers and help identify and fix supply-pipe leaks and plumbing losses earlier than Visual Meter Reads (VMR) and Automated Meter Reads (AMR) meters. Following completion of the trial, Southern Water plan to fully replace current VMRs and AMRs with smart meters by 2030.
3. **Tariffs:** Southern Water will use data from smart meters to trial different tariff structures, and use information from these trials to build awareness and readiness before introducing differential tariffs over time to delivery water savings.
4. **Water-saving solutions:** Southern Water intend to use smart meter data to optimise the use of water-saving devices or advice.
5. **Home audits:** Southern Water plan to carry out 10,000 home audits per year from 2025-26 to help customers reduce demand, using smart meter data and behavioural science approaches.

6. **Education:** Southern Water are commissioning classroom resources from curriculum specialists on water-saving and living efficiently for primary and secondary schools to embed water-efficient behaviour in our future customers - both at home and at work.
7. **Policy and regulation:** We are working with government policymakers, regulators, other water companies and wider stakeholders across the UK to develop and implement policies that promote water efficiency across all sectors.

These are then reflected in the following demand management options (to be applied across all resource zones), split between household and non-household interventions which have been assessed to identify potential significant effects:

- Policy Regulation;
- Home Visits;
- Water Audits (Non-Households);
- Enabler Activities Awareness Campaigns;
- Enabler Activities (Non-Households) Awareness Campaigns;
- Tariffs;
- Non-Households Tariffs;
- Water Efficiency Partnership Fund;
- Smart Metering
- Smart Metering USPL
- Smart Metering Unmeasured Households
- NHH Smart Meters.

In addition, a range of leakage management options have been identified.

Table 5-48 presents a summary of the sixteen demand management and leakage options, which includes brief descriptions and a summary of the yield to be provided from the options implementation across the 14 WRZs.

When split across the 14 WRZs, there are total of 224 demand management and leakage options; however, to ensure a focus on identifying likely significant effects, consideration is given to the effects across all zones at the plan level. Table 5-49 present the summary results of the assessment with the full assessment for each option set out in Error! Reference source not found..

Table 5-48 Summary of options.

Option name	Yield (Ml/d)	Description
Policy Regulation	-	Implementation of changes to regulation and policy on building standards and appliances (All WRZs)
Home Visits	2.6	Water use audit and inspection - household
Water Audits (Non Households)	5.3	Water use audit and inspection - Non-household
Enabler Activities Awareness Campaigns	2.3	Targeted water conservation information (advice on appliance water usage)
Enabler Activities (Non Households) Awareness Campaigns	0.2	Targeted water conservation information (advice on appliance water usage)
Tariffs	7.5	Changes to existing measured tariffs - Volumetric charges
NHH Tariffs	2.1	Changes to existing measured tariffs - Volumetric charges
Water Efficiency Partnership Fund	0.2	Sponsoring Water efficiency enabling activities by others
Smart Metering	12.6	Enhanced metering - Household
Smart Metering USPL	2.8	Customer supply pipe leakage reduction
Smart Metering Unmeasured Households	0.0	Compulsory metering - Household
NHH Smart Metering	3.7	Enhanced metering - Non-household
Advanced Find & Fix	5.5	Leakage reduction - Active Leakage Control
Advanced Pressure Management	2.2	Leakage reduction - Pressure reduction programmes
Comms Pipe Replacement	1.8	Comms pipe leakage reduction
Digitalisation/Smart Networks	2.0	Leakage reduction - Active Leakage Control

Table 5-49 Visual evaluation matrix summary (post mitigation) for the demand management options.

WRZ	Option	Stages (post mitigation)	Biodiversity	Soils, Geodiversity, Land Use	Water			Air	Climatic Factors		Landscape	Historic Environment	Population & Human Health		Material Assets	
					Resilience	Quality	Reliability		Carbon emissions	Climate change			Health & well-being	Tourism & recreation	Resource use	Built assets
All	Policy Regulation Implementation of changes to regulation and policy on building standards and appliances (All resource zones)	Construction (positive)	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Construction (negative)	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Operation (positive)	0	0	0	0	+++/?	0	+++/?	+++/?	0	0	+++/?	0	0	0
		Operation (negative)	0	0	0	0	0	0	0	0	0	0	0	0	0	0
All	Home Visits Water use audit and inspection - household	Construction (positive)	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Construction (negative)	0	0	0	0	0	-	0	0	0	0	0	0	0	0
		Operation (positive)	0	0	0	0	+	0	+	+	0	0	+	0	0	0
		Operation (negative)	0	0	0	0	0	0	0	0	0	0	0	0	0	0
All	Water Audits (Non-Households) Water use audit and inspection - Non-household	Construction (positive)	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Construction (negative)	0	0	0	0	0	-	--	0	0	0	0	0	--	0
		Operation (positive)	0	0	0	0	++	0	++	++	0	0	++	0	0	0
		Operation (negative)	0	0	0	0	0	0	0	0	0	0	0	0	0	0
All	Enabler Activities Awareness Campaigns Targeted water conservation information (advice on appliance water usage)	Construction (positive)	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Construction (negative)	0	0	0	0	0	0	0	0	0	0	-/?	0	0	0
		Operation (positive)	0	0	0	0	+	0	+	+	0	0	+	0	0	0
		Operation (negative)	0	0	0	0	0	-	0	0	0	0	0	0	-/?	0
All	Enabler Activities (Non Households) Awareness Campaigns Targeted water conservation information (advice on appliance water usage)	Construction (positive)	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Construction (negative)	0	0	0	0	0	0	0	0	0	0	-/?	0	0	0
		Operation (positive)	0	0	0	0	+	0	+	+	0	0	+	0	0	0
		Operation (negative)	0	0	0	0	0	-	0	0	0	0	0	0	-/?	0
All	Tariffs Changes to existing measured tariffs - Volumetric charges	Construction (positive)	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Construction (negative)	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Operation (positive)	0	0	0	0	++	0	++	++	0	0	++	0	0	0
		Operation (negative)	0	0	0	0	0	0	0	0	0	0	0	0	0	0

WRZ	Option	Stages (post mitigation)	Biodiversity	Soils, Geodiversity, Land Use	Water			Air	Climatic Factors		Landscape	Historic Environment	Population & Human Health		Material Assets	
					Resilience	Quality	Reliability		Carbon emissions	Climate change			Health & well-being	Tourism & recreation	Resource use	Built assets
All	NHH Tariffs Changes to existing measured tariffs - Volumetric charges	Construction (positive)	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Construction (negative)	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Operation (positive)	0	0	0	0	+	0	+	+	0	0	+	0	0	0
		Operation (negative)	0	0	0	0	0	0	0	0	0	0	0	0	0	0
All	Water Efficiency Partnership Fund Sponsoring Water efficiency enabling activities by others	Construction (positive)	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Construction (negative)	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Operation (positive)	0	0	0	0	+	0	+	+	0	0	+	0	0	0
		Operation (negative)	0	0	0	0	0	0	0	0	0	0	0	0	0	0
All	Smart Metering Enhanced metering - Household	Construction (positive)	0	0	0	0	0	0	0	0	0	0	+++	0	0	0
		Construction (negative)	0	0	0	0	0	--	---	0	0	0	0	0	---	0
		Operation (positive)	0	0	0	0	+++	0	+++	+++	0	0	+++	0	0	0
		Operation (negative)	0	0	0	0	0	0	0	0	0	0	0	0	0	0
All	Smart Metering USPL Customer supply pipe leakage reduction	Construction (positive)	0	0	0	0	0	0	0	0	0	0	+	0	0	0
		Construction (negative)	0	0	0	0	0	-/?	-	0	0	0	0	0	0	0
		Operation (positive)	0	0	0	0	+	0	+	+	0	0	+	0	0	0
		Operation (negative)	0	0	0	0	0	0	0	0	0	0	0	0	0	0
All	Smart Metering Unmeasured Households Compulsory metering - Household	Construction (positive)	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Construction (negative)	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Operation (positive)	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Operation (negative)	0	0	0	0	0	0	0	0	0	0	0	0	0	0
All	NHH Smart Metering Enhanced metering - Non-household	Construction (positive)	0	0	0	0	0	0	0	0	0	0	++	0	0	0
		Construction (negative)	0	0	0	0	0	-/?	--	0	0	0	0	0	--	0
		Operation (positive)	0	0	0	0	+	0	+	+	0	0	+	0	0	0
		Operation (negative)	0	0	0	0	0	0	0	0	0	0	0	0	0	0
All	Advanced Find & Fix Leakage reduction - Active Leakage Control	Construction (positive)	0	0	0	0	0	0	0	0	0	0	++	0	0	0
		Construction (negative)	-/?	0	0	0	0	-/?	--	0	0	0	-/?	0	--	-/?
		Operation (positive)	0	0	0	0	++	0	++	++	0	0	++	0	0	0
		Operation (negative)	0	0	0	0	0	0	0	0	0	0	0	0	0	0
All		Construction (positive)	0	0	0	0	0	0	0	0	0	0	++	0	0	0
		Construction (negative)	0	0	0	0	0	-/?	--	0	0	0	0	0	0	0

WRZ	Option	Stages (post mitigation)	Biodiversity	Soils, Geodiversity, Land Use	Water			Air	Climatic Factors		Landscape	Historic Environment	Population & Human Health		Material Assets	
					Resilience	Quality	Reliability		Carbon emissions	Climate change			Health & well-being	Tourism & recreation	Resource use	Built assets
	Advanced Pressure Management Leakage reduction - Pressure reduction programmes	Operation (positive)	0	0	0	0	+	0	+	+	0	0	+	0	0	0
		Operation (negative)	0	0	0	0	0	0	0	0	0	0	0	0	0	0
All	Comms Pipe Replacement Comms pipe leakage reduction	Construction (positive)	0	0	0	0	0	0	0	0	0	0	++	0	+/?	0
		Construction (negative)	-/?	0	0	0	0	-/?	--	0	-/?	-/?	0	0	--	-/?
		Operation (positive)	0	0	0	0	+	0	+	+	0	0	+	0	0	0
		Operation (negative)	0	0	0	0	0	0	0	0	0	0	0	0	0	0
All	Digitalisation/Smart Networks Leakage reduction - Active Leakage Control	Construction (positive)	0	0	0	0	0	0	0	0	0	0	+++	0	0	0
		Construction (negative)	0	0	0	0	0	-/?	---	0	0	0	-/?	0	---	0
		Operation (positive)	0	0	0	0	+	0	+	+	0	0	+	0	0	0
		Operation (negative)	0	0	0	0	0	0	0	0	0	0	0	0	0	0
All	Mains Replacement (Net of NRR) Distribution Main Replacement	Construction (positive)	0	0	0	0	0	0	0	0	0	0	+++	0	+/?	0
		Construction (negative)	-/?	0	0	0	0	--/?	---	0	-/?	-/?	0	0	---	-/?
		Operation (positive)	0	0	0	0	+++	0	+++	+++	0	0	+++	0	0	0
		Operation (negative)	0	0	0	0	0	0	0	0	0	0	0	0	0	0

5.7.1 Construction effects

Three of the 16 revised preferred demand management options (Smart Metering, Digitalisation/Smart Networks, and Mains Replacement (Net of NNR)) were identified as having significant positive effects against the health and wellbeing SEA objective during the construction phase. This is because the options would each result in a significant capital spend that would result in a significant positive effect on the local economy associated with supply chain benefits and spend by workers and contractors in the local economy. Of the remaining 14 options, four have been assessed as having a moderate positive effect against this objective, and one as having a minor effect, with the remainder assessed as neutral.

No other positive effects have been assessed for any of the preferred demand management options, against other SEA objectives, during the construction phase.

Three of the 17 revised preferred demand management options (Smart Metering, Digitalisation/Smart Networks, and Mains Replacement (Net of NNR)) were identified as having significant negative effects against the carbon emissions SEA objective. Construction of these options would include embodied carbon associated with material production, transport and installation of smart meters, new devices, and replacement pipes. Due to the scale of these options, the effects have been assessed as significant. Of the remaining 14 options, five have been assessed as having a moderate negative effect against this objective, and one as having a minor effect, with the remainder assessed as neutral.

These three options have also been assessed as having significant negative effects against the resource use SEA objective. Construction of these options would require new equipment and replacement pipes, with only limited opportunities for the re-use or recycling of waste materials. Production and installation of smart meters and new devices may result in waste associated with manufacturing waste, packaging, materials required for installation and disposal of any faulty/damaged meters or old devices. Again, due to the scale of these options, significant negative effects have been assessed. Of the remaining 14 options, three have been assessed as having a moderate negative effect against this objective, and the remainder assessed as neutral.

No other significant positive effects have been assessed for any of the preferred demand management options during the construction phase, however a range of minor and moderate effects have been assessed against the biodiversity, air, landscape, historic environment, and built assets.

5.7.2 Operational effects

Two of the 17 preferred demand management options (Smart Metering and Mains Replacement (Net of NNR)) were identified as having significant positive effects against the water reliability SEA objective, and another option, Policy Regulation, was assessed as having a significant positive uncertain effect against this objective. The former two options will provide water savings, contributing towards improving security of supply of water in the Southern Water supply region, supporting economic growth. Due to the magnitude of their respective yields this is considered to result in a significant positive effect on the local economy and social wellbeing. The Policy Regulation option could result in a significant reduction for the demand for water through the introduction of new standards and water efficiency labelling across all 14 of Southern Water's WRZ's, although the exact amount is currently uncertain. Of the remaining 14 options, three have been assessed as having a moderate positive effect against this objective, and 10 as having a minor effect, with the remaining one assessed as neutral.

The two options, Smart Metering and Mains Replacement (Net of NNR) were identified as having significant positive effects against the carbon emissions, climate change and health and wellbeing SEA objectives. A third option, Policy Regulation was again assessed as having a significant positive uncertain effect against these three objectives. Each of these options have significant yields derived from demand management (>10Ml/d) and are therefore expected to reduce operational carbon emissions through reduced demand for energy to abstract, treat, and transfer the water. Due to the significance of the yield and associated

reduction, this is anticipated to have a significant positive effect on carbon emissions. The increased capacity provided by the reduction in demand would help to increase the resilience of supply, thereby increasing resilience and adaptability to the effects of climate change. Water savings will also contribute towards improving security of supply of water in the Southern Water region, supporting economic growth. Of the remaining 14 options, three have been assessed as having a moderate positive effect against these three objectives, and 10 as having a minor effect, with the remaining one assessed as neutral.

No significant positive effects have been assessed for any of the preferred demand management options during the operational phase, against the remaining SEA objectives.

No significant negative effects have been assessed for any of the preferred demand management options during the operational phase. Minor negative effects were identified for two options, (Enabler Activities Awareness Campaigns and Enabler Activities (Non Households) Awareness Campaigns) against the air SEA objective, and minor negative uncertain effects were identified for the same two options against the resource use objective. No other negative effects were identified for the operational phase of the preferred demand management options.

5.8 Summary of Significant Effects by SEA Topic and Water Resource Zone (WRZ)

Significant effects have been recorded (**Appendix K and L**) from options proposed for all of the WRZs, as listed:

- Sussex North (SNZ);
- Sussex Worthing (SWZ);
- Sussex Brighton (SBZ);
- Hampshire Kingsclere (HKZ);
- Hampshire Andover (HAZ);
- Isle of Wight (IOW);
- Hampshire Rural (HRZ);
- Hampshire Winchester (HWZ);
- Hampshire Southampton East (HSE);
- Hampshire Southampton West (HSW);
- Kent Medway East (KME);
- Kent Medway West (KMW);
- Kent Thanet (KTZ); and
- Sussex Hastings (SHZ).

Significant positive effects which have been identified that relate to the operation phase and the delivery of **reliable water supplies**, associated with Hampshire Southampton East and Kent Medway West WRZs as follows:

- Recycling (HSE): Recharge of Havant Thicket from recycled water from Budds Farm (60Ml/d);
- Interzonal transfer (HSE-HSW): Yew Hill WSW to River Test WSW bi-directional (60Ml/d);
- T2ST Option B - Central route via Newbury (West of Newbury and remaining west of the A34, to Winchester) 90 Ml/d;

- T2ST Option C - Central route via Newbury (West of Newbury and then crossing east over the A34, to Winchester) 90 Ml/d;
- Bulk import (HSE): Havant Thicket Reservoir to Otterbourne WSW (90Ml/d); and
- Drought option - supply side (HSW): River Test (80 Ml/d).

Significant positive effects which have been identified that relate to the operation phase and **health and wellbeing**, associated with the Hampshire Southampton East WRZ as follows:

- Drought option - supply side (HSE): Lower Itchen.

In respect of significant negative effects, 11 relate to **biodiversity**, all in the operation phase, with Desalination (KTZ): East Thanet (20Ml/d) also having a significant negative uncertain effect during the construction phase, and all with a degree of uncertainty, relating to the Hampshire Southampton East, Kent Medway East, Kent Medway West, and Kent Thanet WRZ's:

- Drought option - supply side (HSE): Candover (22Ml/d);
- Drought option - supply side (HSE): Lower Itchen;
- Desalination (KME): Isle of Sheppey (10Ml/d) phase 2;
- Desalination (KME): Isle of Sheppey 20Ml/d;
- Recycling (KME): Sittingbourne Industrial Water Reuse (7.5Mld);
- Desalination (KMW): Thames Estuary (10Ml/d);
- Desalination (KMW): Thames Estuary (10Ml/d) Phase 2;
- Desalination (KMW): Thames Estuary (20Ml/d);
- Desalination (KMW): Thames Estuary (20Ml/d) Phase 2;
- Desalination (KTZ): East Thanet (20Ml/d); and
- Desalination (KTZ): East Thanet (20Ml/d) Phase 2.

There are four significant negative effects identified in respect of **Water Quality** (operation) in Sussex North, Sussex Hastings, Kent Medway East and Kent Medway West WRZ's:

- Groundwater (SNZ): New borehole at Petworth (4Ml/d);
- Recycling (SHZ): Hastings to Darwell (15.3Ml/d);
- Groundwater (KME): Recommission Gravesend (2.7Ml/d); and
- Recycling (KMW): Medway WTW to lake (14Ml/d).

There are fourteen significant negative effects relating to non-essential use bans in respect of **health and well-being** in the operation phase in relation to the following options

- Drought option: - demand side (SNZ): NEUBs;
- Drought option - demand side (SWZ): NEUBs;
- Drought option - demand side (SBZ): NEUBs;
- Drought option - demand side (SHZ): NEUBs;
- Drought option - demand side (HSE): NEUBs;
- Drought option - demand side (KME): NEUBs;
- Drought option - demand side (KTZ): NEUBs;
- Drought option - demand side (IOW): NEUBs;

- Drought option - demand side (HAZ): NEUBs;
- Drought option - demand side (HKZ): NEUBs;
- Drought option - demand side (HRZ): NEUBs;
- Drought option - demand side (HWZ): NEUBs;
- Drought option - demand side (HSW): NEUBs; and
- Drought option - demand side (KMW): NEUBs.

Where residual significant negative effects have been identified, additional mitigation measures to those identified might have to be explored in order to try and reduce the scale and/or impacts of these effects, or alternative options explored.

Significant effects have also been identified across all 14 WRZ's, for the revised demand management and leakage options.

Significant positive effects which have been identified that relate to the construction phase and **health and wellbeing**, associated with the demand management and leakage options as follows:

- Smart Metering;
- Digitalisation/Smart Networks; and
- Mains Replacement (Net of NNR).

Significant negative effects which have been identified that relate to the construction phase and climatic factors (**carbon emissions**) associated with the demand management and leakage options as follows:

- Smart Metering;
- Digitalisation/Smart Networks; and
- Mains Replacement (Net of NNR).

Significant negative effects which have been identified that relate to the construction phase and **resource use**, associated with the demand management and leakage options as follows:

- Smart Metering;
- Digitalisation/Smart Networks; and
- Mains Replacement (Net of NNR).

Two significant positive effects, and one significant positive uncertain effects (Policy Regulation) have been identified that relate to the operation and the delivery of **reliable water supplies**, associated with the demand management and leakage options as follows:

- Smart Metering;
- Digitalisation/Smart Networks; and
- Mains Replacement (Net of NNR).

Two significant positive effects, and one significant positive uncertain effects (Policy Regulation) which have also been identified that relate to operation and the **carbon emissions, climate change and health and wellbeing** SEA objectives, associated with the demand management and leakage options as follows:

- Smart Metering;
- Mains Replacement (Net of NNR); and
- Policy Regulation.

A summary table illustrating the identified significant effects is presented in Error! Reference source not found..

6 Cumulative effects assessment

6.1 Introduction

The cumulative assessments presented in this section have been carried out in line with the methodology described in Section 4 of this Report.

6.2 Cumulative intra-plan effects

6.2.1 Interactions between options

Table 6-1 below identifies the options where the construction phases (within a 5-year period) overlap with one another option and where they fall within 10km of each other. It also identifies where options intersect in relation to key receptors. National Site Network sites are not included in the table below as these are addressed through the HRA in-combination assessment the findings for which are presented in Section 6.2.2. Similarly, waterbodies/ catchments are not included as these are addressed through the WFD assessment, which also carried out a cumulative effects assessment and the findings for which are presented in Section 6.2.3.

Table 6-1 Interactions between options

Option	Options where the construction phase overlaps and they are within 10km of each other	Is there potential for the options to interact with the same receptor?
Bulk import (SNZ): Havant Thicket Reservoir to Pulborough (50Ml/d) (2041)	Bulk import (SNZ): SEW RZ5 to Pulborough (10Ml/d) (2040)	• Both within 500m of the Roman mansio and settlement, 535m north-east of Penn House Scheduled Monument • Both cross the A285 and A286
	Storage (SNZ): River Adur Offline Reservoir (19.5Ml/d) (2046)	• Both within 500m of the South Downs National Park
	Interzonal transfer (SNZ-SWZ): Pulborough to Worthing (2040)	• Both within 500m of a Pulborough Priory Scheduled Monument • Both within 500m of the Roman mansio and settlement, 535m north-east of Penn House Scheduled Monument • Both within 500m of Pulborough Conservation Area • Both within 500m of the South Downs National Park
	Desalination (SWZ): Tidal River Arun (10Ml/d) (2046)	• Both within 500m of the South Downs National Park
Bulk import (SNZ): SEW RZ5 to Pulborough (10Ml/d) (2040)	Interzonal transfer (SNZ-SWZ): Pulborough to Worthing (2040)	• Both within 500m of the Roman mansio and settlement, 535m north-east of Penn House Scheduled Monument
	Bulk import (SNZ): Havant Thicket Reservoir to Pulborough (50Ml/d) (2041)	• Both within 500m of the Roman mansio and settlement, 535m north-east of Penn House Scheduled Monument • Both cross the A285 and A286

Option	Options where the construction phase overlaps and they are within 10km of each other	Is there potential for the options to interact with the same receptor?
Groundwater (SNZ): New borehole at Petworth (4Ml/d) (2031)	Groundwater (SNZ): Reinstate West Chiltington (3.1Ml/d) (2029)	N/a
	Recycling (SNZ): Littlehampton with direct river discharge (15Ml/d) (2031)	N/a
Groundwater (SNZ): Reinstate West Chiltington (3.1Ml/d|) (2029)	Recycling (SNZ): Littlehampton with direct river discharge (15Ml/d) (2031)	N/a
	Groundwater (SNZ): New borehole at Petworth (4Ml/d) (2031)	N/a
Recycling (SNZ): Littlehampton with direct river discharge (15Ml/d) (2031)	Groundwater (SNZ): Reinstate West Chiltington (3.1Ml/d|) (2029)	N/a
	Groundwater (SNZ): New borehole at Petworth (4Ml/d) (2031)	N/a
Storage (SNZ): River Adur Offline Reservoir (19.5Ml/d) (2046)	Bulk import (SNZ): Havant Thicket Reservoir to Pulborough (50Ml/d) (2041)	• Both within 500m of the South Downs National Park
	Interzonal transfer (SBZ-SWZ): Brighton to Worthing (2041)	• Both within 500m of the South Downs National Park
	Interzonal transfer (SWZ-SBZ): Pulborough winter transfer stage 2 (4Ml/d) (2051)	• Both within 500m of the South Downs National Park
	Desalination (SWZ): Tidal River Arun (10Ml/d) (2046)	• Both within 500m of the South Downs National Park
	Treatment capacity (SWZ): Pulborough winter transfer stage 1 (2Ml/d) (2041)	• Both within 500m of the South Downs National Park
	Storage (SNZ): River Adur Offline Reservoir (19.5Ml/d) (2046)	• Both within 500m of the South Downs National Park

Option	Options where the construction phase overlaps and they are within 10km of each other	Is there potential for the options to interact with the same receptor?
Interzonal transfer (SBZ-SWZ): Brighton to Worthing (2041)	Interzonal transfer (SNZ-SWZ): Pulborough to Worthing (2040)	• Both within 500m of the South Downs National Park • Both within 500m of Cissbury Ring SSSI
Interzonal transfer (SNZ-SWZ): Pulborough to Worthing (2040)	Bulk import (SNZ): Havant Thicket Reservoir to Pulborough (50Ml/d) (2041)	• Both within 500m of a Pulborough Priory Scheduled Monument • Both within 500m of the Roman mansio and settlement, 535m north-east of Penn House Scheduled Monument • Both within 500m of Pulborough Conservation Area • Both within 500m of the South Downs National Park
	Bulk import (SNZ): SEW RZ5 to Pulborough (10Ml/d) (2040)	• Both within 500m of the Roman mansio and settlement, 535m north-east of Penn House Scheduled Monument
	Interzonal transfer (SBZ-SWZ): Brighton to Worthing (2041)	• Both within 500m of the South Downs National Park • Both within 500m of Cissbury Ring SSSI
	Treatment capacity (SWZ): Pulborough winter transfer stage 1 (2Ml/d) (2041)	• Both within 1000m of Hillbarn Recreation Ground Historic Landfill Site • Both within 500m of the South Downs National Park
Interzonal transfer (SWZ-SBZ): Pulborough winter transfer stage 2 (4Ml/d) (2051)	Storage (SNZ): River Adur Offline Reservoir (19.5Ml/d) (2046)	• Both within 500m of the South Downs National Park
	Desalination (SWZ): Tidal River Arun (20Ml/d) Phase 2 (2051)	• Both within 500m of the South Downs National Park • Both cross the A27
Desalination (SWZ): Tidal River Arun (10Ml/d) (2046)	Bulk import (SNZ): Havant Thicket Reservoir to Pulborough (50Ml/d) (2041)	• Both within 500m of the South Downs National Park
	Storage (SNZ): River Adur Offline Reservoir (19.5Ml/d) (2046)	• Both within 500m of the South Downs National Park
Desalination (SWZ): Tidal River Arun (20Ml/d) Phase 2 (2051)	Interzonal transfer (SWZ-SBZ): Pulborough winter transfer stage 2 (4Ml/d) (2051)	• Both within 500m of the South Downs National Park • Both cross the A27

Option	Options where the construction phase overlaps and they are within 10km of each other	Is there potential for the options to interact with the same receptor?
Treatment capacity (SWZ): Pulborough winter transfer stage 1 (2Ml/d) (2041)	Interzonal transfer (SNZ-SWZ): Pulborough to Worthing (2040)	• Both within 1000m of Hillbarn Recreation Ground Historic Landfill Site • Both within 500m of the South Downs National Park
	Storage (SNZ): River Adur Offline Reservoir (19.5Ml/d) (2046)	• Both within 500m of the South Downs National Park
Groundwater (HKZ): Remove constraints at Newbury to increase yield (1.2Ml/d) (2028)	Interzonal transfer (HSE-HWZ): Otterbourne WSW to Yew Hill bi-directional (2031)	• Both within 500m of Bransbury Common SSSI • Both cross the A34 • Both within the North Wessex Downs AONB
T2ST Option C (2040)	Interzonal transfer (HWZ-HAZ): Winchester to Andover bi-directional (15Ml/d) (2040)	• Both within 500m of Bransbury Common SSSI • Both within 50m of Ancient Woodland (1487255) • Both within 1000m of Disused Pits and Disused Cutting North of Whitchurch Station Historic Landfill sites • Both within 500m of Bowl barrow, 630m NNE of Littleton House, Two bowl barrows 120m north-west of Texas, Long barrow and adjacent bowl barrow 500m south-west of Twinley Manor, and Three round barrows 500m WNW of Flowerdown House Scheduled Monuments • Both within 500m of Hurstbourne Priors and Littleton Conservation Areas • Both within 500m of Lainston House Registered Park or Garden • Both cross the A30, A303, A3090, A3093 and A34 • Both within the North Wessex Downs AONB
	Bulk export (HSE): Otterbourne WSW to PWC Source A (45Ml/d) (2040)	N/a
	Bulk import (HSE): Havant Thicket Reservoir to Otterbourne WSW (90Ml/d) (2035)	N/a
	Recycling (HSE): Recharge of Havant Thicket from recycled water from Budds Farm (60Ml/d) (2035)	N/a
T2ST Option B (2040)	Interzonal transfer (HWZ-HAZ): Winchester to Andover bi-directional (15Ml/d) (2040)	• Both within 500m of Bransbury Common SSSI • Both within 50m of Ancient Woodland (1487255)

Option	Options where the construction phase overlaps and they are within 10km of each other	Is there potential for the options to interact with the same receptor?
		• Both within 1000m of Disused Pits, Dismantled Railway Cutting and Old Chalk Pit Historic Landfill Sites • Both within 1000m of Cliffeville Limited Authorised Landfill Site • Both within 500m of Bowl barrow 630m NNE of Littleton House, Two bowl barrows 120m north-west of Texas, and Three round barrows 500m WNW of Flowerdown House Scheduled Monuments • Both within 500m of Hurstbourne Priors and Littleton Conservation Areas • Both within 500m of Lainston House and Hurstbourne Park Registered Park or Garden • Both cross the A30, A303, A3090, and A3093 • Both within the North Wessex Downs AONB
	Bulk export (HSE): Otterbourne WSW to PWC Source A (45Ml/d) (2040)	N/a
	Bulk import (HSE): Havant Thicket Reservoir to Otterbourne WSW (90Ml/d) (2035)	N/a
	Recycling (HSE): Recharge of Havant Thicket from recycled water from Budds Farm (60Ml/d) (2035)	N/a
Interzonal transfer (HSE-HWZ): Otterbourne WSW to Yew Hill bi-directional (2031)	Groundwater (HKZ): Remove constraints at Newbury to increase yield (1.2Ml/d) (2028)	• Both within 500m of Bransbury Common SSSI • Both cross the A34 • Both within the North Wessex Downs AONB
	Groundwater (HRZ): New boreholes at Romsey (4.8Ml/d) (2031)	N/a
	Interzonal transfer (HSE-HSW): Yew Hill WSW to River Test WSW bi-directional (60Ml/d) (2031)	• Both within 500m of Bransbury Common, the River Itchen, and the River Test SSSI • Both within 50m of ancient woodland (1490866) • Both within 1000m of Disused Pits, Former Dell West of Fairfield Road, Land adjacent to Otterbourne Incinerator, Land East of M3 motorway and West of Otterbourne and Land South of Poles Lane, Old Winton Road and Otterbourne Pumping Station Historic Landfill Sites

Option	Options where the construction phase overlaps and they are within 10km of each other	Is there potential for the options to interact with the same receptor?
		• Both within 500m of Bowl barrow 630m NNE of Littleton House and Three round barrows 500m WNW of Flowerdown House Scheduled Monuments • Both within 500m of Littleton Conservation Area • Both within 500m of Lainston House Registered Park or Garden • Both within 500m of the South Downs National Park • Both cross the A30, A303 and M3
Interzonal transfer (HWZ-HAZ): Winchester to Andover bi-directional (15Ml/d) (2040)	T2ST Option B (2040)	• Both within 500m of Bransbury Common SSSI • Both within 50m of Ancient Woodland (1487255) • Both within 1000m of Disused Pits, Dismantled Railway Cutting and Old Chalk Pit Historic Landfill Sites • Both within 1000m of Cliffeville Limited Authorised Landfill Site • Both within 500m of Bowl barrow 630m NNE of Littleton House, Two bowl barrows 120m north-west of Texas, and Three round barrows 500m WNW of Flowerdown House Scheduled Monuments • Both within 500m of Hurstbourne Priors and Littleton Conservation Areas • Both within 500m of Lainston House and Hurstbourne Park Registered Park or Garden • Both cross the A30, A303, A3090, and A3093 • Both within the North Wessex Downs AONB
	T2ST Option C (2040)	• Both within 500m of Bransbury Common SSSI • Both within 50m of Ancient Woodland (1487255) • Both within 1000m of Disused Pits and Disused Cutting North of Whitchurch Station Historic Landfill Sites • Both within 500m of Bowl barrow 630m NNE of Littleton House, Two bowl barrows 120m north-west of Texas, Long barrow and adjacent bowl barrow 500m south-west of Twinley Manor, and Three round barrows 500m WNW of Flowerdown House Scheduled Monuments • Both within 500m of Hurstbourne Priors and Littleton Conservation Areas • Both within 500m of Lainston House Registered Park or Garden • Both cross the A30, A303, A3090, A3093 and A34 • Both within the North Wessex Downs AONB

Option	Options where the construction phase overlaps and they are within 10km of each other	Is there potential for the options to interact with the same receptor?
	Bulk export (HSE): Otterbourne WSW to PWC Source A (45Ml/d) (2040)	• Both within 500m of the River Itchen SSSI • Both within 1000m of Former Dell West of Fairfield Road, Land East of M3 motorway, West of Otterbourne and Land South of Poles Lane, and Otterbourne Pumping Station Historic Landfill Sites • Both within 500m of the South Downs National Park
	Bulk import (HSE): Havant Thicket Reservoir to Otterbourne WSW (90Ml/d) (2035)	• Both within 500m of the River Itchen SSSI • Both within 1000m of Former Dell West of Fairfield Road, Land East of M3 motorway, West of Otterbourne and Land South of Poles Lane and Otterbourne Pumping Station Historic Landfill Sites • Both within 500m of the South Downs National Park
	Recycling (HSE): Recharge of Havant Thicket from recycled water from Budds Farm (60Ml/d) (2035)	• Both within 500m of the River Itchen SSSI • Both within 1000m of Former Dell West of Fairfield Road, Land East of M3 motorway, West of Otterbourne and Land South of Poles Lane and Otterbourne Pumping Station Historic Landfill Sites • Both within 500m of the South Downs National Park
Groundwater (HRZ): New boreholes at Romsey (4.8Ml/d) (2031)	Groundwater (HRZ): Remove constraints at Kings Sombourne (2.5Ml/d) (2031)	N/a
	Interzonal transfer (HSW-HRZ): Romsey Town and Broadlands valve (3.1Ml/d) (2026)	N/a
	Interzonal transfer (HSE-HSW): Yew Hill WSW to River Test WSW bi-directional (60Ml/d) (2031)	N/a
	Interzonal transfer (HSE-HWZ): Otterbourne WSW to Yew Hill bi-directional (2031)	N/a
Groundwater (HRZ): Remove constraints at Kings Sombourne (2.5Ml/d) (2031)	Groundwater (HRZ): New boreholes at Romsey (4.8Ml/d) (2031)	N/a
	Interzonal transfer (HSW-HRZ): Romsey Town and Broadlands valve (3.1Ml/d) (2026)	N/a

Option	Options where the construction phase overlaps and they are within 10km of each other	Is there potential for the options to interact with the same receptor?
	Interzonal transfer (HSE-HSW): Yew Hill WSW to River Test WSW bi-directional (60Ml/d) (2031)	• Both within 500m of the River Test SSSI
Interzonal transfer (HSW-HRZ): Romsey Town and Broadlands valve (3.1Ml/d) (2026)	Groundwater (HRZ): New boreholes at Romsey (4.8Ml/d) (2031)	N/a
	Groundwater (HRZ): Remove constraints at Kings Sombourne (2.5Ml/d) (2031)	N/a
	Drought option - supply side (HSW): Sea tankering from Norway (45Ml/d) (2031)	N/a
	Interzonal transfer (HSE-HSW): Yew Hill WSW to River Test WSW bi-directional (60Ml/d) (2031)	N/a
Interzonal transfer (HSE-HSW): Yew Hill WSW to River Test WSW bi-directional (60Ml/d) (2031)	Groundwater (HRZ): New boreholes at Romsey (4.8Ml/d) (2031)	N/a
	Groundwater (HRZ): Remove constraints at Kings Sombourne (2.5Ml/d) (2031)	• Both within 500m of the River Test SSSI
	Bulk import (HSE): Havant Thicket Reservoir to Otterbourne WSW (90Ml/d) (2035)	• Both within 500m of the River Itchen SSSI • Both within 1000m of Former Dell West of Fairfield Road, Land East of M3 motorway and West of Otterbourne,Land South of Poles Lane, and Otterbourne Pumping Station Historic Landfill Sites • Both within 500m of South Downs National Park • Both cross the A27
	Bulk import (HSE): PWC Source A to Otterbourne WSW (21Ml/d) (2032)	• Both within 500m of the River Itchen SSSI • Both within 1000m of Former Dell West of Fairfield Road, Land East of M3 motorway and West of Otterbourne, Land South of Poles Lane, and Otterbourne Pumping Station Historic Landfill Sites • Both within 500m of South Downs National Park

Option	Options where the construction phase overlaps and they are within 10km of each other	Is there potential for the options to interact with the same receptor?
	Recycling (HSE): Recharge of Havant Thicket from recycled water from Budds Farm (60Ml/d) (2035)	• Both within 500m of the River Itchen SSSI • Both within 1000m of Former Dell West of Fairfield Road, Land East of M3 motorway and West of Otterbourne, Land South of Poles Lane, and Otterbourne Pumping Station Historic Landfill Sites • Both within 500m of South Downs National Park
	Interzonal transfer (HSE-HWZ): Otterbourne WSW to Yew Hill WSW bi-directional (74Ml/d) (2031)	• Both within 500m of Bransbury Common, the River Itchen and the River Test SSSI's • Both within 50m of Ancient Woodland (1490866) • Both within 1000m of Disused Pits, Former Dell West of Fairfield Road, Land Adjacent to Otterbourne Incinerator, Land East of M3 motorway and West of Otterbourne, Land South of Poles Lane, Old Winton Road, and Otterbourne Pumping Station Historic Landfill Sites • Both within 500m of Bowl barrow 630m NNE of Littleton House and Three round barrows 500m WNW of Flowerdown House Scheduled Monuments • Both within 500m of Littleton Conservation Area • Both within 500m of Lainston House Registered Park or Garden • Both within 500m of South Downs National Park • Both cross the A30, A303 and M3
	Drought option - supply side (HSW): Sea tankering from Norway (45Ml/d) (2031)	• Both within 500m of the River Test SSSI
	Interzonal transfer (HSW-HRZ): Romsey Town and Broadlands valve (3.1Ml/d) (2026)	N/a
Bulk export (HSE): Otterbourne WSW to PWC Source A (45Ml/d) (2040)	Bulk import (HSE): Havant Thicket Reservoir to Otterbourne WSW (90Ml/d) (2035)	• Both within 500m of the River Itchen SSSI • Both within 1000m of Bugle Farm, adjacent to Brambridge Road, Former Dell West of Fairfield Road, Hill Lane - Spring Lane, Land between Brambridge Road and Kiln Lane, Land East of Brambridge Road, Land East of M3 motorway and West of Otterbourne, Land South of Poles Lane, North of Vears Lane, Otterbourne Pumping Station and Upper Moors Road Historic Landfill Sites • Both within 500m of Moated site at Otterbourne Manor Scheduled Monument • Both within 500m of South Downs National Park

Option	Options where the construction phase overlaps and they are within 10km of each other	Is there potential for the options to interact with the same receptor?
	Recycling (HSE): Recharge of Havant Thicket from recycled water from Budds Farm (60Ml/d) (2035)	• Both within 500m of the River Itchen SSSI • Both within 1000m of Bugle Farm, adjacent to Brambridge Road, Former Dell West of Fairfield Road, Hill Lane - Spring Lane, Land between Brambridge Road and Kiln Lane, Land East of Brambridge Road, Land East of M3 motorway and West of Otterbourne, Land South of Poles Lane, North of Vears Lane, Otterbourne Pumping Station and Upper Moors Road Historic Landfill Sites • Both within 500m of Moated site at Otterbourne Manor Scheduled Monument • Both within 500m of South Downs National Park
	T2ST Option B (2040)	N/a
	T2ST Option C (2040)	N/a
	Interzonal transfer (HWZ-HAZ): Winchester to Andover bi-directional (15Ml/d) (2040)	• Both within 500m of the River Itchen SSSI • Both within 1000m of Former Dell West Of Fairfield Road, Land East of M3 motorway, West Of Otterbourne and Land South Of Poles Lane, and Otterbourne Pumping Station Historic Landfill sites • Both within 500m of the South Downs National Park
Bulk import (HSE): Havant Thicket Reservoir to Otterbourne WSW (90Ml/d) (2035)	Bulk export (HSE): Otterbourne WSW to PWC Source A (45Ml/d) (2040)	• Both within 500m of the River Itchen SSSI • Both within 1000m of Bugle Farm, adjacent to Brambridge Road, Former Dell West of Fairfield Road, Hill Lane - Spring Lane, Land between Brambridge Road and Kiln Lane, Land East of Brambridge Road, Land East of M3 motorway and West of Otterbourne, Land South of Poles Lane, North of Vears Lane, Otterbourne Pumping Station and Upper Moors Road Historic Landfill Sites • Both within 500m of Moated site at Otterbourne Manor Scheduled Monument • Both within 500m of South Downs National Park
	Recycling (HSE): Recharge of Havant Thicket from recycled water from Budds Farm (60Ml/d) (2035)	• Both within 500m of the River Itchen SSSI • Both within 50m of Ancient Woodland (1490836 and 1490882) • Both within 1000m of Ash House Farm, Bugle Farm, adjacent to Brambridge Road, Crowd Hill, Former Dell West of Fairfield Road, Harts Farm Way, Hill Lane - Spring Lane, Kennel Farm, Land between Brambridge Road and Kiln Lane, Land East of Brambridge Road, Land East of M3 motorway and West of Otterbourne, Land South of Budds Farm Sewage Works, Land South of Poles

Option	Options where the construction phase overlaps and they are within 10km of each other	Is there potential for the options to interact with the same receptor?
		Lane, North of Vears Lane, Otterbourne Pumping Station, Roughay Farm, Scratchface Lane, Tip rear of Parish Church, Upper Moors Road, and Water Treatment Works Historic Landfill Sites • Both within 1000m of Portsmouth Water Limited Authorised Landfill Site • Both within 500m of Moated site at Marwell Manor, Moated site at Otterbourne Manor, Park pale at Marwell, 250m north-west of Marwell Manor, Park pale at Marwell, 400m West of Marwell Manor, and Park pale at Marwell, South of Fisher's Pond Scheduled Monuments • Both within 500m of Sir George Staunton Country Park Conservation Area • Both within 500m of Leigh Park (Staunton Country Park) Registered Park or Garden • Both within 500m of the South Downs National Park • Both cross the A3, A3(M) and A32
	Interzonal transfer (HSE-HWZ): Otterbourne WSW to Yew Hill WSW bi-directional (74Ml/d) (2031)	• Both within 500m of the River Itchen SSSI • Both within 1000m of Former Dell West of Fairfield Road, Land East of M3 motorway and West of Otterbourne, Land South of Poles Lane and Otterbourne Pumping Station Historic Landfill Sites • Both within 500m of the South Downs National Park
	Interzonal transfer (HSE-HSW): Yew Hill WSW to River Test WSW bi-directional (60Ml/d) (2031)	• Both within 500m of the River Itchen SSSI • Both within 1000m of Former Dell West of Fairfield Road, Land East of M3 motorway and West of Otterbourne, Land South of Poles Lane, and Otterbourne Pumping Station Historic Landfill Sites • Both within 500m of South Downs National Park • Both cross the A27
	T2ST Option B (2040)	N/a
	T2ST Option C (2040)	N/a
	Interzonal transfer (HWZ-HAZ): Winchester to Andover bi-directional (15Ml/d) (2040)	• Both within 500m of the River Itchen SSSI • Both within 1000m of Former Dell West of Fairfield Road, Land East of M3 motorway, West of Otterbourne and Land South of Poles Lane, and Otterbourne Pumping Station Historic Landfill Sites

Option	Options where the construction phase overlaps and they are within 10km of each other	Is there potential for the options to interact with the same receptor?
		• Both within 500m of the South Downs National Park
Bulk import (HSE): PWC Source A to Otterbourne WSW (21Ml/d) (2032)	Bulk import (HSE): Havant Thicket Reservoir to Otterbourne WSW (90Ml/d) (2035)	• Both within 500m of the River Itchen SSSI • Both within 1000m of Bugle Farm, adjacent to Brambridge Road, Former Dell West Of Fairfield Road, Hill Lane - Spring Lane, Land Between Brambridge Road and Kiln Lane, Land East Of Brambridge Road, Land East of M3 motorway and West Of Otterbourne, Land South Of Poles Lane, North of Vears Lane, Otterbourne Pumping Station and Upper Moors Road Historic Landfill sites • Both within 500m of Moated site at Otterbourne Manor Scheduled Monument • Both within 500m of South Downs National Park
	Recycling (HSE): Recharge of Havant Thicket from recycled water from Budds Farm (60Ml/d) (2035)	• Both within 500m of the River Itchen SSSI • Both within 1000m of Bugle Farm, adjacent to Brambridge Road, Former Dell West of Fairfield Road, Hill Lane - Spring Lane, Land between Brambridge Road and Kiln Lane, Land East of Brambridge Road, Land East of M3 motorway and West of Otterbourne, Land South of Poles Lane, North of Vears Lane, Otterbourne Pumping Station and Upper Moors Road Historic Landfill Sites • Both within 500m of Moated site at Otterbourne Manor Scheduled Monument • Both within 500m of South Downs National Park
	Interzonal transfer (HSE-HWZ): Otterbourne WSW to Yew Hill WSW bi-directional (74Ml/d) (2031)	• Both within 500m of the River Itchen SSSI • Both within 1000m of Former Dell West of Fairfield Road, Land East of M3 motorway and West of Otterbourne, Land South of Poles Lane and Otterbourne Pumping Station Historic Landfill Sites • Both within 500m of South Downs National Park
	Interzonal transfer (HSE-HSW): Yew Hill WSW to River Test WSW bi-directional (60Ml/d) (2031)	• Both within 500m of the River Itchen SSSI • Both within 1000m of Former Dell West of Fairfield Road, Land East of M3 motorway and West of Otterbourne, Land South of Poles Lane, and Otterbourne Pumping Station Historic Landfill Sites • Both within 500m of South Downs National Park
Recycling (HSE): Recharge of Havant	Bulk export (HSE): Otterbourne WSW to PWC Source A (45Ml/d) (2040)	• Both within 500m of the River Itchen SSSI

Option	Options where the construction phase overlaps and they are within 10km of each other	Is there potential for the options to interact with the same receptor?
Thicket from recycled water from Budds Farm (60Ml/d) (2035)		• Both within 1000m of Bugle Farm, adjacent to Brambridge Road, Former Dell West of Fairfield Road, Hill Lane - Spring Lane, Land between Brambridge Road and Kiln Lane, Land East of Brambridge Road, Land East of M3 motorway and West of Otterbourne, Land South of Poles Lane, North of Vears Lane, Otterbourne Pumping Station and Upper Moors Road Historic Landfill Sites • Both within 500m of Moated site at Otterbourne Manor Scheduled Monument • Both within 500m of South Downs National Park
	Bulk import (HSE): Havant Thicket Reservoir to Otterbourne WSW (90Ml/d) (2035)	• Both within 500m of the River Itchen SSSI • Both within 50m of Ancient Woodland (1490836 and 1490882) • Both within 1000m of Ash House Farm, Bugle Farm, adjacent to Brambridge Road, Crowd Hill, Former Dell West of Fairfield Road, Harts Farm Way, Hill Lane - Spring Lane, Kennel Farm, Land Between Brambridge Road and Kiln Lane, Land East of Brambridge Road, Land East of M3 motorway and West of Otterbourne, Land South of Budds Farm Sewage Works, Land South of Poles Lane, North of Vears Lane, Otterbourne Pumping Station, Roughay Farm, Scratchface Lane, Tip Rear of Parish Church, Upper Moors Road, and Water Treatment Works Historic Landfill Sites • Both within 1000m of Portsmouth Water Limited Authorised Landfill Site • Both within 500m of Moated site at Marwell Manor, Moated site at Otterbourne Manor, Park pale at Marwell, 250m north-west of Marwell Manor, Park pale at Marwell, 400m west of Marwell Manor, and Park pale at Marwell, south of Fisher's Pond Scheduled Monuments • Both within 500m of Sir George Staunton Country Park Conservation Area • Both within 500m of Leigh Park (Staunton Country Park) Registered Park or Garden • Both within 500m of the South Downs National Park • Both cross the A3, A3(M) and A32
	Bulk import (HSE): PWC Source A to Otterbourne WSW (21Ml/d) (2032)	• Both within 500m of the River Itchen SSSI • Both within 1000m of Bugle Farm, adjacent to Brambridge Road, Former Dell West of Fairfield Road, Hill Lane - Spring Lane, Land between Brambridge Road and Kiln Lane, Land East of Brambridge Road, Land East of M3 motorway and West Of Otterbourne, Land South of Poles Lane, North of Vears Lane, Otterbourne Pumping Station and Upper Moors Road Historic Landfill Sites

Option	Options where the construction phase overlaps and they are within 10km of each other	Is there potential for the options to interact with the same receptor?
		• Both within 500m of Moated site at Otterbourne Manor Scheduled Monument • Both within 500m of South Downs National Park
	Interzonal transfer (HSE-HWZ): Otterbourne WSW to Yew Hill WSW bi-directional (74Ml/d) (2031)	• Both within 500m of the River Itchen SSSI • Both within 1000m of Former Dell West of Fairfield Road, Land East of M3 motorway and West of Otterbourne, Land South of Poles Lane and Otterbourne Pumping Station Historic Landfill Sites • Both within 500m of South Downs National Park
	Interzonal transfer (HSE-HSW): Yew Hill WSW to River Test WSW bi-directional (60Ml/d) (2031)	• Both within 500m of the River Itchen SSSI • Both within 1000m of Former Dell West of Fairfield Road, Land East of M3 motorway and West of Otterbourne, Land South of Poles Lane, and Otterbourne Pumping Station Historic Landfill Sites • Both within 500m of South Downs National Park
	T2ST Option B (2040)	N/a
	T2ST Option C (2040)	N/a
	Interzonal transfer (HWZ-HAZ): Winchester to Andover bi-directional (15Ml/d) (2040)	• Both within 500m of the River Itchen SSSI • Both within 100m of Former Dell West of Fairfield Road Historic Landfill Site • Both within 1000m of Former Dell West of Fairfield Road, Land East of M3 motorway, West of Otterbourne and Land South of Poles Lane, and Otterbourne Pumping Station Historic Landfill Sites • Both within 500m of the South Downs National Park
Interzonal transfer (HSE-HWZ): Otterbourne WSW to Yew Hill WSW bi-directional (74Ml/d) (2031)	Bulk import (HSE): Havant Thicket Reservoir to Otterbourne WSW (90Ml/d) (2035)	• Both within 500m of the River Itchen SSSI • Both within 1000m of Former Dell West of Fairfield Road, Land East of M3 motorway and West of Otterbourne, Land South of Poles Lane and Otterbourne Pumping Station Historic Landfill Sites • Both within 500m of the South Downs National Park
	Bulk import (HSE): PWC Source A to Otterbourne WSW (21Ml/d) (2032)	• Both within 500m of the River Itchen SSSI

Option	Options where the construction phase overlaps and they are within 10km of each other	Is there potential for the options to interact with the same receptor?
		• Both within 1000m of Former Dell West of Fairfield Road, Land East of M3 motorway and West of Otterbourne, Land South of Poles Lane and Otterbourne Pumping Station Historic Landfill Sites • Both within 500m of South Downs National Park
	Recycling (HSE): Recharge of Havant Thicket from recycled water from Budds Farm (60Ml/d) (2035)	• Both within 500m of the River Itchen SSSI • Both within 1000m of Former Dell West of Fairfield Road, Land East of M3 motorway and West of Otterbourne, Land South of Poles Lane and Otterbourne Pumping Station Historic Landfill Sites • Both within 500m of South Downs National Park
	Interzonal transfer (HSE-HSW): Yew Hill WSW to River Test WSW bi-directional (60Ml/d) (2031)	• Both within 500m of Bransbury Common, the River Itchen and the River Test SSSI's • Both within 50m of Ancient Woodland (1490866) • Both within 1000m of Disused Pits, Former Dell West of Fairfield Road, Land Adjacent to Otterbourne Incinerator, Land East of M3 motorway and West of Otterbourne, Land South of Poles Lane, Old Winton Road, and Otterbourne Pumping Station Historic Landfill Sites • Both within 500m of Bowl barrow 630m NNE of Littleton House and Three round barrows 500m WNW of Flowerdown House Scheduled Monuments • Both within 500m of Littleton Conservation Area • Both within 500m of Lainston House Registered Park or Garden • Both within 500m of South Downs National Park • Both cross the A30, A303 and M3
Drought option - supply side (HSW): Sea tankering from Norway (45Ml/d) (2031)	Interzonal transfer (HSW-HRZ): Romsey Town and Broadlands valve (3.1Ml/d) (2026)	N/a
	Interzonal transfer (HSE-HSW): Yew Hill WSW to River Test WSW bi-directional (60Ml/d) (2031)	• Both within 500m of the River Test SSSI
Recycling (KME): Sittingbourne industrial water reuse (7.5Ml/d) (2031)	Interzonal transfer (KME-KTZ): KME-KTZ bi-directional (15.8Ml/d) (2026)	• Both cross the A2

Option	Options where the construction phase overlaps and they are within 10km of each other	Is there potential for the options to interact with the same receptor?
Interzonal transfer (KME-KTZ): KME-KTZ bi-directional (15.8Ml/d) (2026)	Recycling (KME): Sittingbourne industrial water reuse (7.5Ml/d) (2031)	• Both cross the A2
	Bulk import (KTZ): SEW Kingston to Near Canterbury (2Ml/d) (2026)	• Both cross the A2 • Both within the Kent Downs AONB
Bulk import (KTZ): SEW Kingston to Near Canterbury (2Ml/d) (2026)	Interzonal transfer (KME-KTZ): KME-KTZ bi-directional (15.8Ml/d) (2026)	• Both cross the A2 • Both within the Kent Downs AONB
Interzonal transfer (KTZ-KME): Utilise full existing transfer capacity (9Ml/d) (2040)	Desalination (KTZ): East Thanet (20Ml/d) (2041)	• Both within 1000m of Cheesemans Farm, Manston Road, Sunnybank and Vincent Road Historic Landfill Sites • Both cross the A28
Desalination (KTZ): East Thanet (20Ml/d) (2041)	Interzonal transfer (KTZ-KME): Utilise full existing transfer capacity (9Ml/d) (2040)	• Both within 1000m of Cheesemans Farm, Manston Road, Sunnybank and Vincent Road Historic Landfill Sites • Both cross the A28
Asset enhancement (KMW): Remove network constraint at Longfield (13Ml/d) (2026)	Recycling (KMW): Medway to lake (14Ml/d) (2031)	N/a
Recycling (KMW): Medway to lake (14Ml/d) (2031)	Asset enhancement (KMW): Remove network constraint at Longfield (13Ml/d) (2026)	N/a
Bulk export (SHZ): Rye to SEW RZ8 (2050)	Recycling (SHZ): Hastings to Darwell (15.3Ml/d) (2051)	• Both within the High Weald AONB
Recycling (SHZ): Hastings to Darwell (15.3Ml/d) (2051)	Bulk export (SHZ): Rye to SEW RZ8 (2050)	• Both within the High Weald AONB

6.2.2 HRA in-combination effects assessment findings

The HRA concluded that, for virtually all options, there will be no adverse effects alone or in combination that cannot be reliably avoided through scheme design or mitigated with measures that are known to be available, achievable and likely to be effective at the project-level. These options are not of a scale or type that would ensure suggest that adverse effects were are unavoidable irrespective of how the option is delivered.

In summary, no adverse effects on European site integrity are anticipated as a result of the rdWRMP24 options operating in combination; however, there are some minor residual uncertainties in relation to the sites and options identified in Table 6-2 below (partly due to uncertainties in the alone assessments) that can only be resolved with more detailed project-level investigations (although mitigation or avoidance measures will almost certainly be available given the long lead time before any potential in combination effects are realised):

Table 6-2 National Site Network Sites and Options identified through the HRA in-combination assessment.

National Site Network Sites	Options	Notes
Margate and Long Sands SAC	• Desalination (KTZ): East Thanet	This site is only likely to be exposed to in-combination effects from the operation of the East Thanet desalination options (construction effects will only occur once, in relation to the outfall), which will necessarily operate additively (i.e. the initial 20Ml/d plant will be supplemented a second plant). Based on proxy information from other sites presented in the alone assessment it is considered that these options will not result in adverse effects on this site (also given the low sensitivity of the interest features) although there is some residual uncertainty regarding this conclusion.
Medway Estuary and Marshes SPA / Ramsar	• Desalination (KME): Isle of Sheppey • Recycling (KMW): Medway WTW to lake (14Ml/d) • Recycling (KME): Sittingbourne industrial water reuse (7.5Ml/d)	This site is potentially exposed to operational effects from the Isle of Sheppey desalination schemes, plus Medway Recycling and Sittingbourne Industrial Reuse. Only the zones of environmental change associated with the desalination options will overlap, and so additive effects at one or more locations between the desalination options and the other options will not occur. Adverse effects alone are not expected as a result of the Medway recycling scheme, and so in combination effects associated with this option are not anticipated; this applies to the Sittingbourne scheme also, where any residual effects on the site are expected to be not adverse and local to the Milton Creek only (hence not this SPA/Ramsar). However the operation of the desalination plant will necessarily operate additively (i.e. the initial 10Ml/d plant will be supplemented a second plant), although construction effects associated with the outfall will only occur once. Based on proxy information from other sites presented in the alone assessment it is considered that these options will not collectively result in adverse effects on this site, and that potential effects can be avoided through the design stage; however, there is some residual uncertainty regarding this conclusion given the absence of detailed design information.
Outer Thames Estuary SPA	• Desalination (KTZ): East Thanet • Desalination (KME): Isle of Sheppey	This site will be affected by the Thanet desalination options (which will inevitably affect the same location within the site through operation, although 'in combination' construction effects will not occur) and potentially by the Isle of Sheppey desalination options (again, cumulatively) depending on the location of the outfall for that option. However, the zones of environmental change associated with e.g. saline plumes are very unlikely to overlap (so spatially coincident additive effects between the two desalination scheme locations would not be expected. The features of the site are likely to have

National Site Network Sites	Options	Notes
		a fairly low sensitivity to the magnitude of environmental change anticipated based on proxy data and evidence from schemes elsewhere, and the proportion of the European site potentially subject to environmental changes as a result of the options will be very small (i.e. the vast majority of the site will be entirely unaffected), and so spatially non-coincident in combination effects (e.g. birds being displace from two key foraging areas) would not be expected.
Thames Estuary and Marshes SPA / Ramsar	• Desalination (KME): Isle of Sheppey • Desalination (KMW): Thames Estuary	This site is potentially exposed to operational effects from the Isle of Sheppey desalination schemes (will ultimately operate additively at one location) and the Thames Desalination options (will also operate additively at one location). The environmental changes associated with the two desalination sites are unlikely to coincide geographically. However, the operation of the desalination plants will necessarily operate additively (i.e. the initial 20Ml/d plants will be supplemented additional treatment plants), although construction effects associated with the outfalls will only occur once. Based on proxy information from other sites presented in the alone assessment it is considered that these desalination options will not individually result in adverse effects on this site, and that potential effects can be avoided through the design stage; however, there is some residual uncertainty regarding this conclusion given the absence of detailed design information. Note that this does not take account of potential in combination effects with Beckton.

Currently, alternatives to the desalination options are not available within the modelled BVP; however, there is sufficient time for these uncertainties to be investigated and the option(s) amended or abandoned given the 2040+ delivery periods. On this basis, it would be possible to adopt the plan with the support of a detailed investigation timetable for the resolution of these uncertainties.

6.2.3 WFD cumulative effects assessment findings

In order to understand the WFD compliance of the rdWRMP as a whole, a cumulative assessment was undertaken of the options within the preferred plan as part of the WFD assessment. The WFD assessment found that six individual water bodies have the potential to be affected as a result of cumulative effects from multiple options in the Preferred Plan:

- There is the potential for cumulative effects on four river water bodies as a result of multiple individual options that could reduce the baseflow to the river water body. Of these four:
  - Cumulative effects on one of the waterbodies may reduce the risk of WFD non-compliance compared to the options alone, as they balance each other out from a water balance perspective;
  - Cumulative effects on the other three river water bodies have the potential to be WFD non-compliant, potentially increasing the risk of non-compliance compared to the options individually.
  - One river waterbody was identified because of the number of construction activities that may impact the waterbody, but is concluded to be WFD compliant.
  - One lake (reservoir) waterbody is assessed for combined effects of a new treated effluent discharge in addition to increased reservoir storage. While further design detail and assessment is required, this has the potential to increase the risk of WFD non-compliance compared to the options individually.

The main river catchments containing multiple options were also identified (where the water bodies may be in the same or different water bodies in the wider catchment, but could potentially converge at a downstream point). Only those options involving operational activities that may impact the WFD status of the waterbody have been considered. There are 11 main river catchments that could potentially be impacted by multiple options. Based on available information, the assessments conclude that there may be cumulative effects resulting in WFD non-compliance, to a greater extent than for the options individually, for four of those catchments. These are the Adur, Arun, Ouse and Medway catchments. However, the nature and scale of those potential cumulative impacts will require further assessment.

While no change to the categorisation of level of confidence of WFD compliance/ non-compliance was identified as a result of the cumulative assessment, compared to the individual option assessments, further investigation is required for most options (both individually and cumulatively) in order to better understand their impacts on WFD status. It is likely that there is the potential for some impacts to be 'more' non-compliant with WFD, when considered cumulatively at the plan level, compared to the options individually.

6.3 Cumulative Effects of the Revised Preferred Programme

The assessment of individual options (Appendix K), interactions between options and the receptors identified in Table 6-1 as well as the findings of the HRA and WFD assessment have informed the assessment of cumulative intra-plan effects for the rdWRMP24. Table 6-3 sets out the likely cumulative effects (post mitigation) associated with the preferred programme of options as a whole by SEA Topic and Objective.

Table 6-3 Cumulative effects assessment of the revised preferred programme of options.

SEA Topic	SEA objective	Cumulative Score Construction (Post mitigation)	Cumulative Score Operation (Post mitigation)	Commentary
Biodiversity, flora and fauna	Protect and enhance biodiversity, priority species, vulnerable habitats and habitat connectivity (no loss and improve connectivity where possible)	---/?	+/---	The construction phase will lead to some effects due to loss of/disturbance of habitats and species. It is likely that the residual significance of these effects can be reduced through appropriate phasing of options and through mitigation measures at the project level when more detailed information is available. However, the HRA appropriate assessment could not rule out adverse effects with certainty for the construction phase of the East Thanet desalination plant option arising from the proposed outfall being located within the Outer Thames Estuary SPA and potentially within the Margate and Long Sands SAC. The proposed plant and pipeline would be located within the Thanet Coast SSSI, run through the SSSI impact zones associated with the Sandwich Bay to Hacklinge Marshes SSSI, and has the potential to impact upon the Thanet Coast MCZ. There are some uncertainties that can only be resolved with detailed design. Cumulatively, significant negative effects with uncertainty are identified for the construction phase. In the operation phase, the HRA appropriate assessment could not rule out with certainty adverse effects for a number of options within the preferred programme at the plan level. This is in relation to the hypersaline discharge related to the operation of the desalination schemes: • Isle of Sheppey regarding impacts on the Medway Estuary and Marshes SPA and Ramsar and Thames Estuary and Marshes SPA and Ramsar; • River Thames desalination regarding impacts on the Thames Estuary and Marshes SPA and Ramsar; • East Thanet desalination scheme with regards to Outer Thames Estuary SPA and Margate and Long Sands SAC. Additionally, significant effects with uncertainty were identified with regard to Recycling (KME): Sittingbourne Industrial Water Reuse (7.5Mld) - Sittingbourne Industrial Water Reuse. The HRA noted minor residual uncertainties remain for the Swale SPA and Ramsar in relation to this option. There is a level of uncertainty with regards to the findings of the HRA at this stage with regards to some of the options. Additionally, it is noted that some drought options require mitigation and monitoring measures to be in place to ensure no adverse effects. Therefore, overall, the cumulative effect of the preferred programme of options is assessed as a significant negative in the operational phase.

SEA Topic	SEA objective	Cumulative Score Construction (Post mitigation)	Cumulative Score Operation (Post mitigation)	Commentary
				Currently, alternatives to the desalination options are not available within the modelled BVP; however, there is sufficient time for these uncertainties to be investigated and the option(s) amended or abandoned given the 2040+ delivery periods. On this basis, it would be possible to adopt the plan with the support of a detailed investigation timetable for the resolution of these uncertainties. There would be a temporary and permanent loss of habitat during the construction of the preferred programme of supply side options. However, the rdWRMP24 makes a commitment to achieving biodiversity net gain (BNG) and provision of ecosystem services associated with habitat creation and enhancement such as new woodland sequestrating carbon. The revised draft plan is committed to achieving 10% for certain options with this potentially being higher dependent on the adoption of higher requirements by individual Local Planning Authorities (LPAs). A minor positive score is therefore also assessed in the operational phase reflecting the scale of loss during the construction phase (that would then see a net gain in the operational phase). There is potential for additional benefit to be gained through consideration of opportunities for BNG across Southern Water's wider landholdings and in consequence, some uncertainties remain at this stage. The operational stage also presents an opportunity to improve existing habitats through post-construction remediation and replacement of low value habitats with higher value habitats. Therefore, cumulative minor positive effects are also assessed. This has the potential to be a moderate positive depending on how it is implemented.
Soil	Protect and enhance the functionality, quantity and quality of soils	--	-	Construction and operation of water resources infrastructure could affect soils due to land take associated with new development. This may result in clearance of vegetation and loss of soil levels leading to the loss of soil function and processes. Mitigation measures are likely to reduce this loss through ground reinstatement. However, some permanent loss of soils, including the best and most versatile agricultural land is likely. The assessment of in zone cumulative effects identifies that the close proximity of some options could result in cumulative effects during the construction phase. Some of the preferred programme options would take place on existing operational land which would not detract from achievement of the objective. However, overall a likely moderate negative score is assessed for the preferred programme of options in relation to the construction phase. The residual effects in the operation phase are expected to be minor, reflecting that the majority of schemes (pipelines) will allow for full reinstatement.

SEA Topic	SEA objective	Cumulative Score Construction (Post mitigation)	Cumulative Score Operation (Post mitigation)	Commentary
Water	Increase resilience and reduce flood risk	-	-	A number of preferred supply side options are located partially within Flood Zones 2 or 3, predominately related to the location of proposed pipelines. Measures to reduce flood risk will therefore need to be implemented in the construction phase. However, in the operational phase, once pipelines are in place, there is no residual risk, and the relevant options are would not have the potential to exacerbate flood risk in the operational phase. However, the Thames Estuary desalination option includes permanent above ground infrastructure located within Flood Zone 2 and 3. Mitigation measures would be required to minimise the risks of flooding to the new assets. For both construction and operation, cumulative minor negative effects are assessed.
	Protect and enhance the quality of the water environment and water resources	-	---	A number of options would involve construction work across waterbodies or are close to waterbodies. This will require mitigation measures to minimise or avoid impacts on water environment. Cumulative minor negative effects are assessed for the construction phase. The WFD assessment found that the supply options could have effects on water quality affecting the ability of some waterbodies to meet WFD objectives. These issues could result in changes to physico-chemical quality elements (e.g. BOD, DO, pH, temperature). Many of the options with potential non-compliance were assessed with low confidence. However, for four options, the WFD assessment concluded the potential for non-compliance with the WFD (with medium compliance). Some of these options involve effluent re-use schemes where the effluent would be discharged to a lake. The others involve a groundwater abstraction. There is limited detail available for these options, which are subject to further investigation, it is possible that different conclusions could be drawn with more evidence. If confirmed for the final WRMP24, the findings of the WFD assessment would therefore require Southern Water to consider alternative options, and if also non-compliant, the case for the potential for the application of Regulation 19 to individual options, in line with guidance issued by the Environment Agency (2023[57]). Given the findings of the WFD, overall

[57] Environment Agency (2023) *WFD Regulation 19 exemptions for water company water resources permissions* (LIT 65716) Published 27/03/2023

SEA Topic	SEA objective	Cumulative Score Construction (Post mitigation)	Cumulative Score Operation (Post mitigation)	Commentary
				significant negative cumulative effects are assessed for the programme as a whole in the operation phase.
	Deliver reliable and resilient water supplies	0	+++	The preferred programme of options would deliver increased capacity across the Southern Water area which will help to ensure a reliable and resilient water supply. Included within the programme are a number of interzonal bi-directional transfers which will help to support supply within areas of deficit. Overall, in the operation phase the preferred programme of options would be expected to deliver significant positive effects against this SEA objective. Cumulatively neutral effects are assessed in the construction phase.
Air	Reduce and minimise air emissions	--	-	Construction of the preferred programme of options will generate emissions to air which could affect local air quality. The principal source of emissions would be pollutants associated with vehicle movements. Vehicle emissions could affect sensitive receptors along transport corridors and effects are likely to be more pronounced where development is located in close proximity to AQMAs. Few of the preferred options are within AQMAs, and where this occurs this only relates to pipeline elements (with the exception of the Thames Estuary desalination plant location within the Northfleet Industrial Area AQMA) although more options are close to AQMAs, through which, some construction traffic may flow. However, the effects would be temporary and best practice mitigation measures would be expected to minimise (or in some cases avoid) the potential for negative effects for options alone. Where this includes options later in the plan (post 2035), it is possible that low emission/zero emission vehicles would be used (reflecting government policy on the ban of the sale of new petrol and diesel cars and vans from 2035 and diesel HGVs by 2040). The assessment of in zone cumulative effects identifies potential cumulative effects for the Sussex North Zone WRZ in the construction phase due to the proximity of some options if construction takes place simultaneously. However, for the plan as a whole cumulative effects are not significant. There remains some uncertainty as the location of demand management and leakage reduction interventions are currently not known but any interventions requiring construction could be timed to avoid simultaneous construction. Overall, it is concluded that there will likely be moderate negative air quality effects during the construction phase. In the operational phase these effects linked to vehicle movements are

SEA Topic	SEA objective	Cumulative Score Construction (Post mitigation)	Cumulative Score Operation (Post mitigation)	Commentary
				expected to be lower than during construction with residual minor effects likely remain for the plan as a whole.
Climatic Factors	Reduce embodied and operational carbon emissions	---	+/---	The construction of the preferred programme of supply side options will require materials with embodied carbon. Construction will also generate a substantial volume of vehicle movements which, together with the operation of plant and machinery, will additionally contribute to carbon emissions. The preferred demand management and leakage options would also (when taken together) require materials with significant cumulative embodied carbon. The embodied carbon in the construction phase is likely to be cumulatively significant. In the operational phase the preferred supply options would incur ongoing carbon emissions associated with the energy used e.g. pumping stations, WTW works, desalination plants. Cumulatively, this is likely to be significant. However, the demand management options will see a reduction in carbon linked to reduced demand for water, whilst drought options would reduce use which would likely see reduced energy consumption. Some residual cumulative minor positive effects are therefore also assessed in the operation phase. Overall, a mix of significant negative and minor positive effects are assessed in the operational phase.
	Reduce vulnerability to climate change risks and hazards	0	++/--	The resilience is unlikely to be affected in the construction phase and therefore neutral effects are assessed. Cumulatively the preferred programme of supply options would increase the capacity of water supply within the Southern Water area. In addition, the demand management and leakage reduction measures would make a significant contribution towards securing a continual supply of clean drinking water and increase resilience of this supply, thereby increasing resilience and adaptability to the effects of climate change. However, there may be some cumulative negative effects in relation to the application of the drought measures (linked to increased abstraction). A mix of moderate positive and minor negative effects are therefore assessed for the operational phase.

SEA Topic	SEA objective	Cumulative Score Construction (Post mitigation)	Cumulative Score Operation (Post mitigation)	Commentary
Landscape	Conserve, protect and enhance landscape, townscape and seascape character and visual amenity	---	-	The preferred programme of supply options includes a number of options that either partially pass through or are wholly within the following designated landscapes in the Southern Water area: South Downs National Park, High Weald National Landscape, Kent Downs National Landscape, North Wessex Downs National Landscape. The majority of these schemes are related to pipeline construction. Mitigation measures are considered likely to reduce the construction effects for individual options. Whilst individually, the effects of options have not been identified as significant, overall, given the number of schemes and their setting, there is likely to be a cumulative significant negative effect on landscape in the construction phase. The significance of these effects could be reduced by appropriate phasing and the effects will be temporary. The residual effects in the operation are considered to be much less than during the construction. The majority of schemes relate to piping infrastructure with little above ground infrastructure either within or in proximity to designated landscapes. Cumulative minor negative effects are therefore assessed for the operational phase.
Historic Environment	Conserve, protect and enhance the historic environment, including archaeology	--	-	The preferred programme includes several options that are located within designated assets or in close proximity. No significant effects were anticipated for the preferred programme of options individually following the application of mitigation measures, such as trenchless techniques and pipeline routing alignment. The development of water resources infrastructure may also result in indirect (e.g. impacts on setting) adverse effects on the significance of heritage assets including scheduled monuments and listed buildings where they are in close proximity to works. However, any effects would be temporary (i.e. for the duration of construction) and taking into account the scale of construction activity at each site, and given mitigation measures that can be employed, effects are not predicted to be significant individually or cumulatively. Overall, some residual minor operation effects may be experienced where above ground infrastructure is in the setting of assets. Additionally, the implementation of drought options may have temporary impacts on the grounds of Registered Parks or Gardens or Listed Buildings (thereby affecting setting) through the restrictions placed on water use. These effects are temporary and uncertain to some extent.

SEA Topic	SEA objective	Cumulative Score Construction (Post mitigation)	Cumulative Score Operation (Post mitigation)	Commentary
Population and Human Health	Maintain and enhance the health and wellbeing of the local community, including economic and social wellbeing	--	+++/-	The construction of water resources infrastructure can adversely affect health and wellbeing through the generation of traffic, noise, vibration, emission to air. Communities in areas where development is required will inevitably experience some disturbance, although best practice construction measures can often reduce such impacts. A number of options are also close to or cross public or sporting facilities. Therefore, it is recognised that that preferred programme of options will cumulatively have temporary effects in relation to access to public parks, playing fields, sport and other recreational facilities, and may lead to temporary diversions to Public Rights of Way (PRoW) (although mitigation measures and careful routing can help to minimise or avoid). These effects are temporary but can be of scale that is significant to specific locational receptors. However, overall, the impact is not considered to be cumulatively significant, which reflects that the impacts are temporary and mitigation measures can reduce or avoid impacts. In the operational phase the positive effects on health primarily relate to the provision of clean drinking water alongside demand management and leakage reduction of across the Southern Water area, which taken together are considered significant. However, some drought measures (such as the non-essential use ban and reduction to provision to commercial customers, which may impact some businesses) will likely have negative impacts in the operational phase. Therefore, cumulatively, a mix of significant positive and minor negative effects are assessed.
	Maintain and enhance tourism and recreation	--	-	As noted above, the location of some options will mean that there are inevitable impacts on recreational facilities either indirectly (in terms of noise or disturbance) or directly, thereby requiring mitigation such as diversions of PRoW. There may also be impacts on visitor experience linked to the construction works although this is unlikely to be cumulatively significant, with effects experienced at a more localised level. Therefore, in the construction phase negative effects are expected on tourism and recreation. Cumulatively, given the temporary nature and mitigation measures employed, this is likely to be moderate. In the operation phase some impacts linked to drought options including, for example, the restriction on filling of swimming pools or reduction in water supply to tourism and recreation businesses may lead to effects in the operation phase, although largely for the plan overall this is expected to be very minor. Cumulatively, minor negative effects are assessed for the plan as a whole.

SEA Topic	SEA objective	Cumulative Score Construction (Post mitigation)	Cumulative Score Operation (Post mitigation)	Commentary
Material Assets	Minimise resource use and waste production	---	--	Given the cumulative concrete, steel and plastics that will likely be required to construct the preferred programme of supply options there is likely to be a significant amount of material and resources required and which will also be associated with waste generated (although there is some potential for re-use of materials and sustainable design measures). The preferred programme of demand management options and leakage measures would also require material resources in some cases (for example in the production of meters and materials for pipeline/mains renewal). Cumulative significant negative effects have therefore been assessed for this objective. In the operation phase, although there may be some minor positive effects linked to reduced water use as a result of, for example, temporary use bans, this is not likely to lead to cumulative positive effect. However, there will be ongoing production of waste linked to chemical treatment of water and generation of brine from desalination as a result of the plan. Cumulatively, this is likely to be moderately negative.
	Avoid negative effects on built assets and infrastructure	--	0	A number of options intersect with major roads including A roads, railway lines, and national cycle routes, whilst others are located within built up areas. Cumulatively, there is therefore likely to be some disruption to built assets and infrastructure during the construction phase, including the need for road closures and diversions. Cumulatively, for the preferred programme as a whole, this is considered likely to be moderate negative. In the operation phase, neutral cumulative effects are assessed given infrastructure will be in situ.

6.4 Cumulative Effects with Existing Relevant Plans, Programme and Projects

6.4.1 Introduction

The SEA Regulations require that the cumulative effects of the rdWRMP24 are assessed. This includes the cumulative effects of the individual preferred options that comprise the preferred programme and the effects of the rdWRMP24 in combination with other plans and programmes.

The cumulative effects of the individual options that comprise the preferred programme of rdWRMP24 preferred options are presented in **Section 0**, in addition to which the cumulative effects of the rdWRMP24 in combination with other plans and programmes, are relevant, including:

- the rdWRMP24 with Southern Water's Drought Plan;
- the rdWRMP24 with the Water Resources South East (WRSE) Regional Plan;
- the rdWRMP24 with other plans e.g., Environment Agency National Drought Plan, River Basin Management Plans, Shoreline Management Plans;
- the rdWRMP24 with other Nationally Significant Infrastructure Projects (NSIPs).

There are inherent uncertainties associated with assessing the cumulative effects of the rdWRMP24, relating to factors such as: future changes to baseline environmental conditions; future population and economic growth; the deliverability of proposed NSIPs and potential future projects, including those associated with other water companies in the WRSE area. As such, it will be necessary to keep under review these factors as the preferred programme is implemented (e.g. in any subsequent scheme level Environmental Impact Assessments (EIA) and HRAs, where required) to ensure that the latest and most up to date information is taken into account.

6.4.2 Regional and Water Resource Management Plans

Water Resources South East Regional Plan

WRSE Regional Plan aims to be a resilient plan that considers the whole of south east England as a single region, unconstrained by water company boundaries, to determine the best value options to meet the water requirements of the domestic and non-domestic consumers in the region. The Regional Plan is to be finalised in 2024. The WRMPs to be published by individual water companies are expected to align with the regional plan consistent with national guidance[58]. To support the alignment, WRSE commissioned a new integrated environmental assessment process to provide a consistent framework for environmental assessments of both the WRSE Regional Plan and the constituent WRMPs. SEA, HRA and WFD assessments[59] have been completed to accompany the Revised Draft Regional Plan to be submitted to the Secretary of State for Environment, Food and Rural Affairs. These assessments provide the cumulative effects assessment of the revised draft WRMPs in conjunction with the Revised Draft Regional Plan. The WRSE Revised Draft Regional Plan SEA Environmental Report identified the following cumulative effects for the Regional BVP under Situation 4:

[58] UK Government (2023) *Water Resource Planning Guideline* [online]. Available at: https://www.gov.uk/government/publications/water-resources-planning-guideline/water-resources-planning-guideline.

[59] WRSE (2023) WRSE Revised Draft Plan - Strategic Environmental Assessment Environmental Report, Habitats Regulations Assessment Report and Water Framework Directive Assessment Report

- **Biodiversity, flora and fauna** - There is potential for residual significant negative cumulative effects on a number of statutory and non-statutory designated sites arising from construction and operational activities. HRA in-combination assessment has been undertaken for the Revised Draft Regional BVP to identify where two or more options included in different WRMPs have the potential to generate in-combination effects on European sites. The assessment found the potential for in-combination adverse effects on European Sites as a result of interactions during the construction and operation of a number of options therefore major negative effects were identified. Potentially affected sites include the Thanet Coast and Sandwich Bay SPA/Ramsar, Thames Estuary and Marshes SPA/Ramsar, Outer Thames Estuary SPA, Blean Complex SAC, Stodmarsh SAC/SPA/Ramsar and Oxford Meadows SAC. Residual positive cumulative effects have been identified during operation due to more water being kept in the environment as a result of the 'High' Environmental Destination (a decision to deliver long-term sustainability and environmental resilience) and demand management options.
- **Soil** - There is potential for cumulative disturbance effects on agricultural land, including BMV Agricultural Land, during the construction phase but also permanent losses where options have above ground infrastructure. Residual minor cumulative effects are identified for construction and residual neutral cumulative effects during operation. The catchment management schemes may lead to positive cumulative effects as they include options which aim to improve water quality at landscape scale with a focus on soil health/management.
- **Water** - There are multiple possible options within the same catchment which may have cumulative effects on the same water body during construction and operation. There are options within the Regional BVP that have similar construction programmes and cross the same and/or multiple main rivers, chalk rivers and waterbodies within close proximity to one another. An in-combination WFD assessment has been undertaken for the options selected within the Regional BVP that fall within the boundaries between the water companies. In summary, the WFD in-combination assessment identified that there are two waterbodies that are impacted by more than one of the Regional BVP Situation 4 options and where there is a risk of WFD deterioration and therefore the potential residual cumulative significant negative effects. These are GB106040018160 Lower Eden and GB40601G602200 Epsom North Downs Chalk. The combined benefit of the Regional BVP options located within the water company boundaries are likely to result in resilient supplies which meet demand therefore major positive cumulative effects are identified. The catchment management schemes also have the potential for cumulative effects as they include activities to improve water quality and reduce pollutants, increase resilience to low flows and increase the storage of water within the environment, facilitating resilience during drought.
- **Air** - There is likely to be localised cumulative effects on air quality from the construction phase for options which are located within close proximity and whose phasing overlaps. The effects may require further investigation if they are located within AQMAs. There is also likely to be localised cumulative effects on air quality during the operational phase of the options from staff and maintenance transport and any emissions from treatment works.
- **Climatic Factors** - All the options will generate carbon emissions from construction associated with embodied carbon emission from construction materials, construction related transport and on-site activities. Most options involve pumping stations or other electricity uses and will therefore generate carbon emissions during operation. Desalination plants involve large amount of energy during operation. Adverse cumulative effects are therefore identified during construction and operation. The Regional BVP includes a number of options which involve abstraction from surface and groundwater sources and therefore have the potential to result in negative cumulative effects on the resilience of the natural environment to climate change. The demand management options along with the catchment management schemes will help to retain more water within the environment compared to the existing situation. This improves the resilience of the natural system and thus increase or maintain resilience to climate change with a positive cumulative effect.
- **Landscape** - Cumulative negative effects on the landscape are predicted during the construction phase where options are located, within close proximity to one another, and are being constructed at

similar times. The catchment management schemes may lead to positive cumulative effects for the landscape across the WRSE region as they contain options which improve the overall health of the catchment such as through wetland creation, river restoration and agricultural measures.

- **Historic Environment** - Potential for adverse cumulative effects identified on the significance and/or setting of built designated heritage assets during construction where options are in close proximity. The impacts would primarily be temporary during construction, particularly where options would comprise permanent below ground infrastructure, and would be mitigated by construction best practice. Neutral effects are predicted during operation.
- **Population and Human Health** - The local community, tourism and recreation all have the potential to be affected by options, particularly where due to proximity and phasing during construction as a result of temporary disturbance, noise, vibration and traffic. It is expected that best practice measures implemented during the construction phase would mitigate this risk. The Regional BVP, in operation and as a whole, provides sufficient water to maintain the health and wellbeing of communities, both the current population and predicted new residential and commercial development. Economic development will be facilitated through the construction and operation of options. Job creation and supply chain benefits are likely to accrue through the delivery of a number of the supply-side options, including large infrastructure projects.
- **Material Assets** - The cumulative effects of the new infrastructure proposed will require significant quantities of materials and generate waste, including excavated materials, although will also present substantial material reuse opportunities. Options within the catchment management schemes may have cumulative positive effects as they contain natural flood management options and pesticide reduction which will help to reduce the use of resources. There is the potential for minor residual negative cumulative effects as a result disruption to transport infrastructure during the construction of options.

At this stage given the strategic nature of the Regional Plan as well as the long planning horizon it is likely that further studies and mitigation could help to reduce the significance of any potential negative cumulative effects. This includes the identification and development of suitable alternative solutions that would avoid or substantially reduce the significance of any residual negative effects. However, these options are not available at this time and would need to be developed collaboratively between water companies through the next iteration of the Regional Plan.

Other Water Company Water Resource Management Plans (WRMPs)

Southern Water and its neighbouring water companies have worked collaboratively on the WRSE Regional Plan and its assessment. As part of this process, option information, including GIS has been shared to facilitate consideration of in-combination effects (for the HRA) and cumulative effects (WFD). Separately the revised draft WRSE Regional Plan SEA[60], HRA[61] and WFD[62] have also considered the potential for in-combination and cumulative effects and where relevant have also been considered.

As a result, the HRA of Southern Water rdWRMP24 has indicated that when considering the potential for adverse effects arising from the interactions between the construction of different water company options, it is possible to conclude that any in-combination construction effects could be avoided through scheme design and implementation. However, when considering the potential for in-combination effects arising from the

[60] WRSE Revised Draft Regional Plan. Strategic Environmental Assessment Environmental Report. 18th September 2023.

[61] WRSE Revised Draft Regional Plan. Strategic Environmental Assessment Environmental Report. Appendix H- HRA Report. 15th September 2023.

[62] WRSE Revised Draft Regional Plan. Strategic Environmental Assessment Environmental Report. Appendix I- WFD Report. 12th September 2023.

operation of options, it has not been possible to exclude the potential for adverse effects on the Outer Thames Estuary, Margate and Long Sands SAC and Thanet Coast and Sandwich Bay SPA/Ramsar arising from the implementation of the Southern Water Thanet Desalination schemes and the South East Water Reculver Desalination scheme. Based on proxy information from other sites presented in the HRA alone assessment, it is likely that such effects could be avoided although there is some residual uncertainty regarding this conclusion, at this stage, reflecting a precautionary conclusion.

The revised draft WRSE Regional Plan WFD assessment has concluded that for the Southern Water Best Value Plan (BVP Sit 4), whilst there were a number of catchments where Southern Water and at least one other water company have an option, no additional cumulative effects were identified.

Southern Water has also reviewed the WFD compliance assessment of its own plan against the option information available from other plans. This has been undertaken at both the water body and operational catchment level, to supplement and complement the assessment undertaken by WRSE. The comparison exercise found:

- Portsmouth Water (PW): there are no waterbodies that could be impacted by both PW and Southern Water.
- South East Water (SEW): There are options in a number of operational catchments that are identified in both SEW and Southern Water's rdWRMPs, including in the Thames, Medway, Rother and Brede catchments. However, no catchments have been identified where both water companies have operational impacts. Therefore, it may be assumed that there will be no cumulative impacts on WFD compliance.
- Sutton and East Surrey (SES): There is one option in the Medway operational catchment where a risk to WFD compliance has been identified, and could potentially have an in-combination effect with some of Southern Water options in the Medway catchment. There are existing flow constraints on the Medway at Teston that may be used to manage this effect. However, further detailed assessment is required.
- Affinity Water (AfW): There are options in a number of operational catchments that are identified in both AfW and Southern Water's rdWRMPs, including in the Thames and Stour catchment. However, no catchments have been identified where both water companies have operational impacts. Therefore, it may be assumed that there will be no cumulative impacts on WFD compliance.
- Thames Water (TWUL): Four WFD water bodies (including one transitional, two groundwater and one river) have been identified where there are options belonging to both TWUL and Southern Water that could involve operational impacts. Note that where there may be a departure of conclusion with the WRSE and TWUL findings, this may in part reflect superseded data used in comparable assessments. With regard to the in-combination effects on the North Kent Medway Chalk and Ebsfleet water bodies, further investigation into the impact of abstraction is required.

In summary, therefore, there are potential in-combination effects with SES and TWUL's rdWRMPs, which should be given further consideration.

Southern Water Drought Plan 2022

The Drought Plan is a statutory plan and will set out sets out how Southern Water will respond to drought conditions in its area, ensuring the continued supply of water to customers during periods of low rainfall when water resources become depleted, whilst minimising any negative effects of the actions taken.

Southern Water published its draft Drought Plan for consultation in June 2021, its Statement of Response[63] in September 2021 and an addendum[64] in April 2022.

The scope for in-combination effects of the WMRP24 with the drought management measures included in the Drought Plan 2022 is limited as in most cases the drought management measures have been integrated into the rdWRMP24. There is the potential for cumulative beneficial effects between the Test and Itchen catchment management options with the Test Surface Water Drought Permit/Order and the Lower Itchen sources Drought Order by helping improve the environmental resilience of these rivers to abstraction at times of low river flows.

This assessment aligns with the Southern Water 2022 drought plan suite of environmental assessments. We are aware that Southern Water continues to work with the EA/NE to gain agreement on HRAs such as those for the Test, IOW and Solent. Southern Water will set out these updates, once complete, when it finalises its drought plan. Any further updates to drought orders/permits after that drought plan is finalised will be shared with EA/NE when available and will be reported on as part of the WRMP annual review process.

6.4.3 Other plans and projects

Environment Agency National Drought Plan

Assessment of the potential for cumulative impacts of WRMP24 options with drought options listed in the Environment Agency national Drought Plan[65] has been undertaken. The information used to carry out these assessments is considered to be the most up to date information available at the time of writing, but the assessments should be reviewed at the time of drought option implementation to ensure that no changes to the Environment Agency Drought Plan have been made in the intervening period, and that the assessment, therefore, remains valid.

Part of the Environment Agency's role is to reduce the impact of drought on the natural environment by taking specific actions. They can apply for environmental Drought Orders if the environment is suffering serious damage because of abstraction during a drought. The plan confirms that the Environment Agency would work with stakeholders, including water companies, to identify where and when it would be necessary to take actions to protect the environment and its potential effects on any essential public supplies or infrastructure. The Environment Agency can restrict spray irrigation during periods of drought which would have a cumulative beneficial effect alongside Southern Water's demand management measures.

River Basin Management Plans (RBMP) (Thames River Basin District and South East River Basin District Plans)

Assessment of the potential for cumulative effects with these River Basin Management Plans (RBMPs) has been undertaken. The information used to carry out these assessments is considered to be the most up to date information available at the time of writing, but the assessments should be reviewed at the time of drought option implementation to ensure that no changes to the River Basin Management Plans have been made in the intervening period, and that the assessment, therefore, remains valid.

The Thames and South East RBMPs describes the planned steps to implement the measures required to achieve the environmental objectives of the Water Framework Directive (WFD). They provide the framework

[63] Southern Water (2021) *Southern Water's Draft Drought Plan 2021 Statement of Response* 20 September 2021. Available on line: https://www.southernwater.co.uk/media/5304/drought-plan-22-statement-of-response-final-20-sept-2021.pdf

[64] Southern Water (2022) *Southern Water's Draft Drought Plan 2021 Addendum to Statement of Response* 14 April 2022. Available on line: https://www.southernwater.co.uk/media/6655/sw-drought-plan-sor-addendum-april-2022.pdf

65 Environment Agency (2017) *Drought response: our framework for England*. June 2017.

for protecting and enhancing the water environment. Whilst it is noted that the EA screened out the requirement for the most recent RBMP updates, the SEAs[66,67] of the 2015 RBMPs determined that the plans was likely to have significant positive effects on the environment, particularly in respect of biodiversity, water, population and human health and that any local negative effects would expect to be mitigated during implementation. Therefore, there will be **no cumulative impacts** between the Thames or South East RBMPs and the WRMP24.

Cumulative effects with Shoreline Management Plans

Shoreline Management Plans provide a policy context for shoreline / coastal zone management and development. The following Shoreline Management Plans are available within the public domain and were considered for in-combination impacts:

- SMP 9 The Medway Estuary and Swale;
- SMP10 Isle of Grain to South Foreland;
- SMP 11 Beachy Head to South Foreland;
- SMP 12 Beachy Head to Selsey Bill (South Downs);
- SMP 13 Hurst Spit to Selsey Bill (North Solent);
- SMP 14 Isle of Wight;
- SMP 15 Durlston Head to Hurst Spit (Poole & Christchurch Bays).

The assessments for any potential in-combination impacts between these plans and the measures contained Southern Water's WRMP24 were considered with regards to spatial proximity and/or hydrological and/or hydrographical connectivity. No in-combination likely significant effects were identified in respect of the policies set out in the plans. Measures put forward in the Isle of Wight Shoreline Management Plan included the proposed creation of a 30.9ha compensatory habitat of coastal grazing marsh for the Solent and Southampton Water Ramsar site. Such a measure could be considered to have a minor beneficial in-combination effect. The potential for in-combination effects would need to be reviewed again for an application-specific HRA against the latest version of the relevant Shoreline Management Plan if any options with the potential to affect the coastal zone were needed in a future drought event, in dialogue with the Environment Agency, local planning authority and/or other relevant statutory bodies and stakeholders.

Cumulative effects with identified relevant strategic level projects

The Planning Act 2008 introduced a procedure to streamline the decision-making process for Nationally Significant Infrastructure Projects (NSIPs). Under the Act, a developer wishing to construct a NSIP must first apply to the Secretary of State for development consent. National Policy Statements (NPSs) establish the need for specific types of infrastructure and provide planning guidance for promoters of NSIPs, and the basis for the examination by the Examining Authority and decisions by the Secretary of State on development consent order applications. A number of NPSs have been published which set out the definition, and in some cases the location, of NSIPs. The current status of NPSs is set out in **Table 6-4**.

66 Environment Agency (2016) *The River basin management plan for the Thames River Basin District Strategic Environmental Assessment: Statement of Particulars Updated December 2015*. https://www.gov.uk/government/collections/river-basin-management-plans-2015

67 Environment Agency (2016) *The River basin management plan for the South East River Basin District Strategic Environmental Assessment: Statement of Particulars Updated December 2015*. https://www.gov.uk/government/collections/river-basin-management-plans-2015

Table 6-4 Current status of national policy statements.

National Policy Statement (NPS)	Status	Are potential locations of NSIPs included in the NPS?
Overarching Energy EN-1	Designated January 2024	No
Natural gas electricity generating infrastructure EN-2	Designated January 2024	No
Renewable Energy Infrastructure EN-3	Designated January 2024	No
Natural Gas Supply Infrastructure and Gas and Oil Pipelines EN-4	Designated January 2024	No
Electricity Networks Infrastructure EN-5	Designated January 2024	No
Nuclear Power Generation EN-6	Designated July 2011	Yes
Ports	Designated January 2012	No
Waste Water Infrastructure	Designated March 2012	Yes
Hazardous Waste Infrastructure	Designated June 2013	No
National Networks	Designated May 2024	No
Airports	Designated June 2018	Yes
Water Resources Infrastructure	Designated September 2023	No
Geological Disposal Infrastructure	Designated October 2019	No

The rdWRMP24 is not expected to have any adverse cumulative effects in-combination with the NPSs listed above. This is because the NPSs are either not site specific or because specific NSIP proposals contained in the NPS are unlikely to affect, or be affected by, the measures that comprise the rdWRMP24 e.g. sites for new nuclear power stations, the two NSIPs set out in the Waste Water Treatment NPS and the proposals to increase runway capacity in the Airports NPS. The Water Resources Infrastructure NPS sets out the need for NSIPs related to water resources, and the Government's policies to deliver them. Whilst this NPS is not site specific, implementation of the rdWRMP24 is likely to be compatible with those objectives of the NPS for improving water supply resilience.

Qualifying NSIPs that have received a decision by the Secretary of State to grant a Development Consent Order, in accordance with the relevant NPS and Planning Act 2008 requirements are outlined in Table 6-5. The Planning Inspectorate's National Planning Infrastructure database[68] identifies a further 14 projects at pre-application stage; however, decisions and subsequent project implementation on these additional projects is less certain.

[68] https://infrastructure.planninginspectorate.gov.uk/projects/south-east/

Table 6-5 Consented major projects in South East England.

Project	Developer	Decision
M25 junction 28 improvements	Highways England	May 2022
M25 junction 10/A3 Wisley interchange improvement	Highways England	May 2022
Thurrock Flexible Generation Plant	Thurrock Power Ltd	February 2022
Wheelabrator Kemsley Generating Station (K3) and Wheelabrator Kemsley North (WKN) Waste to Energy Facility	WTI/EFW Holdings Ltd	February 2021
Southampton to London Pipeline Project	Esso Petroleum Company, Limited	October 2020
Cleve Hill Solar Park	Cleve Hill Solar Park Ltd	May 2020
Kemsley Paper Mill (K4) CHP Plant	DS Smith Paper Ltd	July 2019
Tilbury2	Port of Tilbury London Limited	February 2019
Kentish Flats Extension	Vattenfall	December 2018
M20 Junction 10A	Highways England	2017
Richborough Connection Project	National Grid	2017
M4 Junctions 3 to 12 Smart Motorway	Highways Agency (now Highways England)	2016
Rampion Offshore Wind Farm	E.ON Climate and Renewables	2014

The projects listed are a mix of onshore and offshore energy developments, energy infrastructure and transport infrastructure. With regard to cumulative effects with the rdWRMP24, these are likely to centre on effects associated with the construction phase, if located in similar areas, or if there is coincidence of proposed linear infrastructure and pipeline routes. The implications of such effects will need to be considered in detail at the implementation stage of WRMP schemes, where there is coincidence in proposed phasing.

7 Mitigation

7.1 Overview

The SEA Regulations require that the Environmental Report includes 'The measures envisaged to prevent, reduce and as fully as possible offset any significant adverse effects on the environment of implementing the plan or programme' (Schedule 2 (7)). SEA Regulation 12(3(d)) identifies that the report should include the information referred to in Schedule 2, taking account of 'the extent to which certain matters are more appropriately assessed at different levels in that process in order to avoid duplication of the assessment'. This anticipates that some information would only be available at the consenting stage for individual schemes and identified through assessments such as Environmental Impact Assessment (EIA).

In accordance with the regulation requirements, this section describes how mitigation has been or will be addressed, as applicable and that the appropriate mitigation measures are implemented for any significant adverse effects identified. Mitigation may be defined as a measure to limit the effect of an identified significant impact or, where possible, to avoid the adverse impact altogether.

7.2 Mitigation measures

Consideration of mitigation measures has been an integral part of the SEA process and the selection of preferred options as part of the evolution of the rdWRMP24. Where options continue to demonstrate significant negative effect, taking into account mitigation measures, the implications of these significant negative effects will be considered as part of the further design and study work identified as part of the risk reduction programme. The detail of this mitigation needs to be considered during the planning phases of each of the individual measures if and when they are taken forward for implementation. This should then be consolidated into a Construction Environmental Management Plan (CEMP) for the scheme, noting that all works should be carried out in accordance with relevant Construction Design Management (CDM) Regulations 2015.

General good construction practice measures include:

- invasive species on site are to be identified and removed in advance of construction;
- HGV routing, cap on movements, appropriate working hours;
- screening around the perimeter of works at the start of construction (creation of landscaping/planting for large scale construction);
- footpath diversions established regarding construction work including pipelines;
- resources for construction of the scheme would be sourced locally where possible;
- minimising removal of spoil from construction sites;
- runoff from the construction sites would be attenuated and the quality managed according to best construction practices;
- appropriate pipeline laying techniques regarding river crossings;
- flood risk management during construction (temporary flood defence and siting of spoil and contaminants away from areas at risk of flooding);
- siting of temporary and permanent works to minimise impacts on setting of heritage and landscape features;
- archaeological watching briefs during excavation;
- noise abatement barriers where required;

- dust control measures: dampening dust emissions from groundworks and vehicle washing.

7.2.1 Species specific measures and biodiversity

Most species-specific avoidance or mitigation measures can only be determined at the scheme level, following scheme-specific surveys, and 'best-practice' mitigation for a species will vary according to a range of factors that cannot be determined at this stage. The CEMP should include measures to minimise disturbance to biodiversity during the construction phase, for example:

- scheme design should aim to minimise the environmental effects by 'designing to avoid' potential habitat features that may be important e.g. those used by species that are European site interest features when outside the site boundary (e.g. linear features such as hedges or stream corridors; large areas of scrub or woodland; mature trees; etc.) through scheme-specific routing studies;
- the works programme and requirements for each measure should be determined at the earliest opportunity to allow investigation schemes, surveys and mitigation to be appropriately scheduled and to provide sufficient time for consultations with NE;
- night-time working, or working around dusk / dawn, should be avoided to reduce the likelihood of negative effects on nocturnal species;
- any lighting required (either temporary or permanent) will be designed with an ecologist to ensure that potential 'displacement' effects on nocturnal animals, particularly designated bat species, are avoided;
- all materials will be securely stored away from migratory routes / foraging areas that may be used by designated species;
- all excavations will have ramps or battered ends to prevent species becoming trapped; and
- pipe-caps must be installed overnight to prevent species entering and becoming trapped in any laid pipe-work.

For all river water bodies that could be impacted by abstraction (either from surface water or groundwater), further ecological evidence has been identified as being required including:

- improving the understanding of the impacts of changes to flow on physical habitat parameters, and resulting impacts for species;
- improving the understanding of impacts of changes to flow on ability of fish to pass barriers; and
- undertaking further ecology surveys including macroinvertebrate and macrophyte surveys, and eDNA for fish (while some data is available in all water body catchments, there is variability in the extent of data and the most recent sample dates).

For GWDTEs identified as potentially being impacted by abstraction, further review of existing information is required to understand potential hydrological connectivity, as the current conclusions are relatively precautionary.

7.2.2 Scheme design and planning

All measures will be subject to project-level environmental assessment, which will include assessments of their potential to affect European sites during their construction or operation. These assessments should consider or identify (inter alia):

- opportunities for avoiding potential effects on European sites through design (e.g. alternative pipeline routes; micro-siting; etc);
- construction measures that need to be incorporated into scheme design and or planning to avoid or mitigate potential effects - for example, ensuring that sufficient space is available for pollution prevention measures to be installed, such as sediment traps; and

- operational regimes required to ensure no adverse effects occur (e.g. maintain minimal flows - although note that these measures can only be identified through detailed investigation schemes).

Specific additional measures identified in the assessment include:

- During operation, it is unknown if the saline waste from the proposed new desalination plants would be diluted within existing outflows therefore it is assumed hyper saline plumes would continue to effect designated habitats and species of the designated site. Impacts to benthic communities from concentrate discharges could be minimised by using properly-designed diffuser systems.

Specific enhancement measures will relate to the potential for the creation of new habitats associated with biodiversity net gain. These need to be considered on a scheme specific basis.

The current rdWRMP24 includes a number of desalination options in the western area:

- Desalination (KME): Isle of Sheppey (up to 40Ml/d);
- Desalination (KTZ): East Thanet (20Ml/d);
- Desalination (SWZ): Tidal River Arun (20Ml/d).

For each option, the earliest delivery has been revised and delayed in the rdWRMP24 to allow sufficient time for investigation and mitigation options. The Isle of Sheppey and East Thanet desalination schemes are associated with uncertain effects on European sites. In consequence, the extension of the timeframe also allows Southern Water to engage with other water companies to review the proposed desalination options on the north Kent coast, with the intention, to be reflected in future plan cycles, of a revised, integrated solution, providing substantial yield to the benefit of customers, but appropriately sited to avoid and minimise the range of current identified option and cumulative effects.

7.2.3 Pollution prevention

There is a substantial body of general construction good-practice which is applicable to all of the proposed measures and can be relied on (at this level) to prevent significant or adverse effects on a European site occurring as a result of construction site-derived pollutants. The following guidance documents detail the current industry best-practices in construction that are relevant to the proposed schemes:

- DEFRA's Pollution prevention for businesses (https://www.gov.uk/guidance/pollution-prevention-for-businesses);
- Venables R. et al. (2000) Environmental Handbook for Building and Civil Engineering Projects. 2nd Edition. Construction Industry Research and Information Association (CIRIA), London.

The best-practice procedures and measures detailed in these documents should be followed for all construction works derived from the rdWRMP24 as a minimum standard, unless scheme-specific investigations identify additional measures and / or more appropriate non-standard approaches for dealing with potential site-derived pollutants.

Care should also be taken during construction regarding the potential for contaminants such as silt, concrete or fuel oil to pollute water courses via surface run off. This can be mitigated by undertaking all construction activities in accordance with relevant best practice pollution prevention guidance. Pollution Incident Control Management Plans should be developed to limit adverse effects arising from pollution events.

7.2.4 Effects on air quality

With regard to the potential for effects on air quality, the following measures should be considered for inclusion within the CEMP:

- use of low emission plant, air quality monitoring and preparation of a Dust Management Plan;
- a Construction Traffic Management Plan (CTMP) could be prepared for each preferred supply option to manage the traffic impacts associated with construction which would include measures to mitigate air quality effects including routing of traffic to avoid sensitive receptors and the timing of HGV movements to avoid peak traffic hours;
- low emission/electric vehicles should be used during the construction and operational phases where possible, consistent with the Water UK Net Zero 2030 Route Map and Southern Water's Net Zero Plan.

7.2.5 Effects on population and human health

With regard to the potential for effect on health, social and economic well-being, Southern Water could consider encouraging all its contractors are enrolled in the Considerate Constructors Scheme, a voluntary scheme which commits those contractors in the Scheme to be considerate and good neighbours, as well as clean, respectful, safe, environmentally conscious, responsible and accountable. The following measures should be considered for inclusion within the CEMP:

- care should be taken to avoid works near to the most sensitive health receptors In the development of detailed designs for pipeline routes;
- routing of traffic to avoid sensitive receptors and the timing and phasing of HGV movements to avoid peak traffic hours;
- construction activities should be undertaken so as to minimise short term adverse effects on recreational areas, such as footpaths, and on landscape and biodiversity.

To maximise economic benefits in the Southern Water operational area, it is recommended that, where possible, work is carried out by local firms and contractors or by those with a policy for training and skills development that could help contribute to the local economy and meet employment needs. Where possible, Southern Water should seek to use locally-sourced materials.

7.2.6 Effects of climate change and resource use

Southern Water's Net Zero Plan outlines mitigation measures that have already, or will be taken, to reduce their greenhouse gas emissions, The Plan focuses on the whole life carbon equivalent impact of Southern Water's activities and aims to design solutions that will act to reduce both embodied carbon and operational emissions.

The approach to achieving Net Zero follows the carbon reduction hierarchy and abides by four guiding principles:

- Ensuring carbon is a key focus by instilling carbon conscious decision-making and processes into the Southern Water culture.
- Participating in research and development of innovative solutions, by partnering with stakeholders across the sector and other water companies.
- Participating in trials, research and innovation with the wider sector will allow us to assess hard to abate emissions such as process emissions and implement suitable solutions in successive AMPs.
- Implementing an adaptive approach to planning to better manage the impact of external factors such as climate change, technological development, and consumer demand on our strategies in the future.

Mitigation measures outlined in the Net Zero Plan include:

- enhancing the efficiency of Southern Water's network and reducing water demand;

- shifting to renewable energy and onsite generation;
- deploying of thermal conversion technology and using of green fuels;
- improving energy efficiency of sites;
- reducing energy usage;
- reducing process emissions through consolidation of sites into mega-sludge treatment centres with advanced digestion technologies;
- electrifying the vehicle fleet or introducing low carbon fuel alternatives;
- implementing nature-based solutions;
- identifying opportunities for carbon storage and sequestration insets;
- developing natural capital solutions.

Further detail on Southern Water's Net Zero Plan is available in Section 10.5 of the rdWRMP24 and the Net Zero Plan itself.

In addition, Southern Water could consider:

- Design measures to ensure the long-term resilience of infrastructure to the effects of climate change. Measures may include, for example, the provision/enhancement of natural flood management measures as part of wider biodiversity enhancement and habitat creation.
- Measures to investigate and optimise the use of materials with lower embodied carbon and renewables for energy supply, consistent with the Water UK Net Zero 2030 Route Map.
- Completion of a carbon footprint study could help identify areas for carbon savings, offsets or alternative materials.

Where significant raw materials are required for options, this can be mitigated by utilising recycled and locally sourced materials. Construction and operational wastes should also be reused/recycled where appropriate.

7.2.7 Effects on cultural heritage and landscape

The potential for adverse impacts of the settings of cultural heritage assets should be considered early in the design process and any adverse effects minimised, for example through micro-siting / alternative pipeline routes to avoid designated sites. Further measures, for consideration within the CEMP could include:

- careful consideration being given to the presence of heritage assets when finalising proposals for pipeline routing;
- where required, a programme of trial trenching and archaeological recording should be undertaken at development sites, with results disseminated;
- new above-ground infrastructure should be screened, where possible and informed by informed by a heritage appraisal/assessment, to minimise effects on the settings of heritage assets;
- consideration should be given to enhancing the significance of, and access to, heritage assets.

Proposed rdWRMP24 schemes could have a negative effect on landscape if new infrastructure is required, particularly where development cannot be located on previously developed land and/or where schemes are located within landscapes recognised for their importance and special qualities. In order to minimise such effects, new structures could be located close to existing structures or hedgerows and trees to provide some screening with the potential to utilise local building styles or incorporate landscaping schemes (e.g. tree/ hedge planting). Further measures, for consideration within the CEMP could include:

- where required, proposals should be accompanied by a lighting strategy that is designed to minimise outward glows;

- new above ground infrastructure should adopt high quality design principles where possible (for example, the use of local materials);
- proposals should be accompanied by a landscape mitigation plan, informed by a landscape and visual assessment (where required.

The mitigation measures described above would, in some cases, be implemented through EIA and planning process. In this way, effective mitigation plans can be developed to minimise many of the residual adverse effects currently identified in the SEA appraisals.

8 Assessment of the reasonable alternatives to the rdWRMP24

8.1 Introduction

The SEA Regulations (Regulation 12(2)) require that the Environmental Report 'shall identify, describe and evaluate the likely significant effects on the environment of

(a) implementing the plan or programme; and

(b) reasonable alternatives taking into account the objectives and the geographical scope of the plan or programme'. Further to this, the regulations require (under Schedule 2 (8)) that the Environmental Report presents outline reasons for selecting the alternatives dealt with and a description of how the assessment was undertaken.

This chapter addresses these requirements for the SEA for Southern Water's rdWRMP24 and is structured as follows:

- Establishing Reasonable Alternatives - explains how the alternative programmes were identified.
- Assessment of Alternatives Plans - presents the findings of the assessment of alternatives.
- Cumulative Effects of the Alternative Plans - presents the cumulative effects assessment of the alternative plans compared to the preferred programme.

8.2 Establishing the alternatives

The primary objective of the rdWRMP24 is to ensure that there is always enough water available to meet anticipated demand in Southern Water's supply area, regardless of weather conditions. Working with WRSE, Southern Water have developed a set of best value planning objectives to ensure they can meet their statutory and policy requirements. These are:

- Deliver a secure and wholesome supply of water.
- Deliver environmental and social benefit.
- Increase the resilience of water systems.
- Deliver at a cost that is acceptable to customers.

These objectives are underpinned by a set of supporting environmental and social metrics that can be optimised through investment modelling. These metrics were developed in consultation with stakeholders and in line with the National Framework and WRPG. These are shown in **Table 8-1** below.

Table 8-1 Objectives, criteria and metrics for our Best Value Plan.

Best value objective	Criteria	Metric
Deliver a secure and wholesome supply of water to customers and other sectors to 2075	Meet the supply demand balance	Public water supply - supply demand balance profile (Ml/d) Provides additional water needed by other sectors (Ml/d)
	Leakage	50% reduction in leakage by each company by 2050 from 2017-18 baseline (%) % leakage reduction above 50%
	Water into supply	Distribution input (DI) per property (litres per day)

Best value objective	Criteria	Metric
	Customer preference	Customer preference for option type (score)
Deliver environmental improvement and social benefit	Strategic Environmental Assessment (SEA)	Programme benefit (score max) Programme disbenefit (score min)
	Natural capital	Enhancement of natural capital value (£m)
	Abstraction reduction	Reduction in the volume of water abstracted at identified sites (Ml/d) and by when (date)
	Biodiversity	Net gain score (%)
	Carbon	Cost of carbon offsetting (£m)
Increase the resilience of the region's water systems	Drought resilience	Achieve 1:500 drought resilience (date achieved)
	Resilience assessment reliability	Programme reliability score
	Resilience assessment adaptability	Programme adaptability score
	Resilience assessment evolvability	Programme evolvability score
Deliverable at a cost that is acceptable to customer	Programme cost	Net present value (£m) using the social time preference rate (STPR)
	Inter-generational equity	Net present value (£m) using the long-term discount rate (LTDR)

As highlighted in **Table 8-1** above, the findings of the environmental assessments including the SEA were translated into metrics and these were:

- Four metrics derived from the SEAs (outlined in Chapter 4 above): 1) Positive construction, 2) Negative construction, 3) Positive operation, and 4) Negative operation.
- One metric derived from the natural capital and ecosystem services assessments (outlined in Chapter 4 above): Change in monetary value (£/year) of ecosystem services (combining carbon sequestration, food production, air pollution, natural hazard management, and recreation and amenity).
- Two biodiversity impact metrics derived from application of the Biodiversity Net Gain 3.0 metric (outlined in Chapter 4 above): 1) Total net change in habitat units, and 2) Habitat units requiring replacement, which was either presented as habitat units required to achieve 10% net gain or for options already achieving 10% net gain, the value for this was 0.

These metrics enabled the SEA, HRA, WFD assessment, Natural Capital and Biodiversity Net Gain findings to be directly considered in analysis and selection of programmes of options at an early stage in the planning process. For incorporation of the environmental assessments into modelling, it was assumed that recommended mitigation measures will be applied, e.g. the SEA metric findings were based on the predicted residual effects on the environment.

Long-term planning requires making decisions for an uncertain future. To manage uncertainty, WRSE and Southern Water have used an adaptive planning approach. They have looked at multiple supply-demand balance scenarios in view of the uncertainties associated with growth forecasts, the level of reductions required in the water taken from the environment and climate change impacts. An adaptive planning approach means that these different futures and uncertainties can be taken into account.

A total of nine branches (hereafter referred to as 'situations') cover these future conditions/ uncertainties, which were derived based on combinations of the three key drivers:

- Growth; which determines the demand that will need to be met in the future.
- Climate change; which impacts the amount of water we can abstract from our current sources.

- Environmental Destination; which determines the reductions that need to be made in abstractions from aquifers and rivers in order to preserve or enhance the environment going forward.

The final nine situations were therefore made up of representative combinations of these driver specific forecasts (high, medium and low) within each plan. To make the plan adaptive the forecasts were introduced in two stages over time, which are referred to as the 'branch points'. Population and housing growth are key drivers up to 2035, with climate change and environmental destination then being brought in from 2035 onwards. These forecast drivers and branch points are set out in **Table 8-2** below.

Table 8-2 Key forecast drivers and situations.

2025 to 2030	2030 to 2035	2035 to 2075	
Medium Growth	**High** Growth	Situation 1	**High** Growth (H-Max)
			High Climate Change
			High Env Destination
		Situation 2	**High** Growth
			Medium Climate Change
			Medium Env Destination
		Situation 3	**High** Growth
			Low Climate Change
			Low Env Destination
	Medium Growth	Situation 4	**Medium** Growth
			High Climate Change
			High Env Destination
		Situation 5	**Medium** Growth
			Medium Climate Change
			Medium Env Destination
		Situation 6	**Medium** Growth
			Low Climate Change
			Low Env Destination
	Low Growth	Situation 7	**Low** Growth
			High Climate Change
			High Env Destination
		Situation 8	**Low** Growth
			Medium Climate Change
			Medium Env Destination
		Situation 9	**Low** Growth
			Low Climate Change
			Low Env Destination

To support a robust evaluation of alternatives, an investment model was used to examine how the alternative programmes changed as the inputs to the values used in the adaptive framework changed. The investment model was run multiple times to examine the potential sensitivity of the plan to changes inputs, optimisation criteria and different policy choices, these were:

- **Development of a Least Cost (Cost Efficient) Plan (LCP)** which optimised only on programme cost but still tracked all best value metrics. The best value metrics are presented in **Table 8-1** earlier. The LCP was developed to meet the projected supply-demand deficit in each supply-demand balance situation, under each planning scenario. For this planning approach, the investment model

optimised only on lowest economic cost, expressed in terms of Net Present Value (NPV). Although the best value metrics were not optimised on at this stage, the options used to develop the LCP still have scores for these metrics against each situation.

- **Best Value model runs** to examine the trade-off between programme cost and best value metrics. The highest score for each best value metric was determined by the highest threshold for which the investment model was able to resolve the supply-demand deficit.
- **Policy and sensitivity assessments** which include different programmes based on policy choice. These included:

Many of the sensitivity runs resulted in unresolved supply-demand deficits but in most cases, these occur in isolated years rather than as continuous deficits over multiple years. In the vast majority of cases, the deficits occur in a 1-in-100 year drought event.

It should be noted that there are two versions of the LCP:

1. Regional LCP (RLCP): This version of the LCP has updates to all inputs from all WRSE companies since the dWRMP24 but not the revised dates for the delivery of Littlehampton and Sandown recycling options, the HWTWRP and the Havant Thicket Reservoir.
2. Southern Water LCP (SLCP): This version of the LCP has the solution from RLCP partially fixed for all areas except those directly impacted by the changes in the delivery dates of Littlehampton and Sandown recycling option, HWTWRP and Havant Thicket Reservoir i.e. Central area, Western area and Portsmouth Water supply area.

A summary of Southern Water's adaptive planning approach is presented in Figure 3 below.

Following the investment model runs, it was determined that there are two alternatives programmes that should be considered through the SEA process alongside Southern Water's BVP (SBVP), the SLCP and the Regional Best Value Environment and Societal Plan (BESP). While the SLCP is only optimised on programme cost, it does meet the projected supply-demand deficit in each situation and the WRPG states that a least cost programme should be produced as a benchmark to appraise your other programmes against and be informed by the SEA. The RLCP has not been carried forward as it does not reflect the revised dates for the delivery of Littlehampton and Sandown recycling option, the HWTWRP and the Havant Thicket Reservoir.

The BESP has also been carried forward for further consideration through the SEA process. It seeks to optimise the environmental metrics and remove the resilience metrics while still meeting the projected supply-demand deficit. Assessing an alternative plan that focuses on optimising the environmental metrics (SEA, Natural Capital, BNG and carbon) rather than costs and resilience is considered reasonable and aligned with positive environmental outcomes. While this alternative plan selects a number of schemes that are identified as likely to have adverse effects on the environment, it is still considered reasonable as there are no other viable alternative individual schemes available at this stage to replace them and therefore meet the supply-demand deficit under some of the more challenging futures.

Situation 4 as the 'reported or core pathway' in the rdWRMP24 has been taken forward for consideration through the SEA in terms of the alternative plans. Situation 4 has been chosen as the core pathway as a result of regulatory feedback during pre-consultation. The EA requested that the reported pathway accounts for both housing plan growth and BAU+ environmental destination.

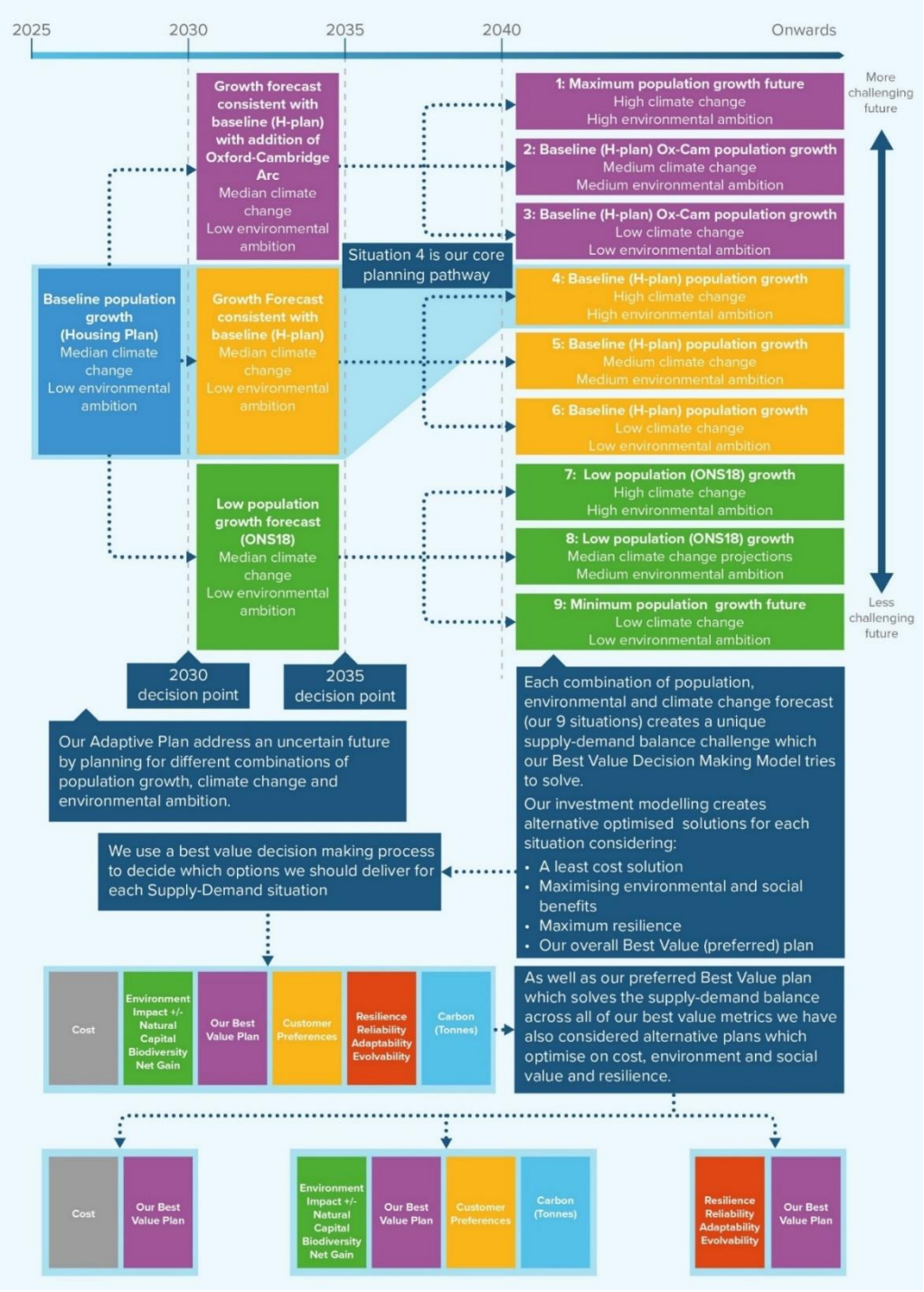

Figure 3: Summary of Southern Water adaptive planning approach.

Given the scale of the supply-demand deficit and challenges being faced, the investment model often selects the majority of schemes available. As a result, there are limited differences between the options being selected. The differences between the SBVP, SLCP and BESP in terms of the selected schemes and implementation dates are presented **Table 8-3** below.

Table 8-3 Key differences between BVP, SLCP and BESP.

Option	Earliest selection in SLCP	Earliest selection in BVP	Earliest selection in BESP
Central area - Sussex North (SNZ) WRZ			
Bulk import (SNZ): SES to SNZ (10Ml/d)	Not selected	2034	2040
Recycling (SNZ): Horsham with storage at Pulborough (11.5Ml/d)	2050	2058	2047
Recycling (SNZ): Littlehampton WTW with river discharge (15Ml/d)	2031	2031	2028
Storage (SHZ): Raising Bewl Reservoir 0.4m (3Ml/d)	2055	2061	2055
Central area - Sussex Worthing (SWZ) WRZ			
Drought option - supply side (SWZ): North Arundel (1.2Ml/d)	Not selected	Not selected	2031
Central area - Sussex Brighton (SBZ) WRZ			
No differences between the alternative plans in this WRZ			
Western area - Hampshire Kingsclere (HKZ) WRZ			
Drought option - demand side (HKZ): NEUBs	2035	2035	2026
Drought option - demand side (HKZ): TUBs	2035	2035	2026
Interzonal transfer (HAZ-HKZ): Andover to Kingsclere bi-directional (10Ml/d)	Not selected	2050	2031
Western area - Hampshire Andover (HAZ) WRZ			
Drought option - demand side (HAZ): NEUBs	2029	2029	2026
Drought option - demand side (HAZ): Reduce transfer to other commercial customers	2029	2029	2031
Drought option: TUBs - HAZ	2029	2029	2026
Interzonal transfer (HAZ-HKZ): Andover to Kingsclere bi-directional (10Ml/d)	Not selected	2050	2031
Western area - Isle of Wight (IOW) WRZ			
No differences between the alternative plans in this WRZ			
Western area - Hampshire Rural (HRZ) WRZ			
Groundwater (HRZ): New boreholes at Romsey (4.8Ml/d)	2031	2031	2032

Option	Earliest selection in SLCP	Earliest selection in BVP	Earliest selection in BESP
Western area - Hampshire Winchester (HWZ)			
Drought option - demand side (HWZ): NEUBs	2029	2029	2026
Drought option - demand side (HWZ): Reduce transfer to other commercial customers	2029	2029	2031
Drought option - demand side (HWZ): TUBs	2029	2029	2026
Western area - Hampshire Southampton East (HSE) WRZ			
Bulk import (HSE): Havant Thicket Reservoir to Otterbourne WSW (90Ml/d)	2035	2035	2031
Bulk import (HSE): PWC Source A to Otterbourne WSW (21Ml/d)	2032	2032	2030
Recycling (HSE): Recharge of Havant Thicket from recycled water from Budds Farm (60Ml/d)	2035	2035	2031
Western area - Hampshire Southampton West (HSW) WRZ			
Drought option - supply side (HSW): Sea tankering from Norway (45Ml/d)	2031	2031	Not selected
Eastern area - Kent Medway East (KME) WRZ			
Interzonal transfer (KTZ-KME): Utilise full existing transfer capacity (9Ml/d)	2040	2040	2036
Eastern area - Kent Medway West (KMW) WRZ			
Bulk export (KMW): Near Rochester to London ring main	2070	Not selected	Not selected
Eastern area - Kent Thanet (KTZ) WRZ			
Interzonal transfer (KTZ-KME): Utilise full existing transfer capacity (9Ml/d)	2040	2040	2036
Eastern area - Sussex Hastings (SHZ) WRZ			
Recycling (SHZ): Hastings WTW to Darwell Reservoir (9.5Ml/d)	Not selected	Not selected	2067
Recycling (SHZ): Tonbridge to Bewl (5.7Ml/d)	Not selected	2036	Not selected
Recycling (SHZ): Tunbridge Wells WTW conjunctive use with Bewl Reservoir (3.6Ml/d)	2036	Not selected	2036

8.3 Assessment of alternatives

As explained in Section 4, the assessment of the alternative programmes builds on the assessment for the BVP presented in Chapter 5, 6 and 7. The assessment below highlights if there are any differences in the likely significant effects identified for the BVP in relation to the alternative pans (SLCP and BESP).

8.3.1 Central area

Sussex North (SNZ) WRZ

Amendments to the delivery dates of schemes selected in the alternative plans will not result in any changes to the significance or nature of effects identified for the BVP in Section 5; however, they will result in changes to when those effects will occur. For example, in the BVP the Storage (SHZ): Raising Bewl Reservoir 0.4m (3Ml/d) scheme will be delivered in 2061, whereas in the SLCP delivery would be in 2055. The predicted effects for this option would therefore remain the same but occur six years prior to that of the BVP in the planning horizon. Further consideration will be given to these changes in implementation dates later in this section under cumulative effects.

There is only one difference in terms of the schemes being selected in this WRZ under the alternative plans. (Bulk import (SNZ): SES to SNZ (10Ml/d)) is selected under the BVP and BESP and not selected under the SLCP. This scheme is not predicted to have any residual moderate or major effects during construction or operation. Minor residual negative effects are predicted during construction for SEA objectives relating to biodiversity, water quality, air, climatic factors, the historic environment, population and human health as well as material assets. During operation this option is predicted to predominantly have a residual neutral effect except for water reliability for which a minor positive effect is identified. In summary, the SLCP and BESP are not likely to result in any changes to the significance or nature of effects identified for the BVP in this WRZ.

Sussex Worthing (SWZ) WRZ

There is only one difference in terms of the schemes being selected under the alternative plans in this WRZ. Drought option - supply side (SWZ): North Arundel (1.2Ml/d) is being selected under the BESP in 2031 and not selected under the SLCP or BVP. The individual assessment of this option found that during construction there is likely to be residual neutral effects against all the SEA objectives. During operation, moderate residual negative effects are predicted in relation to the water SEA objective as this option will be implemented under drought conditions when groundwater resources are vulnerable. It therefore may have negative impacts on resilience of the water environment. A minor positive effect is also identified during operation for the water SEA objective as the option will help to deliver reliable and resilient water supplies. Minor residual negative effects are also predicted for biodiversity, climatic factors and material assets.

Sussex Brighton (SBZ) WRZ

The SLCP and BESP do not propose the addition of any new, the removal of any existing schemes and/ or changes to implementation dates selected under the BVP. As a result, the alternative plans are predicted to have the same effects as the BVP in this WRZ, which are presented in Section 5.

8.3.2 Western area

Hampshire Kingsclere (HKZ) WRZ

Amendments to the delivery dates of schemes selected under the alternative plans (SLCP and BESP) will not result in any changes to the significance or nature of effects identified for the BVP in Section 5; however, they will result in changes to when those effects will occur. For example, the BESP proposes the delivery of drought options earlier in the planning horizon in 2026 compared to the BVP and SLCP in 2035. The BESP also proposes the delivery of an interzonal transfer earlier in 2031 compared to the BVP in 2050. The

interzonal transfer option is not selected for the SLCP. Further consideration will be given to these changes in implementation dates later in this section under cumulative effects.

There is only one difference in terms of the schemes being selected in this WRZ under the alternative plans. Interzonal transfer (HAZ-HKZ): Andover to Kingsclere bi-directional (10Ml/d) is selected under the BVP and BESP and not selected under the SLCP. This scheme is not predicted to have any residual moderate or major effects during construction or operation. Minor residual negative effects are predicted during construction and operation. In summary, the SLCP and BESP are not likely to result in any changes to the significance or nature of effects identified for the BVP in this WRZ.

Hampshire Andover (HAZ) WRZ

Amendments to the delivery dates of schemes selected under the alternative plans (SLCP and BESP) will not result in any changes to the significance or nature of effects identified for the BVP in Section 5; however, they will result in changes to when those effects will occur. There are some minor changes to implementation dates for demand-side drought options under the BESP and BVP in this WRZ.

There is only one difference in terms of the schemes being selected in this WRZ under the alternative plans. Interzonal transfer (HAZ-HKZ): Andover to Kingsclere bi-directional (10Ml/d) is selected under the BVP (implementation in 2050) and BESP (implementation in 2031) and not selected under the SLCP. This scheme is not predicted to have any residual moderate or major effects during construction or operation. Minor residual negative effects are predicted during construction and operation. In summary, the SLCP and BESP are not likely to result in any changes to the significance or nature of effects identified for the BVP in this WRZ.

Isle of Wight (IOW) WRZ

There are no differences between the SLCP, BESP or BVP within this WRZ, in terms of schemes selected or their implementation dates. As a result, there are no differences in the assessment of likely significant effects presented for the BVP in Section 5.

Hampshire Rural (HRZ) WRZ

In terms of delivery dates there is only a change proposed to one scheme (Groundwater (HRZ): New boreholes at Romsey (4.8Ml/d) that falls within this WRZ, with the BESP proposing a later implementation date in 2032 compared to the SLCP and BVP in 2031. As a result, there will not be any changes to the significance or nature of effects predicted for the BVP, only a change of when the predicted effects will occur.

The SLCP and BESP do not propose the addition of any new, or the removal of any existing schemes selected under the BVP. As a result, the alternative plans are predicted to have the same effects as the BVP in this WRZ, which are presented in Section 5.

Hampshire Winchester (HWZ)

There are no differences between the SLCP and BVP in terms of schemes selected or implementation dates in this WRZ. Amendments to the delivery dates of schemes selected under the BESP will not result in any changes to the significance or nature of effects identified for the BVP in Section 5; however, they will result in changes to when those effects will occur. There are some minor changes to implementation dates for demand-side drought options under the BESP in this WRZ.

The SLCP and BESP do not propose the addition of any new, or the removal of any existing schemes selected under the BVP. As a result, the alternative plans are predicted to have the same effects as the BVP in this WRZ, which are presented in Section 5.

Hampshire Southampton East (HSE) WRZ

There are no differences between the SLCP and BVP in terms of schemes selected or implementation dates in this WRZ. The BESP includes earlier delivery dates for three schemes, but this will not change the nature

or significance of the effects identified for the BVP in Section 5. The likely effects will essentially occur slightly earlier in the planning horizon.

The SLCP and BESP do not propose the addition of any new, or the removal of any existing schemes selected under the BVP. As a result, the alternative plans are predicted to have the same effects as the BVP in this WRZ, which are presented in Section 5.

Hampshire Southampton West (HSW) WRZ

There are no differences between the SLCP and BVP in terms of implementation dates in this WRZ. However, the BESP does not include Drought option - supply side (HSW): Sea tankering from Norway (45Ml/d). The SLCP and BVP both identify an implementation date for this option in 2031. As a result, the likely significant effects associated with this option will therefore not be realised under the BESP. This includes a residual moderate negative effect for the Biodiversity SEA objective during construction due to the temporary pipeline crossing the Solent Maritime SAC, Solent & Southampton Water SPA and Ramsar, and the Solent and Dorset Coast SPA. Moderate negative effects were also identified for the Water Resilience, Air, Landscape, Historic Environment and Tourism and Recreation SEA objectives during construction phase, alongside some minor negative effects and no positive effects in the construction phase. The option is identified as having a moderate positive effect on the water Resilience, Climate Change and Health and Wellbeing SEA objectives during the operational phase. The option is identified as having a moderate negative effect against carbon emissions during operation, but no significant negative operational effects.

8.3.3 Eastern area

Kent Medway East (KME) WRZ

In terms of delivery dates there is only one minor change proposed to Interzonal transfer (KTZ-KME): Utilise full existing transfer capacity (9Ml/d) that falls within this WRZ, with the BESP proposing an earlier implementation date in 2036 compared to the SLCP and BVP in 2040. As a result, there will not be any changes to the significance or nature of effects predicted for the BVP, only a minor change to when the predicted effects will occur.

The SLCP and BESP do not propose the addition of any new, or the removal of any existing schemes selected under the BVP. As a result, the alternative plans are predicted to have the same effects as the BVP in this WRZ, which are presented in Section 5.

Kent Medway West (KMW) WRZ

There are no differences between the BVP and BESP in terms of schemes selected or implementation dates in this WRZ. The SLCP includes the delivery of an additional scheme (Bulk export (KMW): Near Rochester to London ring main) in 2070. The assessment of this option identified the potential for residual moderate negative effects during construction on biodiversity, as the scheme crosses and is in close proximity to a number of national (SSSIs and ancient woodland) and international designations (SAC, SPA and Ramsar site). The option includes the installation of a pipeline across the River Medway, which is likely to involve significant engineering works during the construction phase, and therefore that the mobilisation of sediment and the creation of pollution in the River Medway. Residual minor negative effects are identified for a number of other SEA objectives (water, air, climatic factors, landscape, historic environment, material assets and population and human health) during construction.

Residual minor negative effects during operation were identified as a result of operational carbon emissions and minor positive effects in terms of helping to deliver reliable and resilient water supplies. No residual moderate or major positive or negative effects were predicted for this scheme during operation.

Kent Thanet (KTZ) WRZ

In terms of delivery dates there is only one minor change proposed to Interzonal transfer (KTZ-KME): Utilise full existing transfer capacity (9Ml/d) that falls within this WRZ, with the BESP proposing an earlier implementation date in 2036 compared to the SLCP and BVP in 2040. As a result, there will not be any changes to the significance or nature of effects predicted for the BVP, only a minor change to when the predicted effects will occur.

The SLCP and BESP do not propose the addition of any new, or the removal of any existing schemes selected under the BVP. As a result, the alternative plans are predicted to have the same effects as the BVP in this WRZ, which are presented in Section 5.

Sussex Hastings (SHZ) WRZ

Recycling (SHZ): Hastings WTW to Darwell Reservoir (9.5Ml/d) is selected under the BESP in 2067 and not selected under the SLCP and BVP. As a result, the likely significant effects associated with this option will therefore not be realised under SLCP and BVP. This includes a residual major negative effect identified for the Water SEA objective during operation. The option overlies nitrate vulnerable zones, the Hastings Beds Cuckmere and Pevensey Levels, and Kent Weald Eastern - Rother WFD groundwater bodies. It also intersects several surface water bodies, including main rivers, therefore there is potential for leaks and spills during construction that could contaminate the water environment. The WFD assessment confirms potential WFD non-compliance (with medium confidence) regarding discharge into Darwell Reservoir. Given the option is conjunctive use, there is also the potential for residual minor positive effects on the water environment, as it may help to reduce pressures during dry periods.

Residual minor negative effects are identified for a number of other SEA objectives (biodiversity, soil, air, climatic factors, landscape, historic environment, material assets and population and human health) during construction. Residual minor negative effects during operation were identified as a result of operational carbon emissions and minor positive effects in terms of helping to deliver reliable and resilient water supplies.

Recycling (SHZ): Tonbridge to Bewl (5.7Ml/d) (and Recycling (SHZ): Tunbridge Wells WTW conjunctive use with Bewl Reservoir (3.6Ml/d) are essentially the same scheme but with different yields. Recycling (SHZ): Tunbridge Wells WTW conjunctive use with Bewl Reservoir (3.6Ml/d) is selected in the SLCP and BESP in 2036 and not selected in the BVP. Recycling (SHZ): Tonbridge to Bewl (5.7Ml/d) is selected in the BVP in 2036 and not selected in the SLCP and BESP. In summary, the higher yield option is selected in the BVP, while the alternative plans include the lower yield scheme.

A residual moderate negative effect is identified for the Water SEA objective during construction. The option intersects nitrate vulnerable zones, SPZ2 and overlies the Kent Weald Western - Medway WFD groundwater body. Residual minor negative effects are identified for a number of other SEA objectives (biodiversity, soil, air, climatic factors, landscape, historic environment, material assets and population and human health) during construction.

Residual minor negative effects during operation were identified as a result of operational carbon emissions as well as flood risk, as the existing Tunbridge WTW may require site expansion and it is within or within close proximity to flood zones 2 and 3. Residual minor positive effects are also identified during operation as a result of helping to deliver reliable and resilient water supplies. A residual major negative effect is identified for water quality as the WFD assessment found potential WFD non-compliance (with medium confidence) regarding discharge into Bewl water. The WFD assessment identifies that new discharge of treated effluent could potentially result in physico-chemical effects that could impact on biological status elements. Macrophytes are already at Poor status, and the option could make it more difficult to achieve future improvements. A new discharge into the reservoir could potentially change the physico-chemistry of the water body, for example by increasing nutrient concentrations, changing dissolved oxygen concentrations, and changing water temperature. The water body already fails for phosphate, which is at Poor status, and

the introduction of treated effluent (depending on the final discharge quality) could worsen this or prevent future improvements. Further assessment is therefore required to consider the final characteristics of the new discharge and ensure that water quality is not compromised.

8.4 Assessment of the effects of the demand management options

There are no differences to the demand schemes selected under the BVP compared to the alternative plans (SLCP and BESP). As a result, the findings on likely significant effects presented in Section 5 for the BVP demand management options are also valid for the alternative plans.

8.5 Summary of significant effects by WRZ

At a plan or individual scheme level there are no differences in terms of significant (major) effects between the SLCP, BESP and the preferred programme (BVP) for the majority or WRZs. The alternative plans do not include any new schemes or remove any existing schemes selected under the preferred programme (BVP) that are predicted to result in a significant (major) effect. As a result, the summary of significant effects presented for the preferred programme (BVP) in Section 5.8 and in **Error! Reference source not found.** are also valid for the alternative plans.

8.6 Cumulative effects of the alternative plans

The cumulative effects (post mitigation) associated with the preferred programme (BVP) are presented in Section 6 of this report. Table 8-4 below builds on this work and presents the cumulative effects (post mitigation) of the alternative programmes (SLCP and BESP) compared to the BVP. In summary, there are no significant differences between the preferred programme (BVP) and alternative programmes in relation to the predicted cumulative effects.

Table 8-4 Cumulative effects assessment of the alternative plans.

SEA topic	SEA objective	BVP cumulative score Construction (Post mitigation)	BVP cumulative score Operation (Post mitigation)	Commentary	SLCP cumulative score Construction (Post mitigation)	SLCP cumulative score Operation (Post mitigation)	BESP cumulative score Construction (Post mitigation)	BESP cumulative score Operation (Post mitigation)
Biodiversity, flora and fauna	Protect and enhance biodiversity, priority species, vulnerable habitats and habitat connectivity (no loss and improve connectivity where possible)	---	+/---	The amended implementation dates and changes to schemes proposed under the alternative plans do not significantly affect the findings of the cumulative effects for the BVP. The alternative plans are still likely to have a significant negative cumulative effect during construction and operation as a result of schemes that are common across the plans. As for the BVP, minor cumulative positive effects are also likely during operation for the alternative plans through the delivery of BNG and provision of ecosystem services associated with habitat creation and enhancement such as new woodland sequestrating carbon.	---	+/---	---	+/---
Soil	Protect and enhance the functionality, quantity and quality of soils	--	-	The alternative plans are also likely to lead to the cumulative permanent loss of soils, including best and most versatile agricultural land. As for the BVP, the residual effects in the operation phase of the alternative plans are expected to be minor, reflecting that the majority of schemes (pipelines) will allow for full reinstatement.	--	-	--	-

SEA topic	SEA objective	BVP cumulative score Construction (Post mitigation)	BVP cumulative score Operation (Post mitigation)	Commentary	SLCP cumulative score Construction (Post mitigation)	SLCP cumulative score Operation (Post mitigation)	BESP cumulative score Construction (Post mitigation)	BESP cumulative score Operation (Post mitigation)
Water	Increase resilience and reduce flood risk	-	-	As for the BVP, a number of schemes selected under the alternative plans are located partially within Flood Zones 2 or 3. No differences in the cumulative effects predicted for the BVP compared to the alternative plans. For both construction and operation, cumulative minor negative effects are assessed.	-	-	-	-
	Protect and enhance the quality of the water environment and water resources	-	---	The alternative plans also include options that are identified through the WFD assessment as being non-compliant (with medium confidence). The BESP includes an additional option identified as being non-compliant (with medium confidence) but this does not change the potential significance of the residual effect which already major. As a result, cumulative significant negative effects are also predicted for the alternative plans during operation. A number of options would involve construction work across waterbodies or are close to waterbodies. This will require mitigation measures to minimise or avoid impacts on water environment. Cumulative minor negative effects are assessed for the construction phase.	-	---	-	---

SEA topic	SEA objective	BVP cumulative score Construction (Post mitigation)	BVP cumulative score Operation (Post mitigation)	Commentary	SLCP cumulative score Construction (Post mitigation)	SLCP cumulative score Operation (Post mitigation)	BESP cumulative score Construction (Post mitigation)	BESP cumulative score Operation (Post mitigation)
	Deliver reliable and resilient water supplies	0	+++	As for the BVP, the alternative plans would deliver increased capacity across the Southern Water area which will help to ensure a reliable and resilient water supply. Overall, in the operation phase the BVP and alternative plans would be expected to deliver significant positive effects against this SEA objective. Cumulatively neutral effects are assessed in the construction phase.	0	+++	0	+++
Air	Reduce and minimise air emissions	--	-	As for the BVP, construction of the alternative plan schemes will generate emissions to air (predominantly through vehicle emissions) which could affect local air quality. Overall, at the plan level there are no significant differences between the BVP and alternative plans. It is concluded that the alternative plans are likely to result in cumulative moderate negative effects during the construction phase. In the operational phase these effects linked to vehicle movements are expected to be lower than during construction with residual minor effects likely remain for the alternative plans as a whole.	--	-	--	-
Climatic factors	Reduce embodied and operational carbon emissions	---	+/---	The alternative plans are predicted to have similar cumulative effects compared to the BVP against this SEA objective. The construction of the	---	+/---	---	+/---

SEA topic	SEA objective	BVP cumulative score Construction (Post mitigation)	BVP cumulative score Operation (Post mitigation)	Commentary	SLCP cumulative score Construction (Post mitigation)	SLCP cumulative score Operation (Post mitigation)	BESP cumulative score Construction (Post mitigation)	BESP cumulative score Operation (Post mitigation)
				alternative plan schemes will require materials with embodied carbon as well as generate a substantial volume of vehicle movements which will contribute to carbon emissions. In the operational phase the alternative plans would also incur ongoing carbon emissions associated with the energy used e.g. pumping stations, WTW works, desalination plants. Cumulatively, this is likely to be significant. As for the BVP, the demand management options will see a reduction in carbon linked to reduced demand for water, whilst drought options would reduce use which would likely see reduced energy consumption.				
	Reduce vulnerability to climate change risks and hazards	0	++/--	Cumulatively the alternative plan schemes would increase the capacity of water supply within the Southern Water area as for the BVP with a moderate positive effect during operation. However, there may be some cumulative moderate negative effects in relation to the application of the drought measures (linked to increased abstraction). The resilience is unlikely to be affected in the construction phase and therefore neutral effects are assessed.	0	++/--	0	++/--

SEA topic	SEA objective	BVP cumulative score Construction (Post mitigation)	BVP cumulative score Operation (Post mitigation)	Commentary	SLCP cumulative score Construction (Post mitigation)	SLCP cumulative score Operation (Post mitigation)	BESP cumulative score Construction (Post mitigation)	BESP cumulative score Operation (Post mitigation)
Landscape	Conserve, protect and enhance landscape, townscape and seascape character and visual amenity	---	-	As for the BVP, the alternative plans include a number of schemes that either partially pass through or are wholly within nationally designated landscapes. Overall, given the number of schemes there is likely to be a cumulative significant negative effect on landscape in the construction phase but these effects will be temporary as the majority of schemes involve pipelines that will not be visible during operation. Minor negative effect also predicted during operation as a result of some visible new infrastructure.	---	-	---	-
Historic environment	Conserve, protect and enhance the historic environment, including archaeology	--	-	As for the BVP, the alternative plans include several options that are located within or in close proximity to designated heritage assets. Post mitigation of the effects, these schemes are not predicted to have significant effects during construction. There is the potential for residual minor cumulative effects during operation where above ground infrastructure falls within the setting of designated heritage assets.	--	-	--	-

SEA topic	SEA objective	BVP cumulative score Construction (Post mitigation)	BVP cumulative score Operation (Post mitigation)	Commentary	SLCP cumulative score Construction (Post mitigation)	SLCP cumulative score Operation (Post mitigation)	BESP cumulative score Construction (Post mitigation)	BESP cumulative score Operation (Post mitigation)
Population and human health	Maintain and enhance the health and wellbeing of the local community, including economic and social wellbeing	--	+++/-	At a plan level, there are no significant differences between the BVP and the alternative plans in terms of cumulative effects against this SEA objective. The construction of water resources infrastructure can temporarily adversely affect health and wellbeing through the generation of traffic, noise, vibration, emission to air. In the operational phase the positive effects on health primarily relate to the provision of clean drinking water alongside demand management and leakage reduction of across the Southern Water area, which taken together are considered significant. However, some drought measures (such as the non-essential use ban and reduction to provision to commercial customers, which may impact some businesses) will likely have negative impacts in the operational phase.	--	+++/-	--	+++/-
	Maintain and enhance tourism and recreation	--	-	As for the BVP, the location of some options selected under the alternative plans will mean that there are inevitable impacts on recreational facilities either indirectly (in terms of noise or disturbance) or directly. Cumulatively, given the temporary nature and mitigation measures employed, this is likely to be moderate. Cumulatively, minor	--	-	--	-

SEA topic	SEA objective	BVP cumulative score Construction (Post mitigation)	BVP cumulative score Operation (Post mitigation)	Commentary	SLCP cumulative score Construction (Post mitigation)	SLCP cumulative score Operation (Post mitigation)	BESP cumulative score Construction (Post mitigation)	BESP cumulative score Operation (Post mitigation)
				negative effects are assessed for the BVP and alternative plans as a whole as a result of drought options that could restrict water supply for tourism and recreation.				
Material assets	Minimise resource use and waste production	---	--	As for the BVP, given the cumulative concrete, steel and plastics that will likely be required to construct the alternative plan options there is likely to be a significant amount of waste generated (although there is some potential for re-use of materials and sustainable design measures). Cumulative significant negative effects have therefore been predicted. In the operation phase there will be ongoing production of waste linked to chemical treatment of water and generation of brine from desalination as a result of the BVP and the alternative plans. Cumulatively, this is likely to be moderately negative.	---	--	---	--
	Avoid negative effects on built assets and infrastructure	--	0	As for the BVP, a number of options intersect with major roads, railway lines and national cycle routes, whilst others are located within built up areas. Cumulatively, there is therefore likely to be some disruption to built assets and infrastructure during the construction phase, including the need for road closures and diversions. Cumulatively, this is	--	0	--	0

SEA topic	SEA objective	BVP cumulative score Construction (Post mitigation)	BVP cumulative score Operation (Post mitigation)	Commentary	SLCP cumulative score Construction (Post mitigation)	SLCP cumulative score Operation (Post mitigation)	BESP cumulative score Construction (Post mitigation)	BESP cumulative score Operation (Post mitigation)
				considered likely to be moderate negative. In the operation phase, neutral cumulative effects are assessed given infrastructure will be in situ.				

8.6.1 Cumulative effects of the alternative plans summary

At the plan level, there are no significant differences between the preferred programme (BVP) and the alternative plans (SLCP and BESP) in terms of predicted cumulative effects. Changes in implementation dates could result in some differences to cumulative effects at a more localised scale, for example at an individual WRZ level, but these would not affect the overall cumulative effects predicted for the plans. The alternative plans do not propose the removal or inclusion of any individual schemes that would alter the significant effects identified for the BVP. These changes to schemes are not considered to result in any significant differences to the cumulative effects predicted at the plan level for the preferred programme (BVP).

9 Next Steps and proposals for monitoring

9.1 Conclusions

Southern Water's forecasts in the rdWRMP24 show that as a consequence of growth, Environmental Destination commitments and climate change, there are significant deficits forecast through to 2075 (estimated to be 280.17 Ml/d in 2035 and 552.58 Ml/d in 2075 in the 1:500 Dry Year Annual Average (DYAA)). In consequence, Southern Water are undertaking a considerable amount of environmental investigation through to 2027 to help to reduce the uncertainty around the possible magnitude of any licence changes required to achieve Environmental Destination.

The forecast deficit will be addressed through the implementation of new options to increase supply as well as measures to reduce demand, including reduction in both leakage and water consumed by household and non-household customers. Following the application of the decision-making tools and testing to some 300 constrained options, Southern Water has identified a total of 111 revised preferred options comprising of 85 supply options, 10 drought options and 16 generic demand management and leakage options.

Overall, the rdWRMP24 is considered to have significant positive operational effect against SEA objectives to: deliver reliable and resilient water supplies; and maintain and enhance the health and wellbeing of the local community, including economic and social wellbeing. The additional design capacity for potable water that Southern Water would provide would help to ensure a continual supply of clean drinking water, supporting economic/population growth, generating a positive effect on human health and increasing adaptability to the effects of climate change.

The rdWRMP24 (post mitigation) is also considered to have a range of likely significant negative effects on the following SEA objectives:

- Protect and enhance biodiversity, priority species, vulnerable habitats and habitat connectivity (no loss and improve connectivity where possible);
- Protect and enhance the quality of the water environment and water resources;
- Reduce embodied and operational carbon emissions;
- Conserve, protect and enhance landscape, townscape and seascape character and visual amenity;
- Minimise resource use and waste production.

These effects reflect the number, scale, proposed location and findings of the HRA and WFD assessments, including a precautionary view on the treatment of uncertainty. Many of the options have been revised from the draft WRMP24, with delivery delayed in the rdWRMP24 to allow sufficient time for investigation and consideration of additional mitigation options.

The HRA has concluded that for a number of options, adverse effects on integrity cannot be excluded. This reflects the desalination plant options concerning either construction (East Thanet, with potential effects arising from the proposed outfall being located within the Outer Thames Estuary SPA and potentially within the Margate and Long Sands SAC) and operation in relation to the hypersaline discharge related to the operation of the desalination schemes:

- Isle of Sheppey regarding impacts on the Medway Estuary and Marshes SPA and Ramsar and Thames Estuary and Marshes SPA and Ramsar;
- River Thames desalination regarding impacts on the Thames Estuary and Marshes SPA and Ramsar;
- East Thanet desalination scheme with regards to Outer Thames Estuary SPA and Margate and Long Sands SAC.

The revised earliest implementation date also allows Southern Water to engage with other water companies to review the proposed desalination options on the north Kent coast, with the intention, to be reflected in future WRMP cycles, of a revised, integrated solution, providing substantial yield to the benefit of customers, but appropriately sited to avoid and minimise the range of current identified option and cumulative effects.

The WFD assessment found that the supply options could have effects on water quality affecting the ability of some waterbodies to meet WFD objectives. These issues could result in changes to physico-chemical quality elements (e.g. BOD, DO, pH, temperature). Many of the options with potential non-compliance were assessed with low confidence. However, for four options, the WFD assessment concluded the potential for non-compliance with the WFD (with medium confidence). Some of these options involve effluent re-use schemes where the effluent would be discharged to a lake. The others involve a groundwater abstraction. There is limited detail available for these options, and subject to further investigation, it is possible that different conclusions could be drawn with more evidence. Further evidence and assessment is required, and is being progressed through the programme of work to reduce delivery risk as well as programmes to support the Hampshire Water Transfer and Water Recycling Project (HWTWRP) SRO. Given the significant lead in time for some options, it is considered to provide an adequate period with which to conclude such investigations and establish conclusions with which the regulator would concur.

When compared to the assessment of effects the reasonable alternative plan, there are no significant differences between the Southern Water rdWRMP24 and the alternative plans (the Least Cost Plan and the Best Environmental and Societal Plan) in terms of the predicted cumulative effects. The alternative plans do not remove or add any additional significant effects not already identified for the BVP. However, changes in implementation dates could result in some differences as to when effects may occur, which may also have localised effects, but these would not affect the overall cumulative effects predicted for the plans.

9.2 Role of the SEA in developing the WRMP

The SEA, along with the findings of the HRA and WFD assessment, have been used to help inform the development of the rdWRMP24, and enable the consideration of reasonable alternative options for inclusion in the plan and/or alternative phasing of implementing the different options. In summary, the application of these processes has:

- Informed dialogue with the Environment Agency and Natural England as to the options to be included in the rdWRMP24, their effects and potential for modifications.
- Identified a small number of options that have been excluded from the rdWRMP24 due to environmental and other concerns.
- Supported engineering design changes to six schemes to reflect further mitigation opportunities (Isle of Sheppey desalination, River Arun desalination, Thanet Coast desalination, Test Managed Aquifer Recharge, Pulborough to Havant Thicket transfer, SES to SNZ transfer).
- Fostered sub-regional discussions and commitments to refinement of the proposed desalination options on the north Kent coast.

9.3 Next steps

The SEA, along with the findings of the HRA and WFD assessment, have been used to help inform the development of the rdWRMP24. In summary, the application of these processes has:

- Informed dialogue with the EA and NE as to the options to be included in the WRSE Emerging Regional Plan and the rdWRMP24.
- Identified a number of HRA and WFD risks.

- Identified a small number of options that have been excluded from the rdWRMP24 due to environmental and other concerns.

Southern Water is submitting the rdWRMP24 and this Environmental Report to the Secretary of State for Environment, Food and Rural Affairs, for a request for publication and once directed to do so, Southern Water will publish the documents for consultation. Following consultation and an analysis of responses and any further work, Southern Water will complete a final dWRMP24. This will be submitted to Government. Following receipt of Government direction, Southern Water will publish the final WRMP24. In conjunction with publishing the final WRMP24, a Post Adoption Statement will also be issued (to meet the requirements of SEA regulation 16 (4)). This will set out the results of the consultation and SEA processes and the extent to which the findings of the SEA have been accommodated in the final plan.

9.4 Consideration of environmental effects during plan implementation

Once the WRMP24 has been agreed, the preferred options for managing water supply and demand contained in it will need to be implemented through specific projects. As part of this process, each project may be subject to further assessment to understand and manage its potential environmental and social impacts. These assessments, which may include HRA and EIA, will take account of the issues discussed in this Environmental Report but will also be informed by the greater detail available as the work progresses about construction techniques, building materials, agreed locations and routes.

9.5 Monitoring the effects of the WRMP

Monitoring is required to track the environmental effects to show whether they are as predicted, to help identify any adverse impacts and trigger deployment of mitigation measures. The SEA Regulations require the responsible authority to:

'monitor the significant environmental effects of the implementation of each plan or programme with the purpose of identifying unforeseen adverse effects at an early stage and being able to undertake appropriate remedial action.'

Monitoring the significant effects of the WRMP24 can help to answer questions such as:

- Were the SEA predictions of effects accurate?
- Is the WRMP24 contributing to the achievement of the SEA objectives?
- Are mitigation measures performing as well as expected?
- Are there any adverse effects? Are these within acceptable limits, or is remedial action desirable?

It is not necessary to monitor everything or monitor an effect indefinitely. Instead monitoring should be focussed on:

- significant effects that may give rise to irreversible damage, with a view to identifying trends before such damage is caused; and
- significant effects where there was uncertainty in the SEA and where monitoring would enable preventative or mitigation measures to be undertaken.

Annex 21 of the rdWRMP24 sets out the monitoring plan for the adaptive planning approach adopted for WRMP24, which will help Southern Water to track and identify the supply-demand adaptive pathway (or 'situation') they are likely to be following into the future, and the options we will need to deliver to maintain the supply-demand balance. Using the WRMP annual review cycle and feeding into the WRSE monitoring of the regional plan, as well as the 5-year water resources management planning cycle, Southern Water can

ensure progress on the adaptive plan is monitored and updated regularly, and action is taken in timely manner to course correct if needed.

As options are brought forward for development, further specific monitoring requirements may be set out in detailed designs and plans accompanying scheme development (including, where applicable, formal applications for any required environmental permits or abstraction licences, planning permission, as well as any scheme-specific HRA and WFD assessments). These will be discussed with relevant regulatory and statutory bodies and stakeholders to agree the appropriate scale and duration of such scheme-specific monitoring activities proportionate to the assessed environmental risks.

Table 9-1 below sets out some proposed monitoring indicators for each of the SEA Topics. In line with the rdWRMP24 monitoring plan, the frequency of review will be aligned with the WRMP planning cycle.

Table 9-1 SEA monitoring indicators for rdWRMP24.

SEA Topic	Monitoring indicators	Source(s) of Information
Biodiversity, flora and fauna	• Number of objections by Natural England on biodiversity grounds for planning applications related to WRMP24 schemes.	Southern Water/ Local Planning Authority
	• Condition of National Site Network sites and SSSIs.	Natural England
Soil	• Area of agricultural land (by grade) lost to WRMP options.	Southern Water
Water	• Proportion of surface waters and groundwater waterbodies at 'Good' WFD status	Environment Agency
	• Ecological and chemical status of water bodies.	Environment Agency
Air	• Changes in air quality as monitored by the Defra Automatic Urban and Rural Network	Defra
	• Scheme-specific monitoring during construction works / during operation (where applicable) would be monitored through an Environmental Management Plan agreed as part of the planning permission process	Southern Water/ Local Planning Authority/ Local Authority Environmental Health Departments
Climatic Factors	• Net greenhouse gas emissions per Ml (million litres) of treated water (kg CO2 equivalent emissions per Ml) reported annually by Southern Water	Southern Water
	• Progress against Southern Water Reporting Criteria[69] e.g. Renewable generation	
Landscape	• Number of objections by Natural England on landscape grounds for planning applications related to WRMP24 schemes.	Southern Water/ Local Planning Authority
	• Baseline, construction phase and operational phase Landscape and Visual Impact Assessments or equivalent assessment techniques of sensitive landscapes and visual amenity identified in the SEA (and subsequent planning application submissions) as being at a major or moderate adverse effect. Assessments to	Southern Water/ National Park Authorities/ National Landscape Management Bodies/ Natural England

[69] https://www.southernwater.co.uk/media/4902/reporting_criteria_2020_21.pdf

SEA Topic	Monitoring indicators	Source(s) of Information
	be carried out in consultation with appropriate bodies, such as the National Park Planning Authorities, relevant National Landscape management bodies and Natural England. These surveys will aid planning and evaluation of the success of proposed mitigation measures to reduce adverse effects on landscape and visual amenity.	
Historic Environment	• Number of objections by Historic England on planning applications for WRMP24 schemes.	Southern Water/ Local Planning Authority
	• Change in the number of assets on the Heritage at Risk Register.	Historic England
	• Condition of buried archaeology would be monitored during construction works as part of a watching brief and associate response measures as set out in the Environmental Management Plan agreed as part of the planning permission process.	Southern Water
Population and Human Health	• Complaints logged with Southern Water and Local Authority Environmental Health Officers or equivalent related to WRMP24 schemes.	Southern Water/Local Authority Environmental Health Officers
	• Scheme level community disruption due to construction works / during operation (where applicable) would be monitored through an Environmental Management Plan agreed as part of the planning permission process	Southern Water
Material Assets	• Number of road closures and diversions.	Southern Water
	• Number of complaints related to WRMP24 schemes from infrastructure providers and the public.	Southern Water

10 Quality assurance

The Government's Guidance on SEA[70] contains a quality assurance checklist to help ensure that the requirements of the SEA Directive are met. The checklist is reproduced in Appendices A to L, demonstrating how this Environmental Report meets the requirements.

[70] Office of the Deputy Prime Minister (2005) *A Practical Guide to the Strategic Environmental Assessment Directive*.

Appendices A to L

Please see separate documents.