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SES Water WRMP 24

Strategic Environmental Assessment - Main Report

November 2022

5198463

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Contents

Tables

Figures

Glossary

Abbreviation	Explanation
ALC	Agricultural Land Classification
ACWG	All Company Working Group
AONB	Area of Outstanding Natural Beauty
AQMA	Air Quality Management Area
ARU	Aquifer Resource Unit
BAP	Biodiversity Action Plan
BMV	Best and Most Versatile
BNG	Biodiversity Net Gain
CO_2	Carbon dioxide
DCLG	Department for Communities and Local Government
DEFRA	Department for Environment Food and Rural Affairs
DLUHC	Department for Levelling Up, Housing and Communities
DP	Drought Plan
EAR	Environmental Appraisal Report
ER	Environmental Report
EU	European Union
GHG	Greenhouse Gas
GIS	Geographic Information System
GVA	Gross Value Added
HRA	Habitats Regulation Assessment
IMD	Index of Multiple Deprivation
INNS	Invasive Non Native Species
km	Kilometres
$ktCO_2$	Kilo Tonnes of Carbon Dioxide
LSE	Likely Significant Effects
LFRMS	Local Flood Risk Management Strategies
LNR	Local Nature Reserve
MCZ	Marine Conservation Zone
MRF	Minimum Residual Flow
NCA	National Character Areas
NGO	Non-Governmental Organisation
NHS	National Health Service
NIA	Noise Action Planning Important Area
NNR	National Nature Reserve
NO_2	Nitrogen dioxide

NPPF	National Planning Policy Framework
MCHLG	Ministry of Housing Communities and Local Government
Ml/d	Mega litres per day / Million litres per day
NEUB	Non-Essential Use Ban
ODPM	Office of the Deputy Prime Minister
Ofwat	Water Services Regulation Authority
PM	Particulate Matter
PPPs	Plans, Policies and Programmes
PRoW	Public Right of Way
pSPA	Potential Special Protection Area
RBD	River Basin District
RBMP	River Basin Management Plan
RIGS	Regional Importance Geological Sites
RRP	Regional Resilience Plan
SAC	Special Area of Conservation
cSAC	Candidate Special Area of Conservation
SEA	Strategic Environmental Assessment
SES Water	Sutton and East Surrey Water
SPA	Special Protection Area
SPZ	Source Protection Zone
SSSI	Site of Special Scientific Interest
SuDS	Sustainable Drainage Systems
TUBs	Temporary Use Bans
UK	United Kingdom
UKWIR	UK Water Industry Research
ULEV	Ultra Low Emission Vehicle
WFD	Water Framework Directive
WHS	World Heritage Site
WPS	Water Pumping Station
WRMP	Water Resource Management Plan
WPRG SG	Water Resource Planning Guideline Supplementary Guidance
WRSE	Water Resources South East
WRZ	Water Resource Zone
WTW	Water Treatment Works

1. Introduction

1.1. Purpose of this Document

This is the Strategic Environmental Assessment (SEA) Report of SES Water's Water Resource Management Plan (WRMP24), which has been prepared by Atkins Limited.

In addition to the SEA, five other environmental assessments have been undertaken by Water Resources South East (WRSE) alongside the SEA process of the WRMP24 and integrate with it, namely Habitats Regulations Assessment (HRA), Water Framework Directive (WFD) Assessment, Biodiversity Net Gain (BNG) Assessment, Natural Capital (NC) Assessment and Invasive Non-Native Species (INNS) Assessment. Notes on these assessments have been included as Appendices to this Report.

This SEA Report identifies the likely environmental effects of implementing the WRMP24, with an overview of the Water Resource Plan presented in the following section.

1.2. SES Water

SES Water is a supply-only water company supplying an area of 834 km^2 within Surrey, West Kent, and also in the London Boroughs of Sutton, Croydon and Merton. SES Water supplies, on average, 160 million litres of water per day (Ml/d) in the area, however, during the summer period this can increase to above 200 Ml/d.

SES Water provides supplies to around 745,000 consumers in nearly 300,000 properties from eight WTW. As well as covering a large proportion of Surrey, the SES Water supply area extends into parts of Kent, West Sussex and Greater London.

In respect of sources, 85% of the raw water is extracted from groundwater resources and 15% from Bough Beech Reservoir, supplied by a pumped river abstraction from the River Eden in Kent. The network contains trunk mains capable of transferring water from Bough Beech WTW to the central and northern parts of the supply area.

Groundwater is sourced from four main groundwater aquifer resources units (ARUs). These are:

- North Downs Chalk;
- Confined Chalk;
- Mole Valley Chalk; and
- Lower Greensand

1.3. The background and need for the WRMP

It is a regulatory requirement under the Water Industry Act 1991 for water companies to produce a Water Resources Management Plan (WRMP) every five years to help ensure customers and communities have adequate water supplies available. A WRMP should provide details on how the company will provide and develop an affordable and efficient water supply for its customers, whilst also protecting the environment, effectively improving the resilience of water supplies to droughts and other future challenges.

The SES Water WRMP24 outlines how the water company has considered the implications of climate change, sustainable abstractions, future population, and housing growth, in addition to other factors that affect long term future uncertainty. The Plan sets out the overall approach and recommended options to reduce any predicted deficits and how to maintain secure supplies to its customers, for the period 2025 to 2075. As it is recognised that the Plan could have implications for the environment beyond the Plan area, it is also couched within a wider regional planning context, which examines water resource planning and associated environmental effects across the south-east of England.

1.3.1. Regional Planning

At a national level, water companies across England are developing their own regional plans to give a complete picture of the nation's water resources for the first time. This ensures that the regional plans, when combined, can meet the national need in a dynamic yet flexible way. This more 'joined up' approach marks a step-change in water resource planning. There are five regional groups:

- Water Resources North;
- Water Resources West
- Water Resources East,
- Water Resources West Country; and
- Water Resources South East.

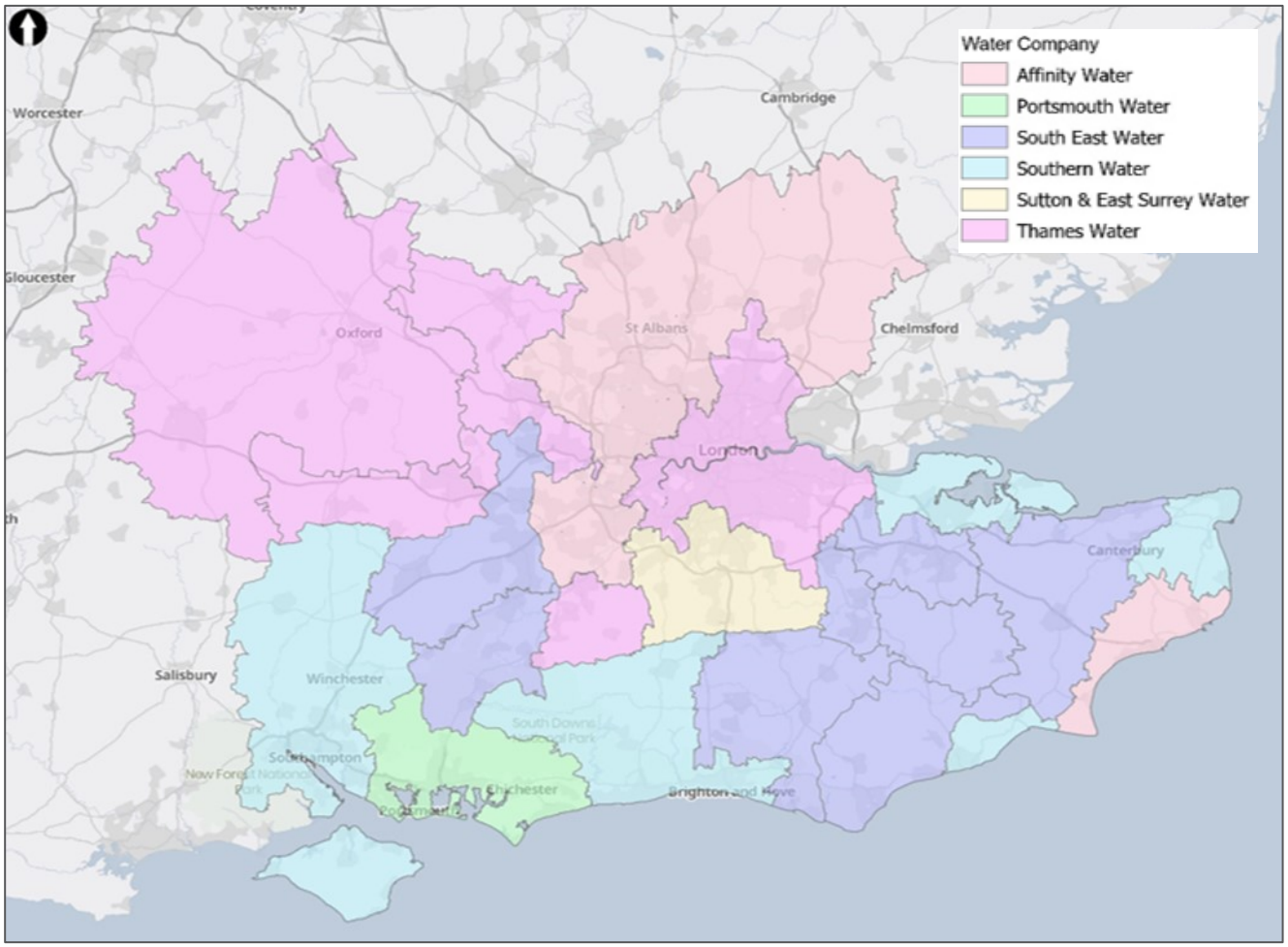
The SES Water WRMP24 is being produced alongside the Water Resources South East (WRSE) regional resilience Plan. The south-east faces the greatest pressures on public water supplies as a designated area of serious water stress by the Environment Agency. This means that current or future household demand for water is a high proportion of the effective rainfall available which is, or is likely to be, available to meet that demand. It has been estimated that over 1 billion additional litres of water will be required per day by 2050 and nearly 1.7 billion litres per day by 2100[1].

Via a collaborative approach, SES Water are working with five other companies under the banner of WRSE to deliver the National Framework for water resources and help safeguard continued supplies of water to this part of the country. Alongside SES Water, the other companies within WRSE are:

- Affinity Water;
- Portsmouth Water;
- Southern Water;
- South East Water; and
- Thames Water.

[1] WRSE Draft Regional Plan SEA Environmental Report, September 2022

Figure 1-1: Water Companies in the WRSE region



The WRSE regional resilience plan aims to take a long-term view to water resource planning across the region to 2100 in order to secure a sustainable and resilient water supply. It covers investment in new infrastructure, leakage reduction measures and water efficiency programmes. In addition, it also includes catchment management solutions which seek to provide more sustainable land management practices that will protect and enhance the quality of the water at source. This will reduce water treatment costs in future, enhance the biodiversity of rivers and streams and increase the overall resilience of the water environment. The Regional Plan seeks to:

- Ensure there is enough water for a **growing population** and to support economic growth;
- **Improve the environment** by leaving more water in the region's rivers, streams and underground sources;
- Increase the region's resilience to **severe drought** and other extreme shocks and stresses; and
- Address the impacts of **climate change** on demand for water and how much is available.

In order to fully identify and assess effects at both the regional and local levels, the regional resilience plan and the local SES Water WRMP24 will iteratively inform each other.

1.4. SES Water's WRMP24

The process of producing a WRMP can be simplified to six stages starting with a calculation of the supply and demand forecasts. Where the supply forecast is not sufficient to meet demand at any point in the planning period, then this deficit must be solved through a comparison of options. How options are assessed, using metrics covering environmental, social and resilience aspects, are developed through engagement and consultation with stakeholders and customers. SES Water assessed different versions of the plan, from least cost to best value, in order to propose a plan which has been fully tested against a range of scenarios including different possible futures that the Company needs to be able to adapt to.

Figure 1-2: WRMP Process

1.4.1. Adaptive planning

There is considerable uncertainty to planning many years in advance as it requires planning for different scenarios using various supply and demand projections. However, the regional planning process has been specifically designed to help water companies adopt a forward-looking approach to uncertain requirements through adaptive planning. This allows companies to plan for schemes that may be required from 2025 and beyond.

In order to do this, WRSE developed a 'root and branch' adaptive tree as the base for forecast for its regional plan investment modelling. This includes the most likely set of future challenges and uncertainties facing the south east region over the next 50 years. There are nine different pathways ('situations'), as shown in Figure 1-2, with different combinations of:

- **Population growth:** According to the Office for National Statistics (ONS) the south east region could grow between two (minimum growth) and 33 per cent (maximum growth) over the next 50 years;
- **Climate change impacts:** Using the Met Offices most recent climate change predictions the model reflects a low climate change forecast up to a high climate change scenario; and
- **Levels of environmental ambition:** There needs to be a reduction on the amount of water taken from rivers, streams and underground sources, all which have impacts on the environment. The model reflects a range of abstraction reduction scenarios from low to high.

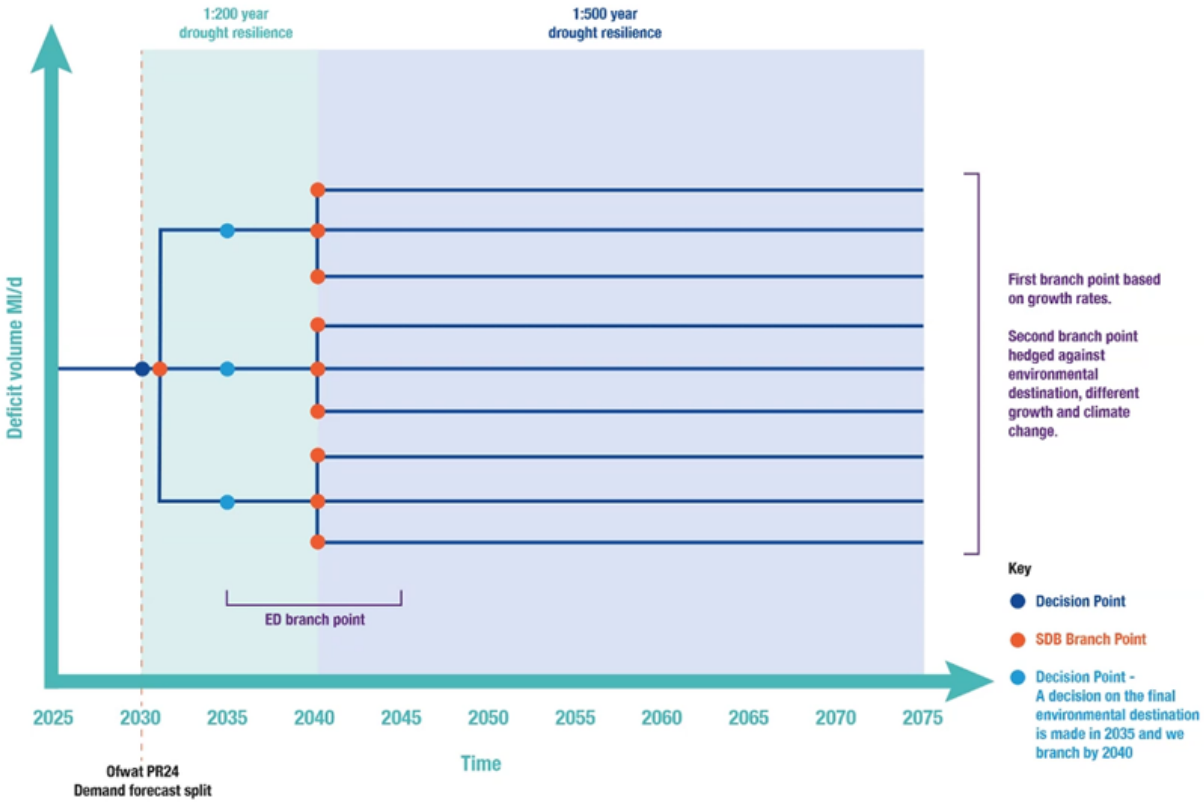
SES Water have developed three levels (high, medium and low) of impact for each of these uncertainties over 5-yearly time steps and built them into the adaptive plan so that solutions for combinations of these pathways can be created (see Figure 1-3). Note that all of these factors are beyond the control of the water companies who cannot influence the pathway they will take but can adapt so that they can meet future challenges. Population growth and climate change are risk-based triggers with smoother trends whereas environmental destination (also known as environmental ambition), which is based on policy decisions relating to step reductions in abstraction, will lead to a corresponding step change in the amount of water available for supply. More information on the impacts of the range of scenarios, in terms of demand and supply, is considered in the Demand Forecast and Supply Forecast chapters of the draft WRMP24.

The investment plan up to the point the first branch occurs, in 2035, is common across all pathways and is termed the 'least regrets' segment of the plan, in that it will allow adaptation to any one of the nine possible pathways from that date onwards. This period will be covered in part by the next Business Plan (PR24) and therefore only one set of investment options will be proposed for the short-term. However, monitoring will be required from 2025 onwards to ensure the plan remains optimal for customers and the environment.

It is important to note that all pathways are assumed to be equally probable, and although one pathway or 'situation' of the nine will be selected to represent the 'preferred plan' this does not infer that it is calculated to be more likely to occur than the others.

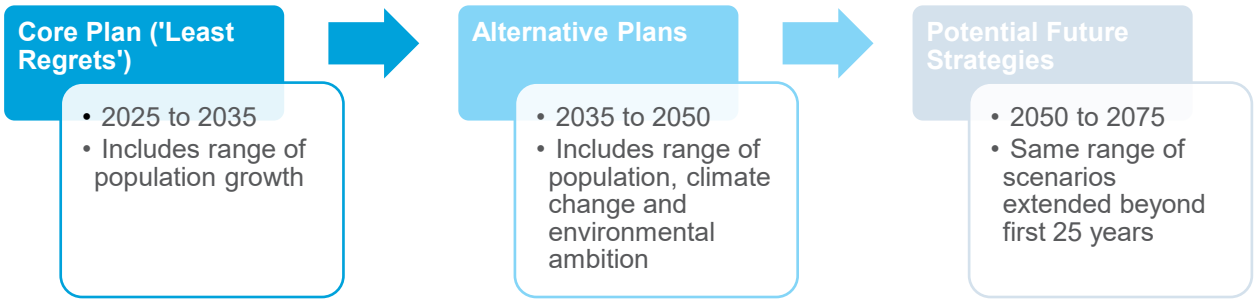
The draft regional plan identifies the immediate investment needed in all the future pathways. It can then adapt depending on which future occurs. This ensures water companies, including SES Water, will make the right immediate investment decisions so they can provide resilient water supplies to their customers in the years ahead.

Figure 1-3: Adaptive Planning



1.4.2. The preferred WRMP24

Aligning with the Regional Plan, SES Water's WRMP24 has been divided into three periods, to reflect the increase in uncertainty over time and therefore a change in the depth of analysis needed. This includes a core plan ('least regrets'), alternative plan and potential future strategies as set out below[2].



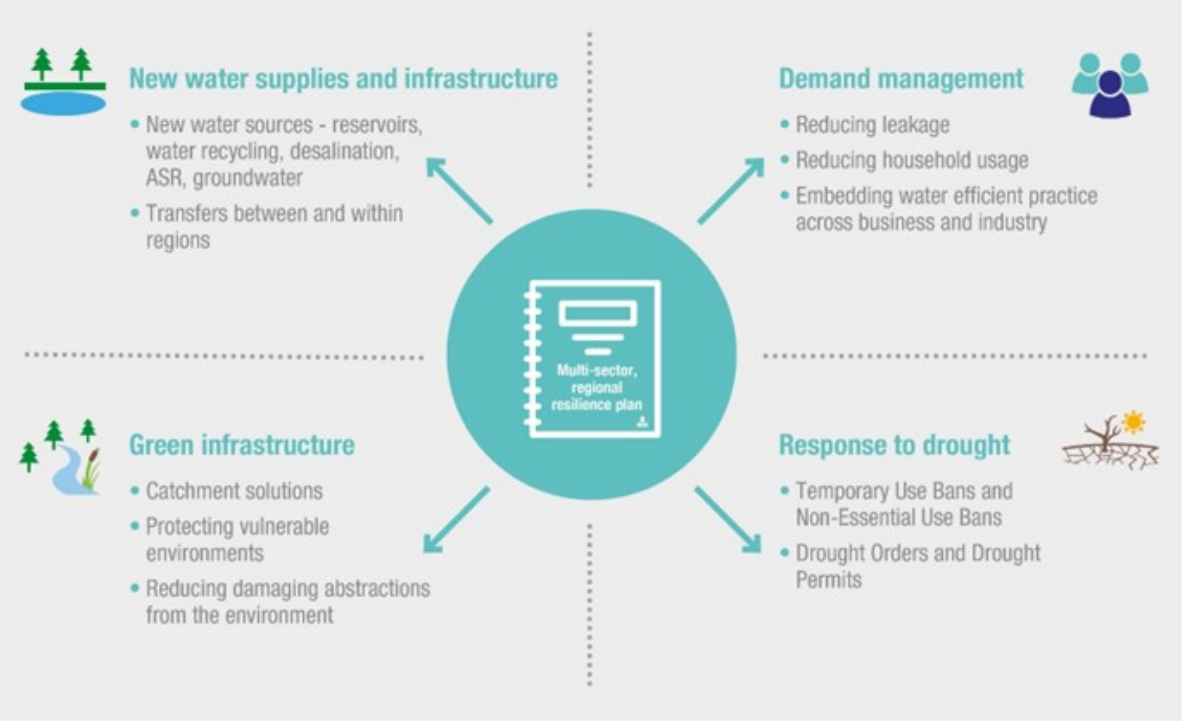
The preferred WRMP24 has taken the adaptive planning approach considered by WRSE. The options appraisal stage was carried out in three main stages:

a) Developing unconstrained options;
b) Screening the unconstrained options to produce a 'feasible' options list; and
c) Option costing (carbon, opex and capex).

For the first stage, four groups of options (new water supplies and infrastructure, demand management, green infrastructure and drought management), as shown in the Figure 1-4, were developed both by SES Water and WRSE. To ensure fairness, options both inside and outside the region were assessed consistently, objectively and transparently, aligning with the regional process, including re-evaluating previously rejected options using the same criteria. SES Water carried out a one-step screening process, with unconstrained options filtered down to a feasible list in one stage, although in some cases using initial and secondary screening criteria. See SES WRMP24 for more information.

[2] SES Water Draft WRMP24

Figure 1-4: Option Types[3]



WRSE options were derived by assessing the potential for import and export transfer options to other regions, and intra-regional transfer options between companies, plus catchment management and multi-sector options which were best conducted at a regional level. The WRSE Method Statement on Options Appraisal[4] provides more detail on the types of options considered.

The screening process removes options which have an unacceptable environmental impact, a high risk of failure or an insufficient yield or demand reduction. The feasible options were then developed to determine costs and assess environmental and social impacts, so that they could be modelled to produce the required solution to the planning problem.

WRSE screening resulted in a shortlist of 41 feasible options relating to hard infrastructure, demand management and drought measures. Options relating to catchment management were not found to increase deployable output but are recommended for consideration as part of a wider approach to reducing the need for end-of-pipe solutions such as additional treatment as well as enhancing biodiversity.

Once the costs for the options had been derived, the results of the assessments were uploaded to the WRSE database to be used in the regional programme appraisal to derive a Best Value Plan and alternatives.

1.4.2.1. Least Cost Plan

Once SES Water had completed their central forecasts and decision-making framework (including the problem characterisation and adaptive planning approach) they ran the regional investment model to determine the most cost-effective way of balancing supply and demand (Least Cost Plan). This was to provide a comparison with later iterations of the model which include value criteria to produce a Best Value Plan (BVP). This process is detailed further in the Best Value Plan Method Statement, available on the WRSE platform.

[3] SES Water Draft WRMP24
[4] https://www.wrse.org.uk/media/e2epaulq/wrse_file_1328_wrse-ms-options-appraisal.pdf

Table 1-1 - Least Cost Plan Option - Situation 4

Option	Delivery Year	Maximum Year (first)
Demand Reduction Basket – Medium	2026	2075
Government-led demand reductions	2027	2075
Temporary Use Bans	2026	2070
Non-Essential Use Bans	2026	2070
Transfer – Bough Beech to Riverhill	2040	2041
Transfer – Outwood to Whitely Hill	2041	2041
Transfer – Outwood to Turners Hill	2031	2031
Drought permits (all)	2026	2026

The most challenging adaptive branch of the Least Cost Plan (Situation 1) also included two hard infrastructure options (Outwood Lane and Seacombe Centre UV). Both of these relate to existing groundwater sources in the North Downs chalk aquifer, although these would not be required until post-2050.

Overall, the modelling results shown that under the Least Cost Plan, SES Water would essentially need to implement the same set of scenarios regardless of the level of supply and demand, but with varying amounts of water available to transfer to neighbouring water company supply areas

1.4.2.2. Best Value Plan

Once the least cost solution was obtained, the investment model was run under alternative programmes to see which options the model would select if the choice was limited in order to favour a certain approach or to incorporate a set target. The aim was to find a plan which not only secures the necessary water resources whilst meeting regulatory and policy requirements, but one that increases the overall benefit to customers, the environment and wider society. SES Waters approach is detailed in the Best Value Planning Method Statement and the Resilience Framework Method Statement available on the WRSE platform.

Table 1-2 - Best Value Plan Options - Situation 4

Option	Delivery Year	Maximum Year (first)
Demand Reduction Basket – Medium	2026	2075
Government-led demand reductions	2027	2075
Temporary Use Bans	2026	2070
Non-Essential Use Bans	2026	2070
Transfer – Bough Beech to Riverhill	2040	2041
Transfer – Outwood to Turners Hill	2031	2031
Transfer – Cheam to Merton	2050	2051
Outwood Lane – increase pump capacity	2042	2046
Raising of Bough Beech Reservoir	2051	2051
Drought permits (all)	2026	2026

In comparison to the least cost plan, the model has selected a lower utilisation of the demand management reductions, a change to one of the transfer schemes and two additional hard infrastructure schemes.

The adaptive BVP also sees the inclusion of the Seacombe Centre UV to meet extra demand that a more challenging pathway needs (Situation 1).

1.4.2.3. Best Environmental and Societal Plan

As required by the Water Resource Planning Guidance (WRPG), SES Water were also required to create an alternative plan which is optimised on delivery of the best outcomes to the environment and society, based on criteria developed in consultation with stakeholders. This gives greater emphasis on the metrics relating to SEA, Natural Capital and Biodiversity Net Gain.

Table 1-3 - Best Environmental and Societal Plan - Situation 4

Option	Delivery Year	Maximum Year (first)
Demand Reduction Basket – Medium	2026	2075
Government-led demand reductions	2027	2075
Temporary Use Bans	2026	2070
Non-Essential Use Bans	2026	2070
Transfer – Bough Beech to Riverhill	2040	2041
Transfer – Outwood to Whitely Hill	2041	2041
Transfer – Outwood to Turners Hill	2031	2031
Transfer – Cheam to Merton	2055	2055
Outwood Lane – increase pump capacity	2042	2042
Raising of Bough Beech Reservoir	2055	2055
Drought permits (all)	2026	2026

In comparison to the Best Value Programme, the BESP selected an additional transfer (Outwood to Whitely Hill), which was also selected in the Least Cost run. All other options are similar, although the Raising of Bough Beech is selected four years later.

1.4.2.4. SES Waters' Preferred Plan

SES Waters Preferred Plan is based on the Best Value Plan, including options on demand management, drought measures and, in the longer term, bulk supply transfer schemes and two supply-side infrastructure schemes. The Preferred Plan options, which are reported in the SEA (Pathway 4), are displayed, in order of delivery date, in Table 1-4 below.

Table 1-4 - Preferred Plan Options

Option	Delivery Year	Maximum Year (first)
Demand Reduction Basket – Medium	2026	2075
Temporary Use Bans	2026	2070
Non-Essential Use Bans	2026	2070
Drought permits (all)	2026	2026
Government-led demand reductions	2027	2075
Transfer – Outwood to Turners Hill (SW)	2031	2031
Transfer – Bough Beech to Riverhill (SEW)	2040	2041
Outwood Lane – increase pump capacity	2042	2046
Transfer – Cheam to Merton (TW)	2050	2051
Raising of Bough Beech Reservoir	2051	2051

Further detail on the Options proposed within WRMP24 are provided in Chapter 10.

For full technical detail of how the WRMP24 was arrived at, please see both the WRSE regional plan and the SES Water WRMP24.

2. Environmental destination

Environmental destination is a new term that was introduced through the Environment Agency's Water Resources National Framework document, published in March 2020. The term refers to the consideration of actions to build environmental resilience to future challenges, for example, to drought, flooding, raw water quality decline, impact from invasive non-native species, land use change, and impacts from run off. This information is important to understand to ensure we meet the objective of leaving the environment in a better place for future generations.

This objective is also reflected in the Government's 25 Year Environment Plan, which also pledges to improve resilience to drought and minimise interruption to water supplies. The 25-year plan also includes a commitment to work with the water industry to set an ambitious personal consumption target. More widely, the 25-year plan embeds an 'environmental net gain' principle for development and sets out ten environmental goals:

1. Clean air;
2. Clean and plentiful water;
3. Thriving plants and wildlife;
4. A reduced risk of harm from environmental hazards such as flooding and drought;
5. Using resources from nature more sustainably and efficiently;
6. Enhanced beauty, heritage and engagement with the natural environment;
7. Mitigating and adapting to climate change;
8. Minimising waste;
9. Managing exposure to chemicals; and
10. Enhancing biosecurity.

Understanding how much water can be abstracted from the environment in a sustainable way now and in the future is important when developing a regional resilience multi-sector plan and individual water companies' water resources management plans within a given region.

WRSE regional resilience plan has sought to address this by incorporating an environmental forecast which sets out potential futures, looking at the potential water quality and availability requirements of the environment. The WRSE environmental assessments, including the SEA, will support the environmental destination by assessing and informing the long-term resilience of the regional plan and aiming to achieve a plan that provides environmental net gain.

WRSE has developed an environmental assessment process (see Figure 2-1) to be applied in the development of the regional resilience plan. SES Water is adopting the same approach as far as possible for the WRMP24 environmental assessment. It is noted that the environmental assessment process includes six different assessments:

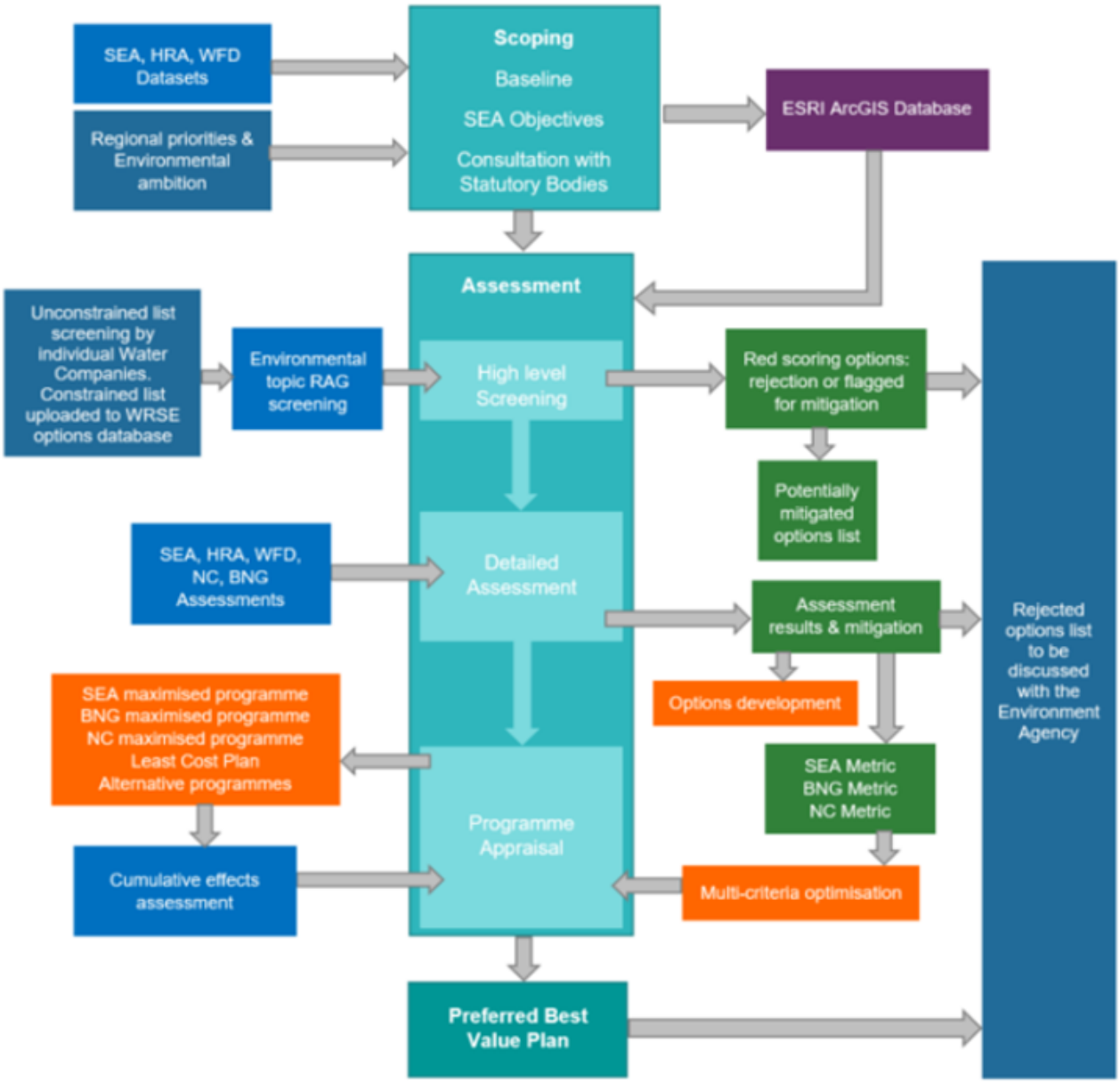
- Strategic Environmental Assessment (SEA);
- Habitats Regulations Assessment (HRA);
- Water Framework Directive (WFD) Assessment;
- Biodiversity Net Gain (BNG) Assessment;
- Natural Capital (NC) Assessment; and
- Invasive Non-Native Species (INNS) Assessment.

As such, SES Water have conducted an environmental assessment process grounded on using the SEA process as the umbrella process under which the parallel environmental assessments listed above will take place as advised in the UKWIR and WRSE environmental assessment guidance (see Figure 2-1).

WRSE have prepared and consulted upon a SEA Scoping Report for the Regional Plan with the statutory consultation bodies in 2020. WRSE have subsequently carried out (2021) a high level screening (for all six assessments mentioned above) of all feasible options provided by SES Water using a methodology as set out

in the WRSE 'Method Statement: Environmental Assessment' guidance document. These assessments were fed into the SES Water WRMP24 environmental assessment as the starting point for the identification of further mitigation for the Plan Options.

Figure 2-1: WRSE Environmental method integration with Options decision making and plan development



3. Approach to the SEA

3.1. Introduction

Due to the various options contained in the WRMP24, as detailed in Chapter 10, and their potential for these to have significant effects on the environment, it has been decided that SEA is undertaken under the European Directive 2001/42/EC 'on the assessment of certain plans and programmes on the environment' (the 'SEA Directive'). This Directive came into force in the UK on 20 July 2004 through the Environmental Assessment of Plans and Programmes Regulations 2004. The Directive applies to a variety of plans and programmes including water resource planning and planning for droughts. While the United Kingdom has now left the EU, these SEA Regulations still apply to a wide range of plans and programmes, including water resource management plans, and modifications to them.

These SEA Regulations still reflect the overarching objective of the SEA Directive which is:

"*To provide for a high level of protection of the environment and to contribute to the integration of environmental considerations into the preparation and adoption of plans…with a view to promoting sustainable development, by ensuring that, in accordance with this Directive, an environmental assessment is carried out of certain plans…which are likely to have significant effects on the environment*." (Article 1)

The main requirements introduced by the SEA Regulations are that:

- the findings of the SEA are published in an Environmental Report (ER), which sets out the significant effects of the draft plan;
- consultation is undertaken on the plan and the ER;
- the results of consultation are taken into account in decision-making relating to the adoption of the plan; and
- information on how the results of the SEA have been taken into account is made available to the public.

As noted by WRSE, the WRSE regional plan environmental assessments including the SEA has been used as a framework for the WRSE member water companies when undertaking their WRMP24 statutory environmental assessments. A large amount of the supporting information required for WRMP24 has been produced as part of the regional plan environmental assessments which were made available for use by the individual water companies[5]. This SEA has utilised this information upon which to build upon this more detailed assessment of 'local' effects.

3.2. Geographical and temporal scope of the WRMP24

The WRMP applies to the water supply area under the responsibility of SES Water, as shown on Figure 3-1. SES Water supply approximately 160 million litres of clean water every day to over 745,000 people in parts of Surrey, Kent and south London. The supply area is 322 square miles extending from Morden and South Croydon in the north to Gatwick Airport in the south and from Cobham, Leatherhead and Dorking in the west to Edenbridge in the east.

The Plan area, intersects with 12 Local Authority areas, as follows:

- Sevenoaks;
- Elmbridge;
- Epsom and Ewell;
- Guildford;
- Mole Valley;
- Reigate and Banstead;

[5] See Section 4.7 of WRSE Draft Regional Plan SEA Environmental Report

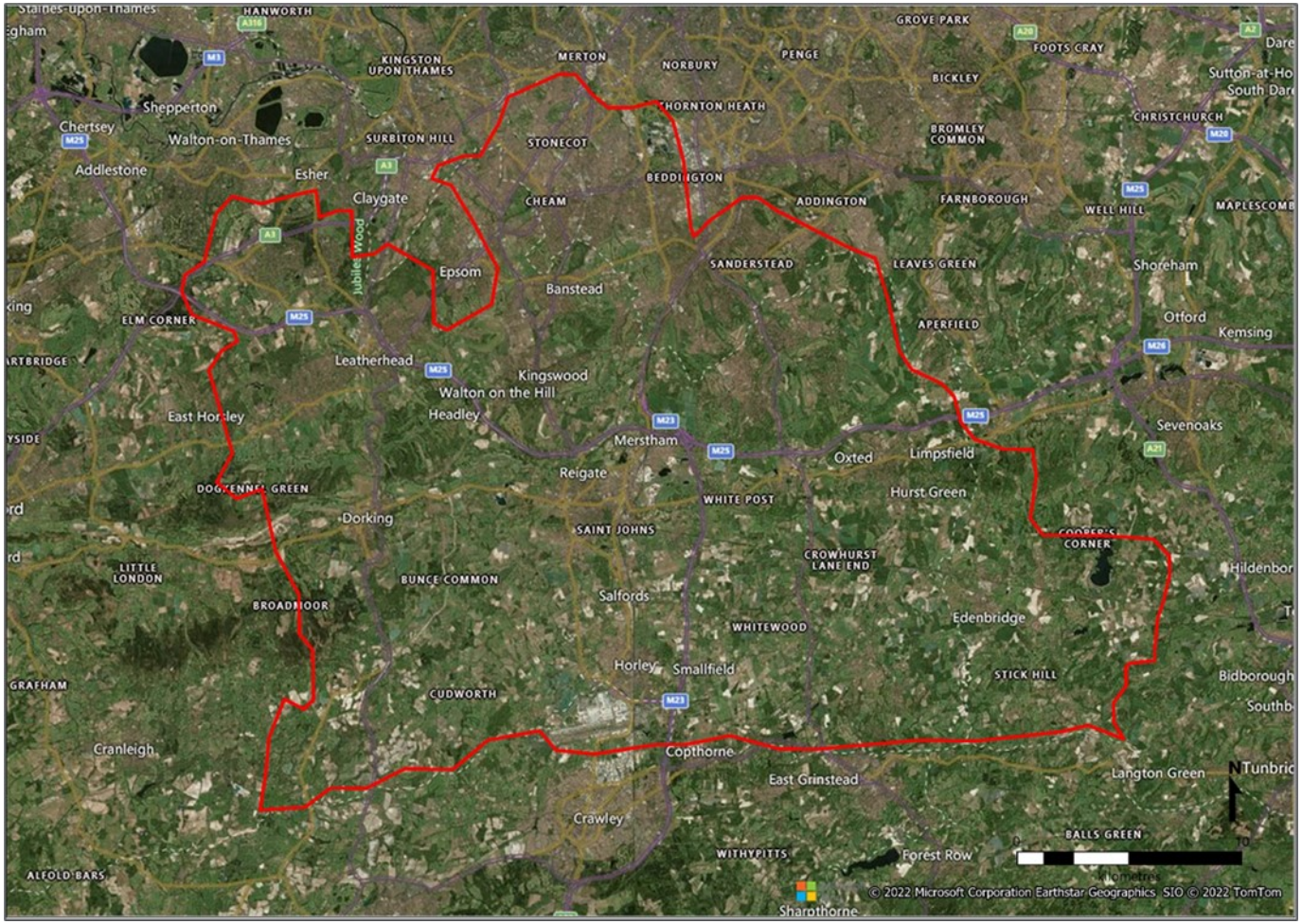
- Tandridge;
- Crawley;
- Croydon;
- Kingston upon Thames;
- Merton; and
- Sutton.

It is to be noted that effects could be experienced outside of the Plan area for example, from transfer of water outside the plan area or from options close to the plan boundary with potential pathways affecting receptors outside the plan area. Such potential for 'transboundary' effects is considered in the assessment (mainly via the work undertaken by WRSE). It should also be noted however, that it is not anticipated that this WRMP24 will have any effect in any Devolved administration within the United Kingdom, or in any other state outside the United Kingdom – in short, it is considered that significant effects will be confined to England only.

WRMPs are long term operational plans (reviewed and updated at least every five years). The SES Water 'Water Resource Management Plan 24' (WRMP24) is linked to the Company's Drought Plan in that both plans have the objective of maintaining water supplies to customers, at least for essential purposes, up to a defined level of resilience or drought severity. The WRMP is a long term plan to cover the 50 year period from 2025-2075 and assesses future demand against supply availability, and determines any measures needed to address a future gap in supplies.

In both plans, the supply area (classed as a single Water Resource Zone) is the geographical unit of assessment used in water resource planning. All actions, including demand restrictions on customers, would be implemented consistently and uniformly across the area.

Figure 3-1 - SES Water WRMP 24 area



3.2.1. Technical scope of the SEA

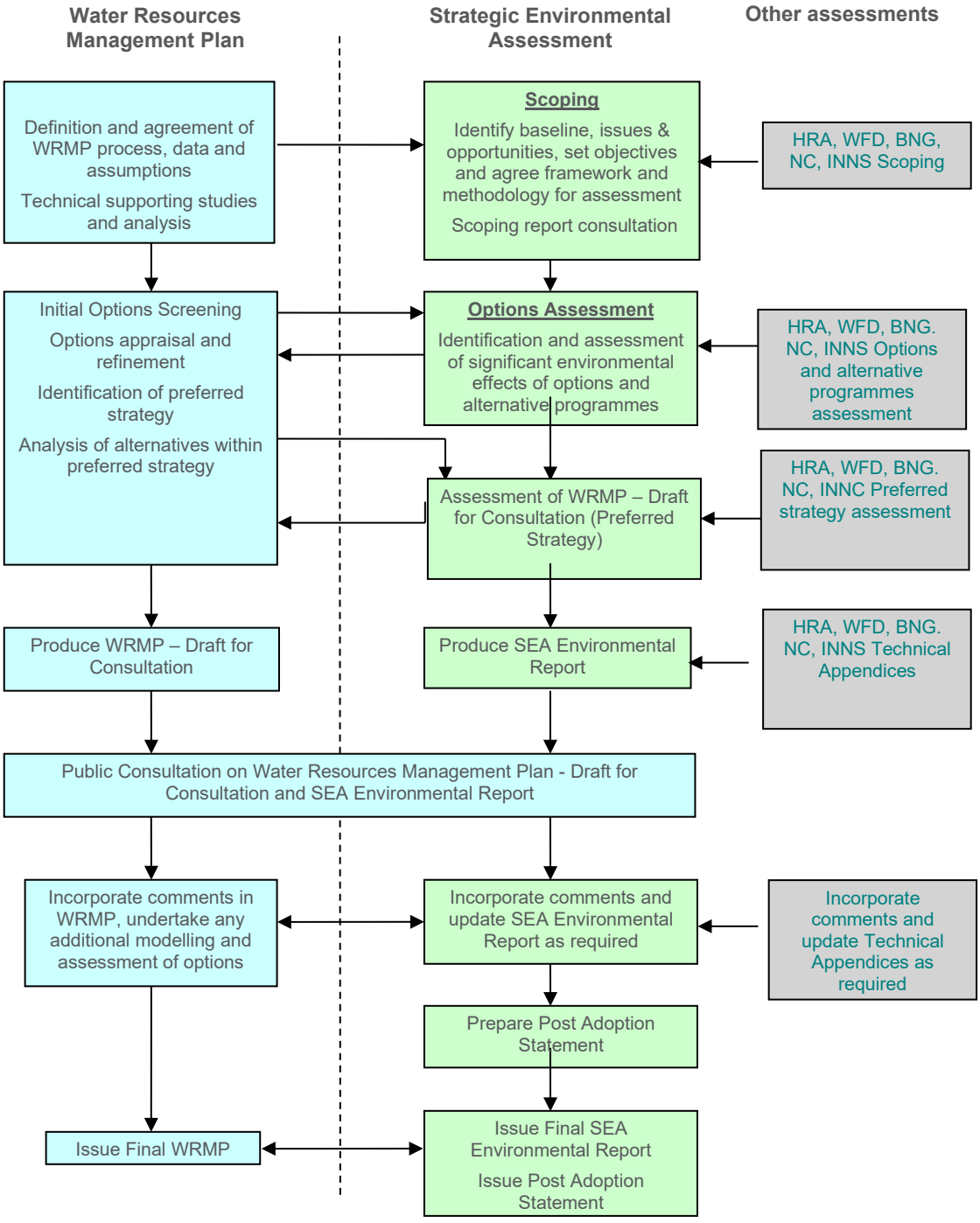
The SEA Directive and the SEA regulations require that the likely significant effects on the environment are assessed, considering the following factors and interrelationship between them:

- Biodiversity;
- Population;
- Human health (covering noise issues among other effects on local communities and public health);
- Fauna and flora;
- Soil;
- Water;
- Air;
- Noise;
- Climatic factors;
- Material assets (covering infrastructure, waste and other assets);
- Cultural heritage including architectural and archaeological heritage; and
- Landscape.

In addition to consideration of the above factors within the SEA, more detailed assessment of particular elements has been made and have been used to help inform the SEA. These elements are:

- Habitats Regulations Assessment (HRA);
- Water Framework Directive (WFD) Assessment;
- Biodiversity Net Gain (BNG) Assessment;
- Natural Capital (NC) Assessment; and
- Invasive Non-Native Species (INNS) Assessment.

Figure 3-2 - Relationship between WRMP24, SEA and other environmental assessment processes



An introduction to each of these other assessments is presented in turn as follows.

3.3. Introduction to Habitats Regulation Assessment

Habitats Regulation Assessment (HRA) is required by the Conservation of Habitats and Species Regulations 2017 (SI No. 2017/1012, as amended by The Conservation of Habitats and Species (Amendment) (EU Exit) Regulations 2019 (SI 2019/579)) for all plans and projects which may have likely significant effects on a European site and are not directly connected with or necessary to the management of the European site. The WRMP24 itself is not directly connected with, or necessary to, the nature conservation management of any European sites.

European sites include Special Areas of Conservation (SAC) and Special Protection Areas (SPA). As a matter of UK Government policy, potential SPAs (pSPA), possible SACs (pSAC), listed or proposed Wetlands of international importance (Ramsar sites) and sites identified, or required, as compensatory measures for adverse effects on European sites, pSPA, pSAC, and listed or proposed Ramsar sites, are included for the purposes of considering plans and projects which may affect them. Hereafter all of the above designated nature conservation sites are referred to as 'European sites'.

There are four stages to the HRA process. These are summarised below:

- Stage 1 – Screening: To test whether a plan or project either alone or in combination with other plans and projects is likely to have a significant effect on a European site;
- Stage 2 – Appropriate Assessment: To determine whether, in view of a European site's conservation objectives, the plan (either alone or in combination with other projects and plans) would have an adverse effect on the integrity of the site with respect to the site structure, function and conservation objectives. If adverse impacts are anticipated, potential mitigation measures to alleviate impacts should be proposed and assessed;
- Stage 3 – Assessment of alternative solutions: Where a plan is assessed as having an adverse impact (or risk of this) on the integrity of a European site, there should be an examination of alternatives (e.g. alternative locations and designs of development); and
- Stage 4 – Assessment where no alternative solutions remain and where adverse impacts remain: In exceptional circumstances where no alternative solutions remain and where adverse impacts remain (e.g. where there are imperative reasons of overriding public interest). Compensatory measures would usually be required to offset negative impacts.

As part of the regional level work, WRSE completed the Stage 1 'screening' assessments on all the options selected in SES Waters Preferred Plan. Where a scheme was assessed as having likely significant effects on a European site, either alone or in-combination, a Stage 2 'Appropriate Assessment' was undertaken. The results of the Stage 2 assessments were reported back to WRSE, as part of the iterative process, and fed into the modelling and the option selection process. Please refer to Appendix F for full HRA report.

All the international sites within the WRMP24 area and up to 30km from its boundaries have been identified and are listed in Table 3-1 (see also Figures in Appendix D, as well as the HRA Appendix G).

Relevant designated sites have been identified and are reported in Table 3-1 below.

Table 3-1: Natura 2000 sites identified in HRA

Natura 2000 site name	Type	Location
Mole Gap to Reigate Escarpment	SAC	Within the SES Water Supply area
Thames Basin Heaths	SPA	Within the SES Water Supply area
Richmond Park	SAC	Extended study area*
Wimbledon Common	SAC	Extended study area*
Thames Estuary and Marshes	SPA and Ramsar	Extended study area*
Peter's Pit	SAC	Extended study area*
Medway Estuary and Marshes	SPA and Ramsar	Extended study area*

*An extended study area has been defined by aquifer units and catchments within which the supply-side actions would operate or downstream of their location. This recognises the potential for hydrological and hydrogeological mechanisms by which drought actions could theoretically affect European Sites.

3.4. Introduction to Water Framework Directive

The Water Environment (Water Framework Directive) (England and Wales) Regulations 2017 require all natural water bodies to achieve both Good Chemical Status (GCS) and Good Ecological Status (GES) which, collectively, result in a water body classification of good status. The River Basin Management Plans (RBMP) outline the actions required to enable natural water bodies to achieve good status. Artificial and Heavily Modified Water Bodies (A/HMWB) may be prevented from reaching GES due to the modifications necessary to maintain their function, or 'human use'. They are, however, required to achieve Good Ecological Potential (GEP).

New activities and schemes that affect the water environment may adversely impact biological, hydromorphological, physico-chemical and/or chemical quality elements (WFD quality elements), leading to a deterioration in the baseline water body status. They may also render proposed improvement measures ineffective, precluding the ability of the water body to meet its WFD objectives for GES/GEP. Under the WFD Regulations, and to attain WFD 'compliance', activities and schemes must not cause deterioration in water body status or prevent a water body from meeting GES/GEP by invalidating improvement measures.

The overall ecological status of a water body is primarily based on consideration of its biological quality elements and is determined by the lowest scoring of these elements. These biological elements are, however, supported by the physico-chemical and hydromorphological quality elements. Assessment of hydromorphological quality is not explicitly required for a water body to achieve GES or lower. However, for a water body to be classed as high status hydromorphological quality must be considered to be at near reference conditions within the classification assessment.

In addition, to achieve the overall WFD aim of GES, a water body must pass a separate chemical status assessment to reach Good Chemical Status, relating to pass/fail checks on the concentrations of various identified priority/dangerous substances.

There are two key objectives against which the impacts of proposed works on a water body need to be assessed and met to determine compliance and to avoid infraction of the WFD Regulations:

- The scheme will not cause a deterioration in any element of water body classification.
- The scheme will not prevent the WFD status objectives from being reached within the water body or other downstream water bodies.

A third objective that is central to the Environment Agency's implementation of the WFD is:

- The scheme will contribute to the delivery of the relevant WFD objectives. In this case, it will be what contribution the scheme can make towards the water body reaching its objective GES, or GEP directly via planned RBMP mitigation measures.

If a WFD assessment[6] concludes that a scheme is likely to cause deterioration in water body status or prevent a water body from meeting its ecological objectives, then an assessment is required against the conditions listed in Article 4.7 of the WFD. Article 4.7 can be invoked if; 'new modifications' (relating only to new physical modification and/or changes in groundwater levels) are of overriding public interest and/or the environmental and social benefits of achieving the WFD objectives are outweighed by the benefits of the new modifications to human health, safety and sustainable development; there are no significantly better environmental options that are technically feasible or not disproportionately costly; and, all practicable steps for mitigation have been taken.

The River Basin District (RBD) which makes up the plan area is the South East RBD. There are three surface water management catchments in the South East RBD and 282 surface water bodies in the South East RBD. See Figures in Appendix D, as well as the WFD Appendix H.

The All Company Working Group (ACWG)[7] developed a consistent framework for undertaking WFD assessments for Strategic Resource Options (SROs) to demonstrate where options would or would not cause deterioration in status of any WFD water bodies. The assessment considers mitigation that would need to be put in place to protect water body status. The assessment also considers WFD future objectives. This methodology is also being used in the development of WRMP's and has been followed for this assessment.

Two stages of assessment are completed under the ACWG WFD approach, an initial Level 1 basic screening and a Level 2 detailed impact screening. These are conducted/reported using a spreadsheet assessment tool which is automated based on option information for Level 1 and expert judgment for Level 2. The Level 1 assessment broadly aligns to the Screening and Scoping stages of the PINS guidance and the Level 2 assessment the Impact assessment.

The Level 1 WFD assessments were completed by WRSE as part of the Emerging Regional Plan.

Where water bodies and option impacts were 'screened in', they have been taken forward to Level 2 assessment, and the results of this work has been fed back to WRSE, as part of the iterative process, and fed into the modelling and the option selection process. Please see Appendix G for full WFD report which outlines the detailed methodology and results.

3.5. Introduction to Biodiversity Net Gain and Natural Capital Assessment

Biodiversity Net Gain (BNG) is an approach that aims to leave the natural environment in a measurably better state than beforehand. Natural England have produced a Biodiversity Metric that provides a way of measuring and accounting for biodiversity losses and gains resulting from development or land management change.

Natural capital is defined in the 25 Year Environment Plan (England) as "the elements of nature that either directly or indirectly provide value to people". As a new and emerging approach, natural capital incorporates methodologies and approaches (such as ecosystem services) to understand the value that natural assets provide. For the water industry, these can be substantial. The Water Resource Planning Guidelines (WRPG) (England and Wales) states that Water Resource Management Plans (WRMPs) should "use natural capital in decision-making", "use a proportionate natural capital approach", "deliver environmental net gain", and provide cost information on monetised ecosystem service costs and benefits where monetisation is used. WRSE conducted both these assessments in full.

As documented in WRSE's Regional Plan – Natural capital and Biodiversity Net Gain Report (2022) WRSE decided to use the most appropriate methodology for assessing and quantifying NCA and BNG and therefore

[6] Note in 2021 the UK Government sought to drop reference to any European legislation post BREXIT and thus has started to call the previously named WFD assessments as Water Environment Regulations (WER) assessments. However, as the terminology needs to be consistent across several ongoing assessments across the UK, WFD terminology has been retained for this assessment.

[7] A group of Water Companies involved in developing Strategic Resource Options for the future, as required by Ofwat. The group of six water companies forming the ACWG are Affinity, Anglian, Severn Trent, Southern and Thames Water and United Utilities.

based assessments on Defra's "Enabling and Natural Capital Approach" ENCA and Defra's BNG assessment methodology. It was important to ensure there was no double counting of benefits or disbenefits when assessing the effects of the options. Therefore, the assessment of those services that would be included in other metrics such as those for water quality, which were included in WFD assessments have been excluded from NCA.

3.6. Introduction to Invasive Non Native Species

As part of the WRMP SEA, water companies are required to undertake invasive non-native species (INNS) investigations to determine the threat of spreading INNS throughout their asset network and specific resource options and assess ways of mitigating this spread. The INNS investigation may be activated in the case that the selected options require it, or otherwise used at a high level to inform any significant environmental constraints for options assessment (see Figure 3-1). The INNS investigation would be completed in accordance with the Environment Agency SRO Aquatic INNS Risk Assessment Tool (SAI-RAT) which has been developed based on working principles within the well-established Wessex Water and Northumbrian Water tools.

The results of these INNS investigations will form part of the SEA process for the biodiversity and water objectives. INNS dispersal can occur through a range of recreational and operational (water company) 'pathways', which may include water or land-based recreation and sports, and water company operations, such as ground maintenance and the operation of raw water transfers (RWTs).

Considering the potential for INNS dispersal and the requirement to assess this risk and mitigate where appropriate, the INNS process can be split into three distinct phases, including:

- Data gathering and water network understanding, including;
- Understanding the source, pathways and receptors of each resource option;
- Identify INNS present at key assets, and at the source, pathway and receptor of RWTs;
- Identify presence of INNS dispersal pathways and the frequency in which they occur;
- Risk assessment of each resource option; and
- Options appraisal of mitigation measures for higher-risk options.

During the first stages of the investigation, screening criteria were developed by WRSE to determine which of the WRMP24 options required an INNS assessment. This was based on the frequency in which transfers would be operational and the severity of their impact. These criteria formed the screening matrix for assessment in which only schemes scoring 'low', 'medium' or 'high' were to be taken forward for a Level 2 (L2) assessment. The results of any L2 INNS assessment were fed back into the regional model as part of the iterative approach.

3.7. Reporting and Consultation

Key consultation requirements are those set in the SEA Regulations which identify three organisations (in England) to act as statutory consultation authorities in the SEA process: Environment Agency, Natural England and Historic England.

Two consultation periods involving the statutory consultation authorities and, in the latter period, the public are also set in the SEA Regulations. The consultation periods relate to:

- **Scoping**. The responsible authority is required to send details of the plan or programme to each consultation authority so that they may form a view on the scope, level of detail and appropriate consultation period of the Environmental Report. The consultation authorities are required to give their views within five weeks. It is to be noted that in relation to this SEA, reliance for Scoping has been via the

WRSE Scoping approach[8]. While the results of this Scoping by WRSE[9] have been used to help inform the development of the SEA Framework for this assessment, additional work was undertaken as part of this SES Water WRMP24 assessment to ensure that understanding of Baseline data reflected local issues relevant to the SES Water area, as well as a review of local Plans and Policies. This work was further informed by Scoping consultation that took place in respect of SES Water's Drought Plan.

- **The Environmental Report**. The responsible authority is required to invite the consultation authorities and the public to express their opinions on the Environmental Report and the plan or programme to which it relates.

Key reporting requirements are those set by the SEA Regulations:

'An Environmental Report shall be prepared in which 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, are identified, described and evaluated.'

Table 3-2 sets out the way the specific SEA requirements have been met in this report.

Table 3-2: Schedule of SEA Requirements

Information to be included in the Environmental Report under the SEA Regulations (Regulation 12 and Schedule 2)		Where covered in the SEA Report
1	An outline of the contents, main objectives of the plan, and of its relationship with other relevant plans and programmes	Chapters 1 and 5
2	The relevant aspects of the current state of the environment and the likely evolution thereof without implementation of the plan	Chapter 6 and Chapter 8
3	The environmental characteristics of areas likely to be significantly affected	Chapter 6 and Appendices C and D
4	Any existing environmental problems which are relevant to the plan including, in particular, those relating to any areas of a particular environmental importance, such as areas designated pursuant to Directives 79/409/EEC and 92/43/EEC	Chapter 6
5	The environmental protection objectives, established at international, Community or Member State level, which are relevant to the plan and the way those objectives and any environmental considerations have been taken into account during its preparation	Chapter 5 and 6
6	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, 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; the interrelationship between the above factors	Chapters 8, 9, 10, 11, 12,13 and 14

[8] See WRSE Draft Regional Plan SEA Environmental Report. This approach has also been agreed with consultation bodies such as Environment Agency.
[9] As noted by WRSE, the WRSE Scoping Report was issued for formal consultation for a six-week period between 18th September and 30th October 2020 to the Statutory Consultees: Natural England, Environment Agency and Historic England. Prior to the formal consultation, the Scoping Report was issued for informal consultation to internal stakeholders to gain early feedback and agreement on key elements of the process. During the formal and informal consultation period stakeholders were able to comment on the proposed scope and approach for the SEA.

7	The measures envisaged to prevent, reduce and as fully as possible offset any significant adverse effects on the environment of implementing the plan	Chapter 11
8	An outline of the reasons for selecting the alternatives dealt with, and a description of how the assessment was undertaken including any difficulties (such as technical deficiencies or lack of know-how) encountered in compiling the required information	Chapter 9
9	A description of measures envisaged concerning monitoring in accordance with Regulation 17	Chapter 13
10	A non-technical summary of the information provided under paragraphs 1 to 9	Non-technical summary

The SEA Environmental Report is thus an important consultation document and likely to be of interest to a wide variety of readers including decision makers, other plan/programme practitioners, statutory consultees, NGOs and members of the public. It accompanies the draft WRMP24 on public consultation.

4. SEA Methodology

4.1. Introduction

SEA is a process that follows a number of sequential stages. This report has been structured to reflect the way in which work has been undertaken, presenting a logical progression through the various tasks that water companies must complete in order to satisfy formal SEA requirements.

The work presented in this report represents the findings of Stage A and Stage B. This Report forms Stage C of the SEA process.

The approach to SEA was based on a range of guidance documents, including of note, the following:

- Department for Communities and Local Government (2005). A Practical Guide to the Strategic Environmental Assessment Directive.
- Environment Agency, Natural Resources Wales, Defra, OFWAT (2022) Water Resource Planning Guideline.
- Environmental Assessments for Water Resources Planning, UKWIR, 2021

It is also important to note that a number of other assessments (as outlined in Chapter 3) where used to inform the SEA. Consideration of these assessments is set out in Appendix G to K. These assessments were:

- Habitats Regulations Assessment (HRA);
- Water Framework Directive (WFD) Assessment;
- Biodiversity Net Gain (BNG) Assessment;
- Natural Capital (NC) Assessment; and
- Invasive Non-Native Species (INNS) Assessment

Full details of these assessments is made within the WRSE Draft Regional Plan SEA Report.

4.2. Strategic Environmental Assessment

4.2.1. Stage A - Setting the Context and Establishing the Baseline

4.2.1.1. Other Relevant Legislation, Plans and Programmes

The WRMP will both influence and be influenced by other plans, policies and programmes (PPPs) produced by local and combined authorities, by statutory agencies and other bodies with plan making responsibilities. Legislation is a further driver that sets the framework for the WRMP, both directly and indirectly. Relevant legislation, plans and programmes have been identified and considered to inform the preparation of this Environmental Report (see Chapter 5 and Appendix B).

4.2.1.2. Baseline information and Key Sustainability Issues

To predict accurately how potential WRMP24 proposals will affect the current baseline, it is first important to understand its current state and then examine the likely evolution of the environment without the implementation of the plan. Baseline information provides the basis for understanding existing local environmental, economic and social issues, in particular in respect of health and equality, and alternative ways of dealing with them; formulating objectives to address these issues and predicting and monitoring effects.

Key environmental issues, across the SES Water area have been identified as a result of the analysis of the baseline data and the review of other plans and programmes. The identification of these issues helped focus the SEA processes on the aspects that really matter. Implications to WRMP development and opportunities for how the WRMP could assist in addressing these issues were also identified.

Information on key baseline and sustainability issues is presented in Chapter 6 of this report.

It is important to note that no issues were Scoped out at the Scoping stage of this assessment.

4.2.1.3. Developing the SEA Framework

A set of SEA Objectives has been developed, against which the policies and proposals in the WRMP could be assessed.

For each objective, assessment aid questions were set out to form the SEA framework. The assessment aid questions provided a clarification of the intended interpretation of each objective to support direction of change sought through the implementation of the WRMP. The questions have guided the WRMP assessment process.

The SEA Objectives and assessment aid questions were refined via the results of the SEA Scoping undertaken by WRSE[10] of the regional plan and have been used to help inform the development of the SEA Framework for this assessment. Additional work was undertaken as part of this SES Water WRMP24 assessment to the Baseline data and a review of local Plans and Policies. This work was further informed by Scoping consultation that took place in respect of SES Water's Drought Plan. The SEA Objectives and assessment aid questions are presented in Chapter 7 of this report. It is important to note that the decision aid questions developed, enable a like for like comparison in the decision making process, ensuring that a common level of detail has been applied to each option as required by the UKWIR guidance[11].

4.2.2. Stage B – Developing alternatives

4.2.2.1. Developing, refining and appraising Strategic Alternatives

WRSE have carried out an assessment of strategic alternatives and this has informed WRMP24. As noted in Chapter 1, the approach has been to identify an Adaptive Plan, with different scenarios being considered and outlined in a 'situational tree'. Situation 4 is the reference scenario that has been used for the environmental assessments due to it meeting the guidance from the regulators. The situation includes the housing plan growth forecast and moves from low environmental destination (including licence capping) and medium climate change scenarios to high environmental destination and high climate change scenarios.

The programme appraisal is a cumulative assessment of the chosen programmes of options selected by the WRSE investment model and includes the following three plans:

- Best Value Plan – Investment model pareto runs for Best Value Plan metrics (Customer Preference, SEA+, SEA-, Natural Capital, Carbon, Resilience (reliability, adaptability, evolvability), intergenerational equity), this is optimised on both individual Best Value Plan and cost metrics
- Least Cost Plan – Investment model run result when optimising on cost only
- Best Environmental and Societal plan - Removes the resilience metrics from the Best Value Plan

The options within these plans include supply, demand, drought, catchment and multi-sector options. The ESRI ArcGIS tool developed for the options assessment was used to help identify potential cumulative or in-combination effects from options on environmental and community features/assets.

The aim of the assessment was to ensure that the selected options in a branch will not result in significant negative effects cumulatively or in-combination with each other and that opportunities to maximise positive effects across the plan as a whole are identified.

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[10] As noted by WRSE, the WRSE Scoping Report was issued for formal consultation for a six-week period between 18th September and 30th October 2020 to the Statutory Consultees: Natural England, Environment Agency and Historic England. Prior to the formal consultation, the Scoping Report was issued for informal consultation to internal stakeholders to gain early feedback and agreement on key elements of the process. During the formal and informal consultation period stakeholders were able to comment on the proposed scope and approach for the SEA.

[11] UKWIR Strategic Environmental Assessment – Guidance for Water Resources Management Plans and Drought Plans

4.2.2.2. Assessing the effects of the draft WRMP

Assessing the significance of predicted effects is essentially a matter of judgement. There are a number of factors that will determine the significance of an effect, e.g. its scale and permanence and the nature and sensitivity of the receptor. It is very important that judgements of significance are systematically documented, in terms of the characteristics of the effect which are deemed to make it significant and whether and what uncertainty and assumptions are associated with the judgement. The assessment of significance also includes information on how the effect may be avoided or its severity reduced.

In the current practice of SEA, the prediction and evaluation of effects can be often based on a qualitative seven point scale in easily understood terms. In general, this assessment has adopted the scale shown in Table 4-1 to assess the significance of effects of the schemes and proposals in the WRMP24. Note that this scale is aligned with that utilised by WRSE at the regional level assessment. In addition, Table 4-2 sets out the characteristics of effect: magnitude, scale, duration, permanence and certainty.

Table 4-1: Assessment scale

Assessment Scale	Assessment Category	Significance of Effect
+++	Major beneficial	Significant
++	Moderate beneficial	
+	Slight beneficial	Not Significant
0	Neutral or no obvious effect	
-	Slight adverse	
--	Moderate adverse	Significant
---	Major adverse	

Table 4-2: Characteristics of Effect

Magnitude (size of effect)	Scale (implications of effect)	Duration (length of time over which effect will be present)	Permanence (lasting of effect)	Certainty (that effect will occur)
Large (L) Medium (M) Small (S)	Local (L) Regional (R) National (N) Global (G)	Long term (LT) Medium term (MT) Short term (ST)	Temporary (T) Permanent (P)	High (H) Medium (M) Low (L)

Moderate and strong beneficial and adverse effects (and combination of this type of effect) have been considered of significance, whereas no effect and slight beneficial and adverse effects (and combination of this type of effect) have been considered non-significant.

Assessments have been undertaken for proposals contained in the draft WRMP. The results are discussed in Chapter 10.

The term mitigation encompasses any approach that is aimed at preventing, reducing or offsetting significant adverse environmental effects that have been identified. A range of measures applying one or more of these approaches has been considered in mitigating any significant adverse effects predicted as a result of implementing the WRMP. In addition, measures aimed at enhancing positive effects have also been considered. All such measures are generally referred to as mitigation measures.

However, the emphasis of the assessments has been in the first instance on proactive avoidance of adverse effects. Only once alternative options or approaches to avoiding an effect have been examined, then ways of reducing the scale/importance of the effect have been examined and proposed.

Mitigation can take a wide range of forms, including:

- Refining intervention measures in order to improve the likelihood of positive effects and to minimise adverse effects;
- Technical measures (such as setting guidelines) to be applied during the implementation stage;
- Identifying issues to be addressed in project environmental impact assessments for certain projects or types of projects; and
- Proposals for changing other plans and programmes.

The assessment also considered cumulative, indirect (secondary) and synergistic effects of the draft WRMP as outlined in the following section.

4.2.2.3. Secondary and Cumulative Effects Assessment

The SEA Regulations require that the assessment of effects include secondary, cumulative and synergistic effects.

Secondary or indirect effects are effects that are not a direct result of the plan but occur away from the original effect or as a result of the complex pathway e.g. a development that changes a water table and thus affects the ecology of a nearby wetland. These effects are not cumulative and have been identified and assessed primarily through the examination of the relationship between various objectives during the Assessment of Effects.

Cumulative effects arise where several proposals individually may or may not have a significant effect, but in-combination have a significant effect due to spatial crowding or temporal overlap between plans, proposals and actions and repeated removal or addition of resources due to proposals and actions. Cumulative effects can be:

- Additive - the simple sum of all the effects;
- Neutralising - where effects counteract each other to reduce the overall effect; and
- Synergistic - is the effect of two or more effects acting together which is greater than the simple sum of the effects when acting alone. For instance, a wildlife habitat can become progressively fragmented with limited effects on a particular species until the last fragmentation makes the areas too small to support the species at all.

Many environmental problems result from cumulative effects. These effects are very hard to deal with on a project by project basis through Environmental Impact Assessment. It is at the strategic level that they are most effectively identified and addressed.

Cumulative effects assessment is a systematic procedure for identifying and evaluating the significance of effects from multiple activities. The analysis of the causes, pathways and consequences of these effects is an essential part of the process.

Cumulative (including additive, neutralising and synergistic) effects have been considered throughout the entire SEA process, as described below:

- Identification of key environmental issues as part of the review of relevant strategies, plans and programmes and baseline data analysis.
- Establishing the nature of likely cumulative effects, causes and receptors.
- Identifying key receptors in the process of collecting baseline information and information on how these have changed with time, and how they are likely to change without the implementation of the WRMP.
- The development of SEA objectives and assessment aid questions has been influenced by cumulative effects identified through the process above and SEA objectives that consider cumulative effects have been identified.

It is also important to note that cumulative effects assessment has formed a key part of the WRSE regional plan development. This is an area where consideration of effects across the six water companies within WRSE is particularly beneficial as it allows careful consideration of the interaction and effects that an Option proposed in one water company plan can have with an Option located within the Plan area of another water company.

Reference should be made to the WRSE regional plan report in respect of cumulative effects of Options across Plan boundaries.

4.2.2.4. Monitoring the effects of the WRMP implementation

The SEA has indicated a series of possible monitoring indicators that could be implemented through the WRMP.

It is anticipated that the monitoring programme will cover significant environmental effects and which will involve measuring indicators that will enable the establishment of a causal link between the implementation of the WRMP24 and the likely significant effects (both positive and negative) being monitored. This will allow identification at an early stage of unforeseen adverse effects and allow appropriate remedial action to be undertaken.

The monitoring indicators are presented in Chapter 13 of this report.

4.2.3. Stage C – Preparing the SEA Report

This SEA Environmental Report has been prepared to accompany the draft WRMP24 on consultation.

4.2.4. Stage D - Consulting on the draft WRMP and SEA Environmental Report

4.2.4.1. Assessing significant changes

The SEA Environmental Report will be published for formal consultation with the Draft WRMP24. The results of the formal public consultation exercise may well result in changes to the Draft WRMP24 and these will have implications for the SEA Environmental Report. In addition, the consultation exercise may result in direct changes to the contents of the SEA Environmental Report. These will be reported in the Post Adoption Statement.

4.2.4.2. Post Adoption Statement

Following completion of the public consultation and adoption of the Final WRMP24, a statement (separate document) will be prepared setting out the following:

- How environmental considerations have been integrated into the plan, for example any changes to or deletions from the plan in response to the information in the SEA Environmental Report.
- How the SEA Environmental Report has been taken into account.
- How the opinions and consultation responses have been considered and addressed. The summary should be sufficiently detailed to show how the plan was changed to take account of issues raised, or why no changes were made.
- The reasons for choosing the plan as adopted in the light of other reasonable alternatives dealt with.
- The measures that are to be taken to monitor the significant environmental effects of implementation of the WRMP24.

5. Review of relevant legislation and other Plans and Programmes

5.1. Introduction

The current draft WRMP updates SES Water's previous 2019 WRMP that was issued in 2019 (WRMP19). The WRMP19 defined the work to be carried out during the five-year period commencing April 2020 in SES Water's Business Plan, and also set out a plan for 2025 to 2080 of how to meet the forecast demand for water for this period. SES Water has also used data produced for the next round of resource plans (WRMP24) which will be derived from the Regional Resilience Plan (RRP) currently being created for the south east region by Water Resource South East (WRSE). As part of the creation of the WRMP24, SES Water works closely with the other five water companies that make up the WRSE group.

The WRMP will both influence and be influenced by other plans, policies and programmes (PPPs) produced by local authorities, statutory agencies (at a national, regional and local level) and other bodies with plan making responsibilities. Legislation is a further driver that sets the framework for the WRMP, both directly and indirectly.

This interaction is reflected by the requirement of the SEA Regulations that information be provided on:

"*The relationship [of the plan or programme] with other relevant plans and programmes*"

"*The environmental protection objectives, established at international, [European] Community or [national] 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*"

Therefore, the SEA sets out the relationship between the WRMP24 and relevant legislation, other relevant plans and programmes and the environmental protection objectives established at international (European), national (UK wide), regional (taken for the purposes of this study to be the WRSE area) and local (local authorities within and immediately adjacent to the WRMP area) levels. This ensures that the SEA Objectives generally adhere to and are not in conflict with, objectives found in other plans, programmes and legislation.

Those plans, programmes and legislation of particular note to the WRMP24 are listed in Appendix B. Appendix B provides an overview of each of the plans and programmes considered particularly relevant to the WRMP24 as well as detailing the anticipated implications for the SEA. Reference should also be made to the review of relevant Plans and Policies carried out by WRSE and contained within the WRSE Draft Regional Plan SEA Environmental Report.

A series of key generic themes which have emerged from the review are presented below.

5.2. Environmental Themes

The review of PPPs revealed a large number of common themes in terms of their objectives relating to sustainability within the context of water resource and drought planning. These are listed below:

Air Quality

- Reduce emissions of Nitrogen dioxide (NO_2)
- Increase use of low emission / zero emission at point of use vehicles
- Reduce emissions of Particulate Matter (PM): PM10 and PM2.5

Greenhouse gas (GHG) Emissions

- Reduce GHG emissions, particularly CO_2
- Maximise the use of renewable energy
- Increase energy efficiency and make use of new technology

- Minimise use of fossil fuels
- Contribute to the achievement of Net Zero Carbon

Adaptation to a Changing Climate and Flooding

- Prepare for extreme weather events and sea level rise
- Minimise the risk and impact of flooding and droughts
- Avoid development in floodplains when possible
- Help meet objectives of Flood Risk Management Plans allowing for climate change

Biodiversity, Fauna and Flora

- Protection of sites designated for nature conservation purposes
- Protect and enhance endangered or important species and habitats
- Contribute to the delivery of biodiversity strategies and plans
- Increase important habitat
- Protect, maintain and where possible enhance natural habitat networks and green infrastructure, to avoid fragmentation and isolation of networks
- Contribute to the achievement of Biodiversity Net Gain

Cultural Heritage

- Conserve and protect historic assets (designated and undesignated) and those of cultural note, including archaeology and historic landscapes
- Improve access to historic assets, including buildings and landscapes of value where appropriate.

Water Resources

- Protect and improve the quality of ground and surface water
- Help to meet objectives of the Water Framework Directive (WFD)
- Make use of Sustainable Drainage Systems (SuDS)

Land Use, Soil and Agriculture

- Prioritise development on brownfield sites
- Seek to reclaim derelict and contaminated land
- Protect farmland and soils

Landscapes and Townscapes

- Protect and enhance landscape and townscape character and local distinctiveness
- Protect tranquillity from the impacts of noise and light pollution

Natural Resources and Waste

- Ensure efficient resource use and minimise resource footprint
- Use secondary and recycled materials
- Consider opportunities to maximise on-site re-use of materials
- Employ waste reduction methods to minimise construction and maintenance waste
- Reduce the amount of waste disposed of at landfill
- Promote circular economy

- Avoid the sterilisation of mineral resources

Population and Health

- Tackle poor health by improving the health of everyone, and of the worst off in particular
- Create a green economy and promote sustainable growth
- Promote sustainable and healthy communities
- Promote social inclusion and community participation
- Address pockets of deprivation
- Provide for an ageing population

Cross cutting

- Support the UK Government's 25 Year Plan to Improve the Environment 2018 goals and key actions as follows:
  - Using and managing land sustainably, including embedding an "environmental net gain" principle into development.
  - 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.

- Support Environment Act 2021 stipulations:
  - targets for four priority areas: (a) air quality; (b) water; (c) biodiversity; (d) resource efficiency and waste reduction to be set.
  - two priority areas: air quality ($PM_{2.5}$ air quality target) and biodiversity (species abundance target) and important new target to reverse the decline in species abundance by the end of 2030.
  - environmental improvement plan for significantly improving the natural environment for a period no shorter than 15 years.
  - 10% biodiversity net gain required for new development.
  - prevent waste/reduce the amount of a product that becomes waste and increase re-use, redistribution, recovery and recycling.

- Adhere to SES Water commitment to becoming net zero operational carbon by 2030. This will be achieved through combination of:
  - Become more energy efficient
  - Reduce demand for water
  - Generate more energy from renewable sources
  - Decarbonise our fleet of vehicles
  - Phase out our use of fossil fuels

6. Baseline information and key environmental issues

6.1. Introduction

In order to assess the potential sustainability effects of the WRMP on the SES Water area of responsibility and surrounding areas, it is necessary to establish a baseline against which predicted effects can be assessed, and then to identify issues and trends that are related to each of the environmental and social (population) interests that may be affected by, or affect, the proposed plan. This is in keeping with the SEA Regulations which state that the Environmental Report should provide information on:

"*The relevant aspects of the current state of the environment and the likely evolution thereof without implementation of the plan or programme" and "The environmental characteristics of areas likely to be significantly affected*" (Schedule 2)

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 Directives 79/409/EEC on the conservation of wild birds and the Habitats Directive* " (Schedule 2).

To accurately predict how WRMP proposals will affect the environmental characteristics, it is important to understand the current state of the environment and then examine the likely evolution of the environment without the implementation of the plan.

The current environment and socio-economic baseline has been reviewed and summarised for the WRSE region in the WRSE Scoping Report. The baseline summarised is a high-level overview of the baseline conditions for the region but more detailed location specific baseline information has been developed in a GIS database which WRSE has made available as the starting point for this baseline exercise.

Baseline information also plays a key role in the other environmental assessments (HRA, WFD, BNG, NC and INNS).

6.2. Data collection methodology

Existing baseline information provides the basis for the prediction and monitoring of the effects of the implementation of the WRMP and helps identify environmental and social issues and alternative ways of dealing with them (implications and opportunities).

As SEA is an iterative process, subsequent stages in its preparation and assessment might identify other issues and priorities that require the sourcing of additional data and/or information and identification of monitoring strategies. This makes the SEA process flexible, adaptable and responsive to changes in the baseline conditions and enables trends to be analysed over time.

The most efficient way to collate relevant baseline data is through the use of indicators whenever possible (see below). This ensures that the data collation is both focused and effective. The identification of relevant data has taken place alongside the review of other relevant legislation, plans, policies and programmes (Chapter 5 and Appendix B), the identification of environmental and social issues (this section) and developing the SEA framework (Chapter 7).

Baseline sources include that from WRSEs regional work including scoping exercise, previous WRMP19 reporting and through more localised baseline gathering exercises undertaken through this SEA and Scoping. Baseline gathering has been with the aide of GIS software and open source datasets that are reflective of the SEA topics.

6.3. Data Analysis

Data have been collated and analysed for the following indicators (as detailed in Appendix C):

Table 6-1: Data Topics

Environmental Data	Economic Data	Social Data
• CO2 emissions • Climate change • Local air quality • Noise / Light pollution ('Tranquillity') • Biodiversity, fauna and flora (including designated sites) • Landscape and townscape • National Character Areas • Heritage assets • Green space • Soil / land classification • Water quality • Flooding • Waste and resources	• Employment • Long term trends in GVA • Long term trends in population • Identification of economic centres	• Population and diversity • General health statistics • Physical activity in children and adults • Multiple deprivation

The baseline data provide an overview of the environmental and social characteristics of the WRMP area. This overview, together with contextual information, is presented in Appendix C. The analysis of the baseline has highlighted a number of key issues across the SES Water area of responsibility. These, together with implications and opportunities arising for the WRMP, have been summarised in Table 6-2.

6.4. Data Limitations

It is believed that the data sets available and utilised in this assessment, along with the output from the WRSE process, provide a comprehensive and robust overview of the environmental and social situation across the SES Water area of responsibility and the wider south east region as a whole.

It is to be noted that option development is in most cases at an outline or preliminary stage and as such may be subject to change or further development. In some instances, option routes (e.g. new transfers) or locations (e.g. new treatment works) are not sufficiently developed and point or coordinate data has been used to represent indicative locations. Each option assessment significance of effect has been attributed with a 'certainty' classification that reflects limitations in locational understanding, data availability and reliability among other considerations that have an impact on the certainty of effect.

Specific data limitations with regard the technical environmental assessments (HRA, WFD, Biodiversity Net Gain, Natural Capital and INNS) have been set out within the corresponding Technical Reports (Appendix G – K).

6.5. Key environmental and social issues

The SEA Regulations state that the Environmental Report should provide information on:

"*Any existing environmental problems which are relevant to the plan or programme including, in particular, those relating to any areas of particular environmental importance, such as areas designated pursuant to Directives 79/409/EEC on the conservation of wild birds and the Habitats Directive*." (Schedule 2)

The key environmental and social issues have been identified from the review of baseline information and other plans and programmes. These key issues are summarised in Table 6-2 below. This table also provides a discussion on the implications/opportunities of such issues to the WRMP and provides clear links to the proposed SEA Objectives. The analysis of key environmental and social issues has influenced the development of the SEA Framework (see Chapter 7), in particular in formulating decision making questions.

Table 6-2: Key issues, implications and opportunities for the WRMP

Key Environmental Issue	Implications / Opportunities for the WRMP	SEA Objective
Adaptation to a Changing Climate Current observations indicate that the UK is continuing to warm. In 2019, four new temperature records were set, including a high of 38.7°C and a new winter record of 21.2°C. The decade between 2010 and 2019 has been on average 0.3°C warmer than the 1981-2010 average and 0.9°C warmer than 1961- 1990. Annual precipitation has increased across the UK in the last few decades with 2019 seeing 107% more rainfall than the 1981-2010 average28. Summers have been 11% wetter on average than 1981- 2010 and 13% wetter than 1961-1990. Winters have been 4% and 12% wetter than 1981-2010 and 1961-1990 respectively. These general trends have also been witnessed in the SES Water area. Likely evolution of the baseline The climate is expected to continue to change with annual average temperatures projected to increase, particularly in summer. Winters are projected to be wetter and summers drier. Climate change is projected to result in more extreme weather events, potentially causing or exacerbating periods of drought which alongside population and economic growth will impact water availability. Nevertheless, some degree of climate change will occur, with the UK's Climate Projections showing that the UK as a whole is likely to experience hotter, drier summers, warmer, wetter winters and rising sea levels. This is likely to have a significant effect on a range of environmental conditions, including the water environment.	A greater degree of resilience will have to be incorporated into the WRMP24 optioneering and design processes to increased river, surface and groundwater flooding due to extreme winter rainfall events and increase in winter mean rainfall as well as increased coastal flooding and erosion damage due to sea level rise and storms sea level rise and the potential risks posed by increased heatwaves, wildfires, reduced water availability and soil desiccation due to increased summer temperatures and reduction in summer mean rainfall. There is a need to manage the risks associated with flooding over the infrastructure's lifetime, without increasing the flood risk elsewhere and identifying opportunities to reduce the risk overall, including through working with nature based solutions. There are multiple benefits associated with the use of nature based solutions to reduce vulnerability such as tree planting or peat restoration. Flood risk should be considered in any design and the implementation of multi-functional green infrastructure including SuDS and other similar appropriate measures or new approaches should be considered and encouraged where feasible. This should include Natural Flood Management and other means of increasing flood storage capacity. WRMP24 should seek to explore the possibilities for creating blue infrastructure which can both help to manage localised flood risk and simultaneously create new habitats.	**Climate Factors:** Increase resilience to climate change and reduce flood risk

Key Environmental Issue	Implications / Opportunities for the WRMP	SEA Objective
	There is also a need to manage risks related to periods of limited water availability. It is possible limitations of abstraction could mean water infrastructure may have to cease to operate for periods of time and abstraction could cause environmental damage, including for sites with legal habitats and water protections (e.g. SSSIs, SACs, Water Framework Directive etc.).	
Greenhouse gas emissions Based on the local authorities which intersect the Plan Area, as detailed in Appendix C, the total carbon dioxide (CO_2) emissions for 2018 across all sectors is estimated at 7,722 ktCO_2. Croydon is identified as having the highest emissions of all relevant LAs. This is attributed to carbon-intensive industries like freight transport and civil engineering. There is potential for an increased need for wastewater treatments as a result of WFD water quality standards combined with population increase. Given the energy intensity of wastewater treatment, the water industry CO_2 emissions may increase and further contribute to climate change.	WRMP24 must work to minimise water demand from households and businesses as this will result in reduced need to abstract, treat and transport water (and also less wastewater to treat) and consequently lesser carbon emissions. The options within WRMP24 have the potential to result in carbon emissions during the construction and operation phase which will further contribute to climate change. The impact of such emissions should be considered through the optioneering and design processes. WRMP24 should also ensure that opportunities are taken for maximising tree planting. Amongst other benefits, such flood protection, biodiversity enhancement and recreation, careful tree species selection can contribute to carbon sequestration by absorbing increased amounts of CO2 from the atmosphere.	**Greenhouse gas emissions:** Reduce embodied and operational carbon emissions
Water There are considerable pressures on water resources with resulting major impacts on many of the waterbodies across the UK. For the purposes of taking a holistic approach to management of water resources and to address the pressures on the water environment, under the Water	WRMP24 options should seek to implement and maximise opportunities to improve waterbody status through the suite of options proposed.	**Water:** Increase resilience to climate change and reduce flood risk Protect and enhance the quality of the water

Key Environmental Issue	Implications / Opportunities for the WRMP	SEA Objective
Framework Directive (WFD), the UK has been divided into a series of 10 River Basin Districts (RBD). Those of relevance to the Plan Area are: o South East o Thames There are 498 surface water bodies within the Thames RBD and 282 within the South East RBD. As with most water bodies in England, there are a range of significant water management issues manifested in these RBD, with pollution from towns, cities and transport noted as being an issue for 9% of those water bodies within the South East RBD and 17% in Thames RBD. Groundwater provides a third of drinking water in England, and it also maintains the flow in many rivers. In some areas of Southern England, groundwater supplies up to 80% of the drinking water. Protecting these sources (along with any private water supplies) will help ensure that water is safe to drink. In order to help protect sources, Source Protection Zones (SPZs) for groundwater sources such as wells, boreholes and springs used for public drinking water supply have been defined. 5 Surface Drinking Water Safeguard Zones (DWSZs) and 11 Groundwater DWSZ fall entirely or partially within the Plan Area. Similarly, parts of the country at which there is increased risk of contamination to groundwater supplied from activities which might cause pollution are covered by Source Protection Zones (SPZs). There are several SPZs noted within the Plan area. Likely evolution of the baseline Maintained and improving - Surface and ground water quality is predicted to increase through legislation such as WFD, though significant challenges remain as noted in the River Basin Management Plan.	Improving network and preventing leaks and bursts is a key outcome of many of the options contained within the WRMP24 and the plan should seek out areas that stand to benefit most from such interventions. Pollution prevention should also be sought during construction through robust construction management plans and pollution prevention plans. In parallel with the SEA of the WRMP24, the WFD assessment is being undertaken which will identify if options will likely deteriorate water body classification or prevent the WFD objectives from being reached and propose appropriate avoidance and mitigation measures early in the development of the WRMP24. The WRMP24 should also seek to reduce the need for drought permits / orders through the suite of options proposed. The Plan should seek to avoid over-abstraction of both groundwater and surface water sources (River Eden). Climate change is likely to affect future availability of water in the region.	environment and water resources Deliver reliable and resilient water supplies

Key Environmental Issue	Implications / Opportunities for the WRMP	SEA Objective
The region is already water-stressed and projected economic and population growth will likely place further pressure on the region's water resources and water dependent environments.		
Biodiversity Within the South East region, there are a wide range of sites designated for nature conservation. Of note, there are 21 Ramsar sites, 25 Special Protection Areas, 69 Special Areas of Conservation and 1,189 Sites of Special Scientific Interest. Specifically within the Plan area there are: • **One SPA** (Thames Basin Heath); • **One SAC** (Mole Gap to Reigate Escarpment); and • **29 SSSIs.** Within the South East region, 52 National Nature Reserves and 623 Local Nature Reserves can be found. Within the Plan area there is one NNR and 43 LNRs. Key pressures and risks in respect of biodiversity and nature conservation that are particularly relevant have been identified from air pollution and climate change, which can change distribution of species and habitats. Areas of Ancient Woodland, i.e. those areas that have been continuously wooded since at least 1600AD are scattered across the South East region. The Ancient Woodland Inventory for England identifies over 2,000 sites of Ancient Woodland within the Plan area. Likely evolution of the baseline Abstraction and public water supply contribute to a decline in habitat and species. Drought conditions that necessitate drought permits exacerbate pressures on habitat and wildlife. Climate change will likely result in decline of some habitats and species further, though may afford opportunities for other species, including invasive species.	WRMP24 should aim to protect and enhance all sites of biodiversity importance and should place a particular emphasis on protecting sites designated for nature conservation and geodiversity purposes. Consideration should be made of protected and priority species and their habitats including local wildlife sites, as well as consideration of issues such as Suitable Alternative Natural Greenspace. Opportunities for new habitat creation and enhancement associated with water resources should be explored. There should be achievement of Biodiversity Net Gain in areas not formally designated, recognising that a target of 10% has been set out in the Environment Act 2021 for new development. WRMP24 should avoid the fragmentation of green infrastructure, by seeking the integration and enhancement of the green infrastructure network to contribute to protecting natural habitats and delivering biodiversity net gain through all new developments. WRMP24 should help create cohesive habitat networks to help habitats and species adapt to the consequences of	**Biodiversity:** Protect and enhance biodiversity, priority species, vulnerable habitats and habitat connectivity (no loss and improve connectivity where possible)

Key Environmental Issue	Implications / Opportunities for the WRMP	SEA Objective
England's wildlife habitats have also become increasingly fragmented and isolated, leading to declines in the provision of some ecosystem services, and losses to species populations'.	climate change in particular. consider the support of water-dependent designated sites and priority habitat/species to adapt to climate change more specifically. WRMP24 should promote the increased accessibility to appropriately designed multi-functional green infrastructure which can play a significant role in diverting pressure away from more sensitive sites or areas. In parallel with the SEA of the WRMP24, HRA is being undertaken which will identify the internationally designated nature conservation areas, where possible establish the likelihood of impacts on the integrity of these sites and identify appropriate avoidance and mitigation measures early in the development of the WRMP24. The INNS assessment also being undertaken in parallel with the SEA will in turn consider potential for INNS dispersal and assess this risk and mitigate where appropriate.	
Population and Human Health There are approximately 19 million people living within the South East Region, which accounts for 30% of the UK's population. From the local authorities falling entirely or partially within the Plan Area, Croydon as the highest population of 388,600, whilst Epsom and Ewell has the lowest at 81,000. Population is expected to grow which will likely place additional pressure on the water environment within the Plan Area. Economic growth and climate change will also add to this pressure. Health within the region is generally good., with 83% of people describing their health as good or very good.	The options within WRMP24 have the potential to result in temporary disturbance effects during the construction phase and disturbance effects for the local community must be prevented. There is also potential for impacts on the water or natural environment which could have impacts on recreation and wellbeing. WRMP24 should aim to protect public health and promote well-being. There is an opportunity for WRMP24 to engage with the local community and maximise opportunities for recreation	**Population and Human health:** Maintain and enhance the health and wellbeing of the local community, including economic and social wellbeing

Key Environmental Issue	Implications / Opportunities for the WRMP	SEA Objective
Of the 12 local authorities wholly or partially intersecting the plan area, all performed better than England for under 75 mortality rate from all cardiovascular diseases and all but four performed better than South East England. In regards to under 75 mortality rate from cancer all local authorities with the exception of Crawley performed better than England and the South East. Nine of the local authorities at a lower rate of overweight or obese adults than South East England. Likely evolution of the baseline Stable / Uncertain – while population levels are likely to continue to rise, there is uncertainty over migration levels due to a lack of clarity on issues such as 'Brexit'. Population profiles are also likely to continue to get older – this will likely result in changes to overall health outcomes with an increased number of long-term conditions. Water available for consumptive use may also be affected by climate change whereby access to water is limited through more frequent droughts or floods	through enhancing access and the condition of the water environment, greenspaces or areas of the natural environment. Thus, improving the inclusivity of and connection to the local natural environment. WRMP24 also has the opportunity to ensure a resilient and reliable water supply for customers now and in the future, through continuing to increased awareness of water conservation in one hand and adapting to climate change in the other so that there is enough water for a growing population and to support economic growth.	
Material Assets Within the UK, the south east is the most populated region with a population of approximately 19 million and expected long-term growth of around four million. Settlements within the South East are diverse and range from large population centres such as London to towns, villages and small rural hamlets. Key urban areas within the SES Water Drought Plan area include: • Banstead - 10,480 • Horley - 26,851 • Reigate - 23,589 • Dorking – 17,690 • Leatherhead - 33,597 • Redhill - 38,171	WRMP24 has the opportunity to consider the efficiency in the use of resources within the option development and reduce the use of energy, materials and prevent waste generation through the promotion of low/zero carbon energy, use of recycled or secondary materials and furthering concepts of circular economy. WRMP24 area contains important transport links which could be affected during construction works. There is also significant water and wastewater treatment infrastructure across the area operated by SES Water.	**Material Assets:** Minimise resource use and waste production Avoid negative effects on built assets and infrastructure

Key Environmental Issue	Implications / Opportunities for the WRMP	SEA Objective
• Caterham - 23,652 Gatwick Airport is also within the Plan area and would be considered a major material asset, along with the wider transport network (road and rail). Likely evolution of the baseline Regeneration and future investment and demand are likely to increase the number and quality of material assets such as housing, transport infrastructure, waste facilities, and community facilities.		
Air Air pollution impacts on public health, the natural environment and the economy. Air quality has improved in the UK over the last sixty years as a result of the switch from coal to gas and electricity for heating of domestic and industrial premises, stricter controls on industrial emissions, higher standards for the composition of fuel and tighter regulations on emissions from motor vehicles. Poor air quality is generally associated with urban/industrial areas and major road infrastructure and this is reflected in the typical location for Air Quality Management Areas (AQMA), many of which have been designated due to high NO2 and PM10 levels. A high proportion of the local authorities which fall within the South East region contain at least one AQMA and are predominately designated for Nitrogen Dioxide (NO_2) and Particulate Matter (PM_{10}). There are 13 AQMAs declared within the Plan Area. 180 Noise Action Important Areas have been identified within the Plan Area. The source of noise in these areas is predominately roads, with the exception of a small number in which the source is rail. Likely evolution of the baseline Improving - At the national level air quality is generally improving as industrial practices, energy sources and tighter environmental legislation have contributed to reductions in pollutants.	The options within WRMP24 have the potential to impact air quality and noise. This could include the generation of air pollutants and noise from treatment plants and there is also likely to be effects from the construction phase. The Plan should meet Government targets for air quality and noise and be reflective of appropriate legislation and should consider ecological receptors alongside human receptors. There is potential for the WRMP24 to mitigate any increases in air pollutants as a result of the options and improve air quality in the region.	**Air:** Reduce and minimise air and noise emissions

Key Environmental Issue	Implications / Opportunities for the WRMP	SEA Objective
Nevertheless, while air quality is generally improving at a national level, new development, economic growth and tourism may lead to increased pollution emissions due to higher numbers of transport journeys and congestion could continue to lead to localised air quality effects.		
Landscapes The South East region's landscape is diverse and there are important landscapes within the region, including two National Parks, eight Area of Outstanding Natural Beauty (AONBs) and 34 National Character Areas (NCAs). Specifically within the Plan area there are: • One AONB (Surrey Hills); and • 6 NCAs (Thames Basin Heaths; North Downs; High Weald; Low Weald; Wealden Greensand; and Thames Basin Lowlands NCA). There are a range of pressures on landscape, many of which are altering landscapes in a direction which could be regarded as inconsistent with the traditional landscape vernacular of the area. These changes are a reflection of the fact that the landscape of the UK has changed over many years due to a range of issues such as urbanisation, changes to agriculture, reduced tranquillity, loss of habitats and forests, etc. In an effort to preserve the best landscapes a series of National Parks and AONBs were designated. The Plan Area has 81 designated Conservation Areas with the first areas designated in 1968 and the most recent being 2010, covering a range of building characters and reflecting a diverse array of architectural styles. Likely evolution of the baseline Stable - Many of the region's most exceptional landscape and townscapes benefit from protection through designations that will persist in the absence of the Drought Plan. In general terms, modern design / landscaping principles and interested parties expectations are promoting a renewed	There is potential for the options within WRMP24 to have an impact on the landscape. This could include temporary construction effects and permanent effects associated with infrastructure which could affect visual amenity or the character of the area. WRMP24 should seek to preserve and enhance the character of the region's landscape and seascape by ensuring that its integrity and valuable natural open space is not lost.. WRMP24 should also aim to ensure that sensitive areas are avoided and respect particular landscape settings, with consideration made of design quality in both an urban, rural or sea setting. Opportunities for landscape enhancement should be explored, e.g. through sympathetic design and enhancements to existing landscape improvement areas, new planting opportunities. Where a scheme would involve physical development in within a Conservation Area or a wider area for which a townscape/urban character appraisal has been undertaken, the design of the scheme should take account of relevant guidance for the Conservation Area / townscape character area.	**Landscape:** Conserve, protect and enhance landscape, townscape and visual amenity

Key Environmental Issue	Implications / Opportunities for the WRMP	SEA Objective
focus on the quality of scheme design and this trend is likely to continue, though risks from increased urbanisation and infrastructure development remain.		
Soil There are a mix of land uses across the Plan Area, ranging from rural areas of open countryside or arable farmland and pasture to extensive heavily urbanised. There are also areas of suburban and urban fringe associated with the main towns and distinct pockets of 'isolated' urban development in the form of villages and small towns. Soils in England are already, and continue to be, degraded by human activity including intensive agriculture, historic levels of industrial pollution and urban development (including transportation networks), making them vulnerable to erosion (by wind and water), compaction and loss of organic matter. Many areas of land in the UK have been contaminated by past industrial and other human activities, including former factories, storage depots and landfills. Land at the full range of potentially contaminated sites could be contaminated by a wide range of harmful substances such as oils and tars, heavy metals, asbestos and chemicals. By its nature, it is often very difficult to know where land has been contaminated previously or is currently suffering ongoing contamination. As such the number of known sites of contamination is likely to be only a very small fraction of the overall number of potentially contaminated sites. Likely evolution of the baseline Declining - it is likely that greenfield sites will experience increasing pressure for development in preference to the complexities of redeveloping previously developed and potentially contaminated sites. This could reduce available high quality soil resources and fail to realise the potential of existing capacity within existing urban and previously developed areas.	Soil is a non-renewable resource and is vulnerable to erosion, degradation and contamination. In addition, historic land uses have contributed to contamination across large areas. WRMP24 should seek to make best use of areas that are already urbanised and provide an opportunity for regeneration / improvements to land quality. Where use of agricultural land is unavoidable, measures should be taken to avoid those areas of the highest quality and aim to protect soil and agricultural holdings through avoidance of impacts such as erosion, contamination or severance. WRMP24 must protect soils as they are essential for achieving a range of important ecosystem services and functions. Dealing with the past pollution / contamination legacy is a major issue and should be addressed at all opportunities due to its ongoing environmental impact. WRMP24 should seek to avoid land that is covered by Mineral Safeguarding Area designations, to prevent the sterilisation of key mineral resources.	**Soils:** Protect and enhance the functionality, quantity and quality of soils

Key Environmental Issue	Implications / Opportunities for the WRMP	SEA Objective
Remediation of contamination is likely to remain sporadic and reflective of individual site requirements		
Cultural Heritage While there are eight World Heritage Sites within the South East Region, none of which are located with the Plan Area. Alongside this, there are a wide range of other historic and cultural heritage features located across the region and which span the full range of human settlement, from the prehistoric to the present. These include Scheduled Monuments, Registered Parks and Gardens and Listed Buildings. Numbers of sites within the Plan Area are as follows: Listed Buildings – 2,834 Registered Parks and Gardens – 17 Scheduled Monuments – 91 It is important to note that the nature of cultural heritage features means that not all are known at present; in particular, buried archaeological remains. Likely evolution of the baseline Stable / Declining - Designated heritage assets benefit from protection that will continue without the Drought Plan. However, there is a risk or uncoordinated and piecemeal development resulting in the successive erosion of the quantum and integrity of the region's cultural heritage resource.	WRMP24 should aim to protect and preserve designated and non-designated heritage assets and their contexts and settings. The options within WRMP24 have the potential to directly or indirect impact the historic environment through effecting the asset's fabric or setting. It is to be noted that some heritage features can be affected by changes to hydrological conditions. Infrastructure should be sensitively designed to be sympathetic to existing character and quality and opportunities for improving settings should be examined. Where schemes would involve physical development that could affect previously undiscovered archaeological assets the design of the scheme and site selection should be informed by early investigation of the potential archaeological interest of the affected land.	**Cultural Heritage:** Conserve, protect and enhance the historic environment, including archaeology

7. SEA Framework

7.1. Introduction

The SEA Framework is a key component in completing the SEA and comprises a bespoke series of objectives. The purpose of the SEA Framework is to provide a set of criteria against which the performance of the WRMP can be predicted and evaluated. As discussed in Chapter 6, it is developed by synthesising the baseline information and sustainability issues into a systematic and easily understood tool that allows the assessment of effects arising from the implementation of the WRMP in key areas.

A framework of 13 objectives and associated decision-making questions has been drawn up, developed through the analysis of baseline information and identification of key environmental issues and opportunities, as well as the PPP review.

The 13 identified objectives (Table 7.1) have been worded so that they reflect one single desired direction of change for the theme concerned and do not overlap with other objectives. They include both externally imposed environmental objectives and others devised specifically in relation to the Plan being prepared. Decision-making criteria have been identified for each objective to aid in the assessment.

In order to assess how each aspect of the WRMP performs against each of the SEA objectives, a series of decision-making criteria have been developed. The decision-making criteria are a way of guiding the assessment and helping to ensure consistency of approach across the assessment of all the WRMP elements. They are not the only considerations to be taken into account when determining likely effects arising from the WRMP, as it is unlikely that every relevant question can be known at this stage. But they do provide a useful starting point and a transparent structure to help demonstrate how the assessment of the effects arising from the implementation of the WRMP have been undertaken. As the SEA progressed, they also helped in the development of a set of indicators to be included in the monitoring programme.

In deriving the SEA Framework, the information contained within the WRSE SEA Scoping Report has been considered (together with the comments received from statutory consultees on the WRSE SEA Scoping Report) have also been taken into account alongside a review of specific baseline data relevant to the SES Water area. An overview of the key issues identified that are specific to the SES Water area has been provided in the previous chapter. Allied to the identification of detailed baseline data relevant to the SES Water area, the SEA Objectives identified in the 'All Companies Working Group SEA Core Objective Identification Report' (2020) were considered and a revised set of SEA Objectives has been developed that allow examination of a greater level of detail than would be expected at WRSE regional level. This has led to the addition of an important separate objective to reduce greenhouse gas emissions reflecting the climate emergency and adjustments in the wording of other WRSE SEA Objectives and decision-making criteria to better reflect SES Water priorities.

It should be noted that, from an assessment perspective, all SEA objectives are considered equally important to be achieved by the WRMP and that there is no inherent prioritisation of objectives. The ultimate aim is for the WRMP24 to achieve net sustainability benefits.

It is also to be noted that there is a certain degree of cross-over of Assessment Aid Questions within the SEA Framework i.e. the same question may be asked across a number of Objectives. The rationale for this is that while the question may be the same, it is considered from a differing viewpoint and within a different context. This is the role of the Decision Aid Questions i.e. to help consider all aspects of an Objective in arriving at an assessment of the performance.

Table 7-1: SEA Framework

No.	SEA Objective	Assessment aid questions	SEA topic
Environment			
1	To reduce vulnerability of built infrastructure to climate change risks and hazards	*Will WRMP24:* • Avoid development in areas likely to be affected by flooding or where this is not possible ensure that flooding can be managed throughout the lifetime of the infrastructure? • Avoid development in areas likely to be affected by coastal erosion or where this is not possible ensure that coastal change can be managed throughout the lifetime of the infrastructure? • Avoid development which would cause or exacerbate climate related issues such as freshwater and coastal squeeze? • Manage the risks associated to periods of limited water availability during droughts over the lifetime of the infrastructure? • Manage the risks associated with heatwaves and wildfires over the lifetime of the infrastructure? • Manage the risks of flooding and coastal erosion, particularly through working with nature-based solutions?	Climate
2	To reduce or manage flood risk, taking climate change into account	*Will WRMP24:* • Avoid development in flood risk areas (whether existing or future) when possible? • Lead to infrastructure development that is flood resilient over its lifetime, considering the effects of climate change, without increasing the flood risk elsewhere and identifying opportunities to reduce the risk overall?	
3	To protect and enhance the quantity and quality of surface, groundwater, estuarine, coastal waterbodies and water dependent habitats	*Will WRMP24:* • Affect surface water quality or quantity? • Affect groundwater quality or quantity? • Affect estuarine or coastal water quality or quantity?	Water

No.	SEA Objective	Assessment aid questions	SEA topic
		• Affect bathing waters? • Affect shellfish water protected areas? • Affect chalk rivers? • Reduce the flashy nature of surface waters? • Slow the flow in upper catchments and reduce soil losses to river systems? • Support achievement of environmental objectives set out in River Basin Management Plans and Shoreline Management Plans • Protect and enhance the environmental resilience of the water environment to climate change? • Contribute to the achievement of WFD objectives (taken from the WFD assessment results)?	
4	To protect and enhance biodiversity, priority species, vulnerable habitats and habitat connectivity and achieve biodiversity net gain.	*Will WRMP24:* • Protect and enhance the conservation status of designated sites and their qualifying features (SPAs, SACs, Ramsar sites, MCZs, SSSIs, National Nature Reserves and Ancient Woodland)? • Ensure HRA compliance with regards to international sites? (taken from HRA results) • Affect directly or indirectly a priority habitat on the priority habitat inventory? • Protect and enhance priority habitats and species, including surface and groundwater dependent habitats and species? • Affect the marine environment, habitats and species (including MCZs and MPAs)? • Contribute to the loss or gain in habitat connectivity at local, regional and national level? • Create or restore habitat delivering a 10% net gain for biodiversity? (taken from BNG assessment results) • Avoid the possibility for INNS to be spread/ introduced?	Biodiversity

No.	SEA Objective	Assessment aid questions	SEA topic
		Create an opportunity to improve biodiversity value through removal of INNS? (taken from the INNS assessment results)	
5	To protect and enhance the functionality, quantity and quality of soils	*Will WRMP24:* • Affect high grade agricultural land? • Promote the efficient use of land? • Prevent soil erosion and retain soil stocks as a natural resource? • Involve use of brownfield or greenfield land? • Prevent mineral sterilisation? • Result in soil contamination or involve soil remediation? • Affect SSSIs of geological importance?	Soils
6	To reduce and minimise air and noise emissions	*Will WRMP24:* • Minimise air emissions (pollutants and noise) that affect human health and biodiversity? • Affect an existing air quality management area (AQMA) or lead to the creation of a new one? • Promote enhancements to green infrastructure networks to help improve air quality?	Air Quality
7	To achieve SES target of reducing operational carbon emissions and contribute to national target of Net Zero by 2050	*Will WRMP24:* • Reduce direct and indirect emissions of all greenhouse gases, including carbon dioxide, during construction, operation and decommissioning of schemes? • Maximise supply of energy from low carbon/renewable energy sources / use of low carbon/renewable energy? • Maximise opportunities for making use of waste heat? • Use negative carbon emissions technologies to offset residual emissions such Nature Based Solutions?	Greenhouse Gas Emissions

No.	SEA Objective	Assessment aid questions	SEA topic
		• Create new carbon sinks/removals through natural sequestration including that provided by green infrastructure and soils which contribute to carbon sequestration?	
8	To conserve, protect and enhance landscape, townscape and seascape character and visual amenity	*Will WRMP24:* • Protect and enhance designated landscapes and features? • Affect the character of the landscape, townscape or seascape, including tranquillity and views? • Protect conservation areas or historic landscape/townscape areas? • Minimise noise and light pollution from construction and operational activities on residential amenity and on sensitive locations, receptors and views? • Improve access to the countryside? • Create or improve green infrastructure which contributes to access to the landscape?	Landscape
9	To conserve, protect and enhance the historic environment and assets, including archaeology	*Will WRMP24:* • Protect designated historic assets, sites and features? • Protect heritage assets at risk? • Protect historic assets and their settings? • Protect important archaeology (including unknown archaeology)? • Alter the hydrological conditions of water-dependent heritage assets, including organic remains?	Cultural Heritage
10	To maintain and enhance the health and wellbeing of the local community, including economic and social wellbeing	*Will WRMP24:* • Allow for green economic development? • Provide employment opportunities and economic diversity? • Minimise disturbance from noise, light, visual, and transport due to construction and operational activities? • Minimise disturbance to active travel (pedestrian and cycle routes, Public Rights of Way) during construction and operational activities?	Population and human health

No.	SEA Objective	Assessment aid questions	SEA topic
		• Secure resilient water supplies for the health and wellbeing of customers?	
11	To maintain and enhance tourism and recreation	*Will WRMP24:* • Affect terrestrial, freshwater or marine water resources that are used for tourism and recreation? • Maintain or enhance tourism in the region through the creation or improvement of terrestrial or water-based attractions? • Improve access to the natural environment for recreation, including those living within deprived areas? • Provide education or information resources for the public about the natural environment?	
12	To minimise resource use and waste production	*Will WRMP24:* • Minimise the use of materials, energy and resources? • Promote water efficiency and encourage a reduction in water consumption? • Minimise the production of waste? • Promote sustainable waste management practices in line with the waste hierarchy? • Encourage the use of recycled and / or secondary materials? • Promote the use of low carbon materials and technologies? • Promote the use of local suppliers that use sustainably-sourced and locally produced materials?	Material assets
13	To avoid negative effects on built assets / infrastructure	*Will WRMP24:* • Reuse existing infrastructure? • Affect major built assets and infrastructure, including transport infrastructure?	

8. Technical Environmental Assessment

The SEA objectives, as set out in Section 7, have been formulated to incorporate the findings of the various technical environmental assessments, specifically the Habitats Regulations Assessment, Water Framework Directive Assessment, Biodiversity Net Gain and Natural Capital assessments. This has helped to provide an integrated environmental assessment of the plan.

It is however important to note, that whilst the results of the various technical environmental assessments have been used to inform the SEA, care has been taken to align the approaches to ensure there is no risk of double counting where overlaps between some of the SEA objectives and various metrics used in the technical assessments may have occurred (introducing undue bias).

8.1. Habitat Regulation Assessment

The HRA Technical Note attached to the SEA as Appendix F reports on the Stage 1 Screening Assessment (Test of Likely Significance) undertaken by Water Resources South East (WRSE) for options being considered by SES Water, as part of the environmental assessment work to support the development of the WRSE Emerging Regional Plan. The HRA assessments presented have been undertaken by WRSE and results considered in the undertaking of the SEA of SES Water's WRMP24. Each of the following schemes were considered through the HRA process:

- Outwood Lane;
- Secombe Centre; and
- Raising of Bough Beech Reservoir.

As a result of the Level 1 HRA Screening exercise, WRSE finds that each of the three supply options featuring in at least one of the Preferred Plan (BVP), LCP and/or BESP can be appropriately screened out and do not require further assessment in the form of Appropriate Assessment. This was reasoned through the sufficient distance at which options were located from N2k designated sites, with no effect pathways identified.

8.2. Water Framework Directive

The WFD TN available as Appendix G presents the findings of the Water Framework Directive (WFD) assessment that has been undertaken as part of the environmental assessment process to support the development of the WRSE Emerging Regional Plan.

The Level 1 WFD assessments have been reviewed and updated for the WRMP24 Schemes. The Level 2 assessment has been undertaken only on those supply options selected before 2050 by the WRSE Best Value Plan (BVP), Best Environmental and Societal Plan (BESP) or the Least Cost Plan (LCP) and is based on the All Companies Working Group methodology for each of the Schemes.

The pre-2050 SES Water options selected in the WRSE BVP, BESP and LCP are listed as follows:

- Outwood Lane;
- Secombe Centre; and
- Raising of Bough Beech Reservoir.

Each of the three schemes progressed to Level 2 as a result of the screening exercise. A medium remaining risk score (2) was concluded for each of the three schemes for one or more waterbodies, coastal water body or groundwater body. This reflected new or increased groundwater abstraction and increase in surface water and groundwater abstraction licence (Outwood Lane and Secombe Centre UV options) and modification of an existing reservoir (Raising of Bough Beech reservoir option). As such, the results of the WFD screening undertaken by WRSE, along with the Level 2 assessments have been considered in the undertaking of the SEA of SES Water's WRMP24.

8.3. Biodiversity Net Gain

Biodiversity Net Gain (BNG) is a specific, measurable outcome of project activities that deliver demonstrable and quantifiable benefits to biodiversity compared to the baseline situation. Biodiversity metrics provide a way of measuring and accounting for biodiversity losses and gains resulting from development and/or land management change.

A BNG assessment forms an integral part of the Strategic Environmental Assessment and the inclusion of BNG as part of the WRMP24 environmental assessment process is supported by the updated Water Resources Planning Guideline Supplementary Guidance 'Environmental Society in Decision Making' (November 2021).

BNG assessments for the five emerging SES options comprising drought permits were screened out as they will not result in a change in land use.

BNG assessments of the remaining three options were scoped out on the basis of the current available option information.

8.4. Natural Capital

Natural capital assessments (NCA) are required in order to evaluate the impact of the proposed SES Water options on the natural environment through an assessment of the impact of the option on the natural capital stocks and subsequent ecosystem services these stocks provide.

This was undertaken by WRSE in accordance with the WPRG SG. A condition under this is that only supply-side options are within scope of a NCA, of which there are three options for SES Water.

All three supply side options were scoped out of a natural capital assessment by WRSE. This means that there are no numerical outputs of the NCAs of SES Water's options due to no expected natural capital impacts based on all available option information.

This analysis contributes to the wider dWRMP objectives of SES Water through highlighting that the proposed options are not expected to materiality harm the natural capital stocks of the region.

8.5. Invasive Non-Native Species

This INNS risk assessment (the risk of INNS being introduced and spread through the functioning of each scheme via transfer pathways that may become active once the scheme is operational) has been undertaken through a Level 1 screening assessment only. The Level 1 screening assessment is used to determine whether any schemes are considered high-enough risk to warrant a Level 2 risk assessment using the Environment Agency's standardised risk assessment tool.

Water Resources South East's (WRSE) high-level screening methodology was used for this assessment which accounts for frequency in which transfers would be operational and the severity of their impact, as inferred by the nature and volume of water being transferred. These criteria formed a screening matrix for assessment, in which only schemes scoring 'low', 'medium' or 'high' are taken forward for a Level 2 assessment.

The Level 1 WRSE screening outcome (considering the general scheme type only) for the three schemes concluded that none required a further Level 2 risk assessment, as all were considered to have 'very low' INNS transfer risk.

9. Assessment of Alternatives

9.1. Introduction

Stage B2 of the SEA process normally involves the generation and assessment of plan options. This exercise is undertaken in part to fulfil the requirements of the SEA Regulations, which requires that the Environmental Report should consider:

'reasonable alternatives taking into account the objectives and the geographical scope of the plan or programme' (SEA Regulations Part 3 Section 12 (2)b).

It is normal practice when developing a Plan to propose different ways (options) of fulfilling its objectives. SES Water carried out a staged approach to decide on potential options to either increase supplies or reduce demand, including third party solutions. The unconstrained options list was screened to produce a shortlist of feasible options for the next stage of assessment.

41 options or option groups, relating to hard infrastructure, demand management and drought measures were considered feasible, and SES Water calculated costs, including capex, opex, social, environmental and carbon for each option. The results of the assessment were uploaded to the WRSE database to be used in the regional programme appraisal.

WRSE, using their regional investment model, inputted the results of the feasible options identified and produced three programmes; a Best Value Plan, and as required by the revised Water Resources Planning Guidelines (WRPG), two alternative plans: a Least Cost Plan (LCP), and Best Environmental and Societal Plan (BESP).

As set out in Chapter 1, both alternative plans are constrained to securing the necessary water resources, whilst meeting regulatory and policy requirements. In addition, the LCP is programmed to deliver the set of options that meet the balance in the most cost-effective way. The BESP increases the overall benefit to customers, the environment and wider society.

To assess the alternatives, comparison has been made of the options featuring in the identified alternative plans to those in the Best Value Plan (BVP) as set out in Table 9-1. It is important to note that the majority of options are common to all plans. Therefore, to allow robust comparison between alternatives, comment has only been made on the options in the alternative plans not common to the BVP.

The 'non common' options, both supply (measures that increase supply) and demand (measures that reduce demand for water), have been discussed as follows:

1. the schemes selected in the BVP, but not in an alternative plan; and
2. the schemes selected in an alternative plan, but not the BVP.

The assessment of options featuring in the alternative plans set out here has been fed back to WRSE in development of the preferred plan.

Each option has been assessed against the SEA Framework in respect of construction and operation phases and considering positive and negative effects separately. Full details of the assessment for each option is provided within Appendix D. Where available, the assessment tables have been supplemented with Option IDs, descriptions and mitigation that is considered embedded as part of the option.

The SEA objectives are:

1. To reduce vulnerability of built infrastructure to climate change risks and hazards
2. To reduce or manage flood risk, taking climate change into account
3. To protect and enhance the quantity and quality of surface, groundwater, estuarine, coastal waterbodies and water dependent habitats
4. To protect and enhance biodiversity, priority species, vulnerable habitats and habitat connectivity and achieve biodiversity net gain
5. To Protect and enhance the functionality, quantity and quality of soils

6. To reduce and minimise air and noise emissions
7. To achieve SES target of reducing operational carbon emissions and contribute to national target of Net Zero by 2050
8. To conserve, protect and enhance landscape, townscape and seascape character and visual amenity
9. To conserve, protect and enhance the historic environment and assets, including archaeology
10. To maintain and enhance the health and wellbeing of the local community, including economic and social wellbeing
11. To maintain and enhance tourism and recreation
12. To minimise resource use and waste production
13. To avoid negative effects on built assets / infrastructure

In the following table green is used to denote inclusion of an option in a particular plan, red where an option does not feature.

Table 9-1 - Table showing options featuring in each of the Alternative Plans in comparison to the BVP

Options	WRSE ID	BVP	LCP	BESP
Supply				
Outwood Lane	SES_SES_HI-GRW_RE2_ALL_r22			
Raising of Bough Beech reservoir	SES_SES_HI-ROC_RE2_ALL_r1			
Hackbridge drought permit	SES_SES_RE-DRP_REP_ALL_hackbridge-dp			
Kenley and Purley drought permit	SES_SES_RE-DRP_REP_ALL_ken-pur-dp			
Secombe Centre UV	SES_SES_HI-LRE_WT2_ALL_r26			
Outwood Lane drought permit	SES_SES_RE-DRP_REP_ALL_outwood-dp			
River Eden May drought permit	SES_SES_RE-DRP_REP_ALL_river-eden-maydp			
River Eden Summer drought permit	SES_SES_RE-DRP_REP_ALL_river-eden-summerdp			
Demand				
SES Demand: Gov-led B Hybrid	N/A			
Demand Basket Medium SES	N/A			
Non-Essential Use Ban (NEUB)	PRT_PRT_RE-DRO_ALL_ALL_neubs			
Temporary Use Ban (TUB)	PRT_PRT_RE-DRO_ALL_ALL_tubs			

9.2. Consideration of alternatives

9.2.1. Least Cost Programme

SES Water have produced a Least Cost Plan (LCP) as a benchmark to appraise the Best Value Plan (BVP) against. It is the programme that delivers the least cost solution but meets statutory requirements and is informed by the SEA and HRA. The LCP also meets policy expectations around demand management. The options featuring in the LCP are presented in Table 9-2

Table 9-2: Options selected in the LCP

Name	Year Selected
Demand Options	
SES Demand: Gov-led B Hybrid	2027
Demand Basket Medium SES	2026
Non-Essential Use Ban (NEUB)	2026
Temporary Use Ban (TUB)	2026
Supply Options	
Outwood Lane	2051
Secombe Centre UV	2053
Raising of Bough Beech reservoir	2054
Hackbridge drought permit	2030
Kenley and Purley drought permit	2030
Outwood Lane drought permit	2030
River Eden May drought permit	2030
River Eden Summer drought permit	2030

9.2.2. Comparison of options selected against the BVP

Each of the options that feature in the BVP also feature in the LCP and BESP. Table 9-3 below presents the options that feature in the LCP, but not the BVP. Table 9-4 displays the associated SEA for those options that feature in the LCP.

Table 9-3: Schemes selected in the LCP but not in the BVP

Name	Year Selected
Supply Options	
Secombe Centre UV	2053
Outwood Lane drought permit	2030
River Eden May drought permit	2030
River Eden Summer drought permit	2030

Table 9-4: SEA scores for schemes selected in the LCP but not in the BVP

Supply Side Option		SEA Objective												
		1	2	3	4	5	6	7	8	9	10	11	12	13
Outwood Lane drought permit														
Construction	Positive Residual Effects	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Negative Residual Effects	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Operation	Positive Residual Effects	++	0	++	0	0	+	+	0	0	++	+	++	+
	Negative Residual Effects	-	-	-	-	-	-	--	-	0	-	-	0	0
River Eden May drought permit														
Construction	Positive Residual Effects	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Negative Residual Effects	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Operation	Positive Residual Effects	++	0	++	0	0	+	+	0	0	++	+	++	+
	Negative Residual Effects	-	0	-	-	-	-	--	0	0	-	-	0	0
River Eden Summer drought permit														
Construction	Positive Residual Effects	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Negative Residual Effects	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Operation	Positive Residual Effects	++	0	++	0	0	+	+	0	0	++	+	++	+
	Negative Residual Effects	-	0	-	-	-	-	--	0	0	-	-	0	0
Secombe Centre UV														
Construction	Positive Residual Effects	0	0	0	0	0	0	0	0	+	0	0	0	0
	Negative Residual Effects	0	0	-	-	0	-	-	-	-	-	-	-	-
Operation	Positive Residual Effects	+	0	+	0	0	0	0	0	0	0	0	0	0
	Negative Residual Effects	0	0	--	0	0	0	-	-	0	0	0	-	0

9.2.3. Least Cost Plan Summary

The LCP sees the addition of four supply options.

Outwood Lane drought permit

The purpose of this drought permit is to allow for increased abstraction at Outwood Lane. It is proposed that the current daily licence limit is increased from 3.02 to 5 Ml/d, equivalent to the Outwood Lane pump capacity. The permit also allows for a proportional increase in the Woodmansterne group annual licence limit to avoid output from the other sources in the group from being curtailed.

This drought option would therefore be to increase both the annual licence at Outwood Lane and the Woodmansterne Group to allow an additional 2 Ml/d pumping from Outwood Lane for a maximum 6-month duration.

The drought permit could potentially start at any time of the year, although the implementation of it is most likely to begin in during typical hydrological recession months (April to September). Should indicators of future water resource availability within the SES Water supply area return to sufficient levels to provide confidence that water supply can be maintained by normal licensed abstraction, the drought permit would be suspended.

Given the nature of the option, there are no construction impacts associated with the option.

The operation of this pipeline will likely produce significant (moderate) adverse effects in relation to one SEA objective:

- **Obj. 7:** '**To achieve SES target of reducing operational carbon emissions and contribute to national target of Net Zero by 2050.**', as there would be an increase in pumping requirements and operational carbon emissions associated with the increase in abstraction.

This significant adverse effects are anticipated to be short term, temporary and confined to the local area.

The operation of this pipeline will likely produce significant (moderate) beneficial effects in relation to four SEA objectives:

- **Obj 1: 'To reduce vulnerability of built infrastructure to climate change risks and hazards'**, as the implementation of this measure will increase resilience to climate change
- **Obj. 3: To protect and enhance the quantity and quality of surface, groundwater, estuarine, coastal waterbodies and water dependent habitats',** as this Option, as part of the wider Drought Plan, will help ensure reliability and resilience of the water supply during extreme or prolonged dry periods.
- **Obj. 10: 'To maintain and enhance the health and wellbeing of the local community, including economic and social wellbeing',** as the drought permit is anticipated to result in beneficial impacts on health and wellbeing owing to its capacity to ensure provision of water during periods of drought.
- **Obj. 12: 'To minimise resource use and waste production',** as the drought permit has the potential to reduce the need for more resource intensive external transfers and abstractions.

These significant beneficial effects are anticipated to be short term, temporary and confined to the local area.

River Eden May drought permit

Bough Beech reservoir is refilled primarily via an abstraction from the River Eden which normally operates during the autumn/winter. A drought permit to enable the winter abstraction from the River Eden to continue for an additional period of time; historically this has been into May, so this permit is often termed the May drought permit. The benefit of the proposed drought permit abstraction would be up to 272.2Ml/d of refill volume to the reservoir during May subject to a Minimum Residual Flow (MRF) in the River Eden. A MRF of 22Ml/d would apply and the annual abstraction limit of 29,000Ml/d would apply (it is assumed that the cap would extend from the preceding September through to the end of May). No construction would be required in order to facilitate the increased abstraction associated with the drought permit. Due to operational practice and infrastructure constraints, the abstraction would cease well before natural flows in the river reduce to 22Ml/d and when flows are recovering would not start until flows are much higher than 22Ml/d.

Given the nature of the option, there are no construction impacts associated with the option.

The operation of this pipeline will likely produce significant (moderate) adverse effects in relation to one SEA objective:

- **Obj. 7: 'To achieve SES target of reducing operational carbon emissions and contribute to national target of Net Zero by 2050'**, as abstracting additional water from the River Eden to supplement Bough Beech Reservoir supply will increase operational carbon emissions. While abstractions already take place

over winter months (September to April) this option would extend this abstraction through the month of May thereby introducing additional pumping requirements and operational carbon emissions

This significant adverse effects are anticipated to be short term, temporary and confined to the local area.

The operation of this pipeline will likely produce significant (moderate) beneficial effects in relation to four SEA objectives:

- **Obj 1: 'To reduce vulnerability of built infrastructure to climate change risks and hazards'**, as the implementation of this measure will increase resilience to climate change
- **Obj. 3: To protect and enhance the quantity and quality of surface, groundwater, estuarine, coastal waterbodies and water dependent habitats',** as this Option, as part of the wider Drought Plan, will help ensure reliability and resilience of the water supply during extreme or prolonged dry periods.
- **Obj. 10: 'To maintain and enhance the health and wellbeing of the local community, including economic and social wellbeing',** as drought permit will support and sustain the water-related recreation which takes place within Bough Beech reservoir and therefore the drought permit provides a benefit to these activities
- **Obj. 12: 'To minimise resource use and waste production',** as the drought permit has the potential to reduce the need for more resource intensive external transfers and abstractions.

These significant beneficial effects are anticipated to be short term, temporary and confined to the local area.

River Eden Summer drought permit

Bough Beech reservoir is refilled primarily via an abstraction from the River Eden which normally operates during the autumn/winter. A drought permit to enable summer abstraction from the River Eden (after any May drought permit has ceased) to permit abstraction of up to 272.2Ml/d through June, July and August. A Minimum Residual Flow of 22Ml/d would apply and the annual abstraction limit of 29,000Ml/d would apply (it is assumed that the cap would extend from the preceding September through to the end of August). No construction would be required in order to facilitate the increased abstraction associated with the drought permit. Due to operational practice and infrastructure constraints, the abstraction would cease well before natural flows in the river reduce to 22Ml/d and when flows are recovering would not start until flows are much higher than 22Ml/d.

Given the nature of the option, there are no construction impacts associated with the option.

The operation of this pipeline will likely produce significant (moderate) adverse effects in relation to one SEA objective:

- **Obj. 7: 'To achieve SES target of reducing operational carbon emissions and contribute to national target of Net Zero by 2050.'**, as abstracting additional water from the River Eden to supplement Bough Beech Reservoir supply will increase operational carbon emissions. While abstractions already take place over winter months (September to April) this option would extend this abstraction through months of June, July and August thereby introducing additional pumping requirements and operational carbon emissions

This significant adverse effects are anticipated to be short term, temporary and confined to the local area.

The operation of this pipeline will likely produce significant (moderate) beneficial effects in relation to four SEA objectives:

- **Obj 1: 'To reduce vulnerability of built infrastructure to climate change risks and hazards'**, as the implementation of this measure will increase resilience to climate change
- **Obj. 3: To protect and enhance the quantity and quality of surface, groundwater, estuarine, coastal waterbodies and water dependent habitats',** as this Option, as part of the wider Drought Plan, will help ensure reliability and resilience of the water supply during extreme or prolonged dry periods.
- **Obj. 10: 'To maintain and enhance the health and wellbeing of the local community, including economic and social wellbeing',** as drought permit will support and sustain the water-related recreation which takes place within Bough Beech reservoir and therefore the drought permit provides a benefit to these activities

- **Obj. 12: 'To minimise resource use and waste production',** as the drought permit has the potential to reduce the need for more resource intensive external transfers and abstractions.

These significant beneficial effects are anticipated to be short term, temporary and confined to the local area.

Secombe Centre UV

This scheme provides UV treatment for the Secombe Centre groundwater source which is currently out of supply due to bacti detections on the raw water. Due to the limited footprint available at the Secombe Centre site, the UV treatment plant would be located at Cheam WTW on the 'East Main' which feeds water from Hackbridge, Goatbridge, Woodcote, Oaks, Langley Park, Sutton and Sutton Court Rd boreholes as well as Secombe Centre.

The construction of this option is anticipated to result in significant (moderate or major) beneficial or adverse effects in relation to any of the SEA objectives.

No significant (moderate or major) beneficial effects are anticipated during the operation of this option.

The operation of this pipeline will likely produce significant (moderate) adverse effects in relation to one SEA objective:

- **Obj. 3: To protect and enhance the quantity and quality of surface, groundwater, estuarine, coastal waterbodies and water dependent habitats',** as the WFD assessment identified possible deterioration between classes, impediments to GES and GEP and compromises to waterbody objectives for Epsom North Downs Chalk ground waterbody.

This significant adverse effect is anticipated to be long term, permanent and confined to the local area.

9.2.4. Best Environmental and Social Plan

This programme is not optimised on cost, but will be the programme that SES Water consider delivers best overall environment and society value outcomes. SES Water have identified this by taking into account overall performance across the SEA, Natural Capital and Biodiversity Net Gain metrics, and through engagement with stakeholders. The options featuring in the BESP are presented in Table 9-5.

Table 9-5: Schemes selected in the BESP

Name	Year Selected
Demand Options	
SES Demand: Gov-led B Hybrid	2027
Demand Basket Medium SES	2026
Non-Essential Use Ban (NEUB)	2026
Temporary Use Ban (TUB)	2026
Supply Options	
Outwood Lane	2042
Secombe Centre UV	2045
Raising of Bough Beech reservoir	2055
Hackbridge drought permit	2041
Kenley and Purley drought permit	2041
Outwood Lane drought permit	2041
River Eden Summer drought permit	2041

9.2.5. Comparison of options selected against the BVP

Each of the options that feature in the BVP also feature in the BESP. Table 9-6 below presents the options that feature in the BESP, but not the BVP. Table 9-7 displays the associated SEA for those options that feature in the BESP.

Table 9-6: Schemes selected in the BESP but not in the BVP

Name	Year Selected
Supply Options	
Secombe Centre UV	2045
Outwood Lane drought permit	2041
River Eden Summer drought permit	2041

Table 9-7: SEA scores for schemes selected in the BESP but not in the BVP

Supply Side Option		SEA Objective												
		1	2	3	4	5	6	7	8	9	10	11	12	13
Outwood Lane drought permit														
Construction	Positive Residual Effects	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Negative Residual Effects	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Operation	Positive Residual Effects	++	0	++	0	0	+	+	0	0	++	+	++	+
	Negative Residual Effects	-	-	-	-	-	-	--	-	0	-	-	0	0
River Eden Summer drought permit														
Construction	Positive Residual Effects	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Negative Residual Effects	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Operation	Positive Residual Effects	++	0	++	0	0	+	+	0	0	++	+	++	+
	Negative Residual Effects	-	0	-	-	-	-	--	0	0	-	-	0	0
Secombe Centre UV														
Construction	Positive Residual Effects	0	0	0	0	0	0	0	0	+	0	0	0	0
	Negative Residual Effects	0	0	-	-	0	-	-	-	-	-	-	-	-
Operation	Positive Residual Effects	+	0	+	0	0	0	0	0	0	0	0	0	0
	Negative Residual Effects	0	0	--	0	0	0	-	-	0	0	0	-	0

9.2.6. BESP Summary

The BESP sees the addition of three supply options.

Outwood Lane drought permit

Given the nature of the option, there are no construction impacts associated with the option.

The operation of this pipeline will likely produce significant (moderate) adverse effects in relation to one SEA objective:

- **Obj. 7: 'To achieve SES target of reducing operational carbon emissions and contribute to national target of Net Zero by 2050.'**, as there would be an increase in pumping requirements and operational carbon emissions associated with the increase in abstraction.

This significant adverse effects are anticipated to be short term, temporary and confined to the local area.

The operation of this pipeline will likely produce significant (moderate) adverse effects in relation to four SEA objectives:

- **Obj 1: 'To reduce vulnerability of built infrastructure to climate change risks and hazards'**, as the implementation of this measure will increase resilience to climate change
- **Obj. 3: To protect and enhance the quantity and quality of surface, groundwater, estuarine, coastal waterbodies and water dependent habitats',** as this Option, as part of the wider Drought Plan, will help ensure reliability and resilience of the water supply during extreme or prolonged dry periods.
- **Obj. 10: 'To maintain and enhance the health and wellbeing of the local community, including economic and social wellbeing',** as the drought permit is anticipated to result in beneficial impacts on health and wellbeing owing to its capacity to ensure provision of water during periods of drought.
- **Obj. 12: 'To minimise resource use and waste production',** as the drought permit has the potential to reduce the need for more resource intensive external transfers and abstractions.

These significant beneficial effects are anticipated to be short term, temporary and confined to the local area.

River Eden Summer drought permit

Bough Beech reservoir is refilled primarily via an abstraction from the River Eden which normally operates during the autumn/winter. A drought permit to enable summer abstraction from the River Eden (after any May drought permit has ceased) to permit abstraction of up to 272.2Ml/d through June, July and August. A Minimum Residual Flow of 22Ml/d would apply and the annual abstraction limit of 29,000Ml/d would apply (it is assumed that the cap would extend from the preceding September through to the end of August). No construction would be required in order to facilitate the increased abstraction associated with the drought permit. Due to operational practice and infrastructure constraints, the abstraction would cease well before natural flows in the river reduce to 22Ml/d and when flows are recovering would not start until flows are much higher than 22Ml/d.

Given the nature of the option, there are no construction impacts associated with the option.

The operation of this pipeline will likely produce significant (moderate) adverse effects in relation to one SEA objective:

- **Obj. 7: 'To achieve SES target of reducing operational carbon emissions and contribute to national target of Net Zero by 2050.'**, as abstracting additional water from the River Eden to supplement Bough Beech Reservoir supply will increase operational carbon emissions. While abstractions already take place over winter months (September to April) this option would extend this abstraction through months of June, July and August thereby introducing additional pumping requirements and operational carbon emissions

This significant adverse effects are anticipated to be short term, temporary and confined to the local area.

The operation of this pipeline will likely produce significant (moderate) adverse effects in relation to three SEA objectives:

- **Obj 1: 'To reduce vulnerability of built infrastructure to climate change risks and hazards'**, as the implementation of this measure will increase resilience to climate change

- **Obj. 3: To protect and enhance the quantity and quality of surface, groundwater, estuarine, coastal waterbodies and water dependent habitats',** as this Option, as part of the wider Drought Plan, will help ensure reliability and resilience of the water supply during extreme or prolonged dry periods.
- **Obj. 10: 'To maintain and enhance the health and wellbeing of the local community, including economic and social wellbeing',** as drought permit will support and sustain the water-related recreation which takes place within Bough Beech reservoir and therefore the drought permit provides a benefit to these activities
- **Obj. 12: 'To minimise resource use and waste production',** as the drought permit has the potential to reduce the need for more resource intensive external transfers and abstractions.

These significant beneficial effects are anticipated to be short term, temporary and confined to the local area.

Secombe Centre UV

This scheme provides UV treatment for the Secombe Centre groundwater source which is currently out of supply due to bacti detections on the raw water. Due to the limited footprint available at the Secombe Centre site, the UV treatment plant would be located at Cheam WTW on the 'East Main' which feeds water from Hackbridge, Goatbridge, Woodcote, Oaks, Langley Park, Sutton and Sutton Court Rd boreholes as well as Secombe Centre.

The construction of this option is anticipated to result in significant (moderate or major) beneficial or adverse effects in relation to any of the SEA objectives.

No significant (moderate or major) beneficial effects are anticipated during the operation of this option.

The operation of this pipeline will likely produce significant (moderate) adverse effects in relation to one SEA objective:

- **Obj. 3: To protect and enhance the quantity and quality of surface, groundwater, estuarine, coastal waterbodies and water dependent habitats',** as the WFD assessment identified possible deterioration between classes, impediments to GES and GEP and compromises to waterbody objectives for Epsom North Downs Chalk ground waterbody.

This significant adverse effect is anticipated to be long term, permanent and confined to the local area.

10. Assessment of WRMP Options

10.1. Introduction

In order to meet the requirements of WRMP24 to ensure SES Water customers and communities have continued adequate amounts of clean drinking water supplies available, a series of Options, both 'demand side' Options (measures that reduce demand for water) and 'supply side' Options (measures that increase supply) have been identified and included within the Plan.

Stage B2 of the SEA process normally involves the generation and assessment of plan options. This exercise is undertaken in part to fulfil the requirements of the SEA Regulations, which requires that the Environmental Report should consider:

'reasonable alternatives taking into account the objectives and the geographical scope of the plan or programme' (SEA Regulations Part 3 Section 12 (2)b.

10.2. Development of Options

It is normal practice when developing a Plan to propose different ways (options) of fulfilling its objectives. SES Water carried out a staged approach to decide on potential options to either increase supplies or reduce demand, including third party solutions. The unconstrained options list was screened to produce a shortlist of feasible options for the next stage of assessment.

41 options or option groups, relating to hard infrastructure, demand management and drought measures were considered feasible, and SES Water calculated costs, including capex, opex, social, environmental and carbon for each option. The results of the assessment were uploaded to the WRSE database to be used in the regional programme appraisal.

WRSE, using their regional investment model, inputted the results of the feasible options identified and produced three programmes; a Best Value Plan, Least Cost Plan, and Best Environmental and Societal Plan. This section looks to assess the options contained in the BVP.

SES Water's Preferred Plan, as set out in Section1.4.2 of this report and section 6 of the dWRMP24, is based on the Best Value Programme, which not only secures the necessary water resources whilst meeting regulatory and policy requirements, but also increases the overall benefit to customers, the environment and wider society. The approach is detailed in the Best Value Planning Method Statement and the Resilience Framework Method Statement available on the WRSE platform.

The full list of options contained in the Preferred Plan are detailed in Table 10-1 and 10-2 below. As per the alternative plans, the options featuring under Pathway 4 (the reported pathway) have been compared as this pathway is considered compliant with the Water Resources Planning Guideline produced by the Environment Agency.

Table 10-1: Options in BVP Supply Side Schemes

Component	Year
Outwood Lane	2042
Raising of Bough Beech reservoir	2051
Hackbridge drought permit	2041
Kenley and Purley drought permit	2041

Table 10-2: Options in BVP Demand Side Schemes

Component	Year
SES Demand: Gov-led B Hybrid	2027
Demand Basket Medium SES	2026
Non-Essential Use Ban (NEUB)	2026
Temporary Use Ban (TUB)	2026

More information on the above Options is contained within the relevant Assessment tables within Appendix D, with further detail also available within WRMP24.

The SEA Objectives are:

1. To reduce vulnerability of built infrastructure to climate change risks and hazards
2. To reduce or manage flood risk, taking climate change into account
3. To protect and enhance the quantity and quality of surface, groundwater, estuarine, coastal waterbodies and water dependent habitats
4. To protect and enhance biodiversity, priority species, vulnerable habitats and habitat connectivity and achieve biodiversity net gain
5. To Protect and enhance the functionality, quantity and quality of soils
6. To reduce and minimise air and noise emissions
7. To achieve SES target of reducing operational carbon emissions and contribute to national target of Net Zero by 2050
8. To conserve, protect and enhance landscape, townscape and seascape character and visual amenity
9. To conserve, protect and enhance the historic environment and assets, including archaeology
10. To maintain and enhance the health and wellbeing of the local community, including economic and social wellbeing
11. To maintain and enhance tourism and recreation
12. To minimise resource use and waste production
13. To avoid negative effects on built assets / infrastructure

10.3. Overview of assessment results

The following tables provide an overview of the assessment ‘scores’ for all of the Options considered within the SEA, for both the construction and operation phases (post mitigation). The assessment findings of each option is then discussed in turn, with full detail provided in Appendix D.

Table 10-3: Construction Scores (Post Mitigation)

		Climate Factors				Water		Biodiversity		Soil		Air Quality		Greenhouse Gas Emissions		Landscape		Cultural Heritage		Population and human health				Material Assets			
		To reduce vulnerability of built infrastructure to climate change risks and hazards		To reduce or manage flood risk, taking climate change into account		To protect and enhance the quantity and quality of surface, groundwater, estuarine, coastal waterbodies and water dependent habitats		To protect and enhance biodiversity, priority species, vulnerable habitats and habitat connectivity and achieve biodiversity net gain		To Protect and enhance the functionality, quantity and quality of soils		To reduce and minimise air and noise emissions		To achieve SES target of reducing operational carbon emissions and contribute to national target of Net Zero by 2050		To conserve, protect and enhance landscape, townscape and seascape character and visual amenity		To conserve, protect and enhance the historic environment and assets, including archaeology		To maintain and enhance the health and wellbeing of the local community, including economic and social wellbeing		To maintain and enhance tourism and recreation		To minimise resource use and waste production		To avoid negative effects on built assets / infrastructure	
Option Name	**Plan Featured**	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-
Outwood Lane	BVP, BESP, LCP	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0	0	0	0	0	0	0	0	-	0	0
Raising of Bough Beech reservoir	BVP, BESP, LCP	0	0	0	-	0	-	0	-	0	0	0	-	0	-	0	-	0	-	0	-	0	-	0	-	0	-
Hackbridge drought permit	BVP, BESP, LCP	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Kenley and Purley drought permit	BVP, BESP, LCP	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
SES Demand: Gov-led B Hybrid	BVP, BESP, LCP	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Demand Basket Medium SES	BVP, BESP, LCP	0	-	0	0	0	-	0	-	0	0	0	-	0	-	0	-	0	-	0	-	0	0	0	-	0	-
Non-Essential Use Ban (NEUB)	BVP, BESP, LCP	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Temporary Use Ban (TUB)	BVP, BESP, LCP	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Table 10-4: Operation Scores (Post Mitigation)

		Climate Factors				Water		Biodiversity		Soil		Air Quality		Greenhouse Gas Emissions		Landscape		Cultural Heritage		Population and human health				Material Assets			
		To reduce vulnerability of built infrastructure to climate change risks and hazards		To reduce or manage flood risk, taking climate change into account		To protect and enhance the quantity and quality of surface, groundwater, estuarine, coastal waterbodies and water dependent habitats		To protect and enhance biodiversity, priority species, vulnerable habitats and habitat connectivity and achieve biodiversity net gain		To Protect and enhance the functionality, quantity and quality of soils		To reduce and minimise air and noise emissions		To achieve SES target of reducing operational carbon emissions and contribute to national target of Net Zero by 2050		To conserve, protect and enhance landscape, townscape and seascape character and visual amenity		To conserve, protect and enhance the historic environment and assets, including archaeology		To maintain and enhance the health and wellbeing of the local community, including economic and social wellbeing		To maintain and enhance tourism and recreation		To minimise resource use and waste production		To avoid negative effects on built assets / infrastructure	
Option Name	**Plan Featured**	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-
Outwood Lane	BVP, BESP, LCP	+	-	0	0	+	--	0	-	0	0	0	-	0	-	0	0	0	0	0	0	0	0	0	0	0	0
Raising of Bough Beech reservoir	BVP, BESP, LCP	++	0	0	0	+	--	++	0	0	0	0	0	0	-	0	-	0	-	0	0	0	0	0	0	0	0
Hackbridge drought permit	BVP, BESP, LCP	++	-	0	0	++	-	0	-	0	-	+	-	+	--	0	-	0	0	++	-	0	-	++	0	+	0
Kenley and Purley drought permit	BVP, BESP, LCP	++	-	0	0	++	--	0	-	0	-	+	-	+	--	0	-	0	0	++	-	0	-	++	0	+	0
SES Demand: Gov-led B Hybrid	BVP, BESP, LCP	+	0	0	0	++	0	+	0	0	0	+	0	+	0	0	0	0	0	+	0	0	0	+	0	0	0
Demand Basket Medium SES	BVP, BESP, LCP	+	0	+	0	+++	0	++	0	0	0	+	0	+	0	+	0	0	0	+	0	0	0	+	0	+	0
Non-Essential Use Ban (NEUB)	BVP, BESP, LCP	+	0	0	0	+	0	+	-	0	-	+	0	+	0	0	-	0	0	0	-	0	-	+	0	0	-
Temporary Use Ban (TUB)	BVP, BESP, LCP	+	0	0	0	+	0	+	-	0	-	+	0	+	0	0	-	0	0	0	-	0	-	+	0	0	-

10.3.1. Demand Side Options

The following provides an overview of assessment results for Demand Side Options considered. Note that the assessment of significance is presented in terms of residual effects (i.e., after any additional mitigation is applied) in respect of construction and operation. A discussion on these assessment results follows, with full details of the assessment for each Option provided within Appendix D.

SES Demand: Gov-led B Hybrid

Table 10-5: Gov-led B Hybrid

Supply Side Option		SEA Objective												
		1	2	3	4	5	6	7	8	9	10	11	12	13
SES Demand: Gov-led B Hybrid														
Construction	Positive Residual Effects	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Negative Residual Effects	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Operation	Positive Residual Effects	+	0	++	+	0	+	+	0	0	+	0	+	0
	Negative Residual Effects	0	0	0	0	0	0	0	0	0	0	0	0	0

It is to be noted that this Option applies across the whole of the SES area. The option involves the water efficient labelling that has already been announced by DEFRA, the potential for minimum standards in water using goods, plus enhanced support on new developments that could be introduced in the future to support national targets. Of note, water efficient labelling systems (WELS) were identified in the Water UK 'Pathways to Long-Term PCC Reduction' report as the most significant and cost beneficial approach to demand management.

There is no construction phase associated with this option thus no effects on the SEA objectives emerging from construction.

In relation to the operation phase of this Option, it is anticipated that there will be no adverse effects on any of the SEA Objectives. A number of slight positive effects have been identified. Keeping water in the environment may also help avoid negative effects on the built environment (Objective 1). These positive effects include in relation to Biodiversity (Objective 4), where it is anticipated that these measures will help to keep water in the environment and reduce resource pressures and with consequent benefits for water dependent habitat and species. A reduction in demand may also provide slight benefits in respect of air, noise and carbon emissions (Objective 6 and 7) through reduced need for treatment and pumping. An increased awareness through labelling should also result in improved health and wellbeing (e.g. reduced stress), where the measures will reduce the need for more disruptive action (Objective 10). This Option will also help to reduce and minimise the use of water which is considered a valuable resource and help reduce waste in its treatment (Objective 12).

These noted beneficial effects, though slight, can be considered of regional scale and permanent.

The operation of this pipeline will likely produce moderate significant beneficial effects in relation to one SEA objective:

- **Obj 3: 'To protect and enhance the quantity and quality of surface, groundwater, estuarine, coastal waterbodies and water dependent habitats'**, due to water being kept within the environment, the protection of water resources, reduced pressures on water supplies and improved efficiency.

It is anticipated that this effect will be of regional scale and can be considered permanent.

Demand Basket Medium SES

Table 10-6: Demand Basket Medium SES

Supply Side Option		SEA Objective												
		1	2	3	4	5	6	7	8	9	10	11	12	13
Demand Basket Medium SES														
Construction	Positive Residual Effects	0	0	0	0	0	0	0	0	0	0	0	0	0
	Negative Residual Effects	-	0	-	-	0	-	-	-	-	-	0	-	-
Operation	Positive Residual Effects	+	+	+++	++	0	+	+	+	0	+	0	+	+
	Negative Residual Effects	0	0	0	0	0	0	0	0	0	0	0	0	0

The option involves:

- Compulsory metering – Household
- AMI / Smart metering
- Enhanced metering – Household
- Optant metering
- Water use audit and inspection – Household and non-household water efficiency
- Awareness campaigns – Targeted water conservation information (advice on appliance water usage)
- Promotion of water saving devices – Retrofitting (new or subsidised)
- Reduction in other consumption
- Leakage reduction - trunk mains and service reservoir leakage reduction
- Leakage reduction - Pressure reduction programmes
- Customer supply pipe leakage reduction (non-metering options)
- Leakage reduction - Customer engagement / education / incentives
- Leakage reduction - Active Leakage Control

It is to be noted that this Option applies across the whole of the SES area. It is anticipated that this option would not result in any significant adverse or beneficial effects during its construction. During construction though, a number of slight adverse effects have been identified. These include on the vulnerability of built infrastructure to climate change (Objective 1) and on water quality (Objective 3) through the activities associated with repair works. There may be slight adverse effects on Biodiversity (Objective 4), where there may be minor effects such as disturbance or small areas of habitat loss during repair works. Similar slight adverse effects could be expected through the activities associated with repair works on air, noise and carbon emissions (Objective 6 and 7), landscape and visual amenity (Objective 8), the historic environment (Objective 9) and health and wellbeing due to disturbance causing effects on wellbeing (stress) induced by repair works (Objective 10). Repair works will also lead to the use of resources and increase waste (Objective 12), while there may be effects on built infrastructure (Objective 13) such as road surfacing.

Such construction adverse effects are anticipated to be local scale, short term and temporary to the construction / repair phase.

A range of slight beneficial effects have been identified associated with the operation phase of this Option. Keeping water in the environment may help avoid negative effects on the built environment (Objective 1). Network improvements are also likely to lead to a reduction in pipe bursts and help to reduce the risk of

accidental flooding (Objective 2). Slight beneficial effects are also anticipated in relation to air, noise and carbon emissions (Objective 6 and 7) as reduced water pumping and treatment is required. More water will also be retained in the environment and help maintain visual amenity (Objective 8). Reduced need for disruptive actions will also help maintain health and wellbeing (Objective 10) and reduced leakage, increased awareness, and action to conserve water will acts to minimise resource use and waste production (Objective 12). Reduced leakage and improved repair etc. will help maintain built infrastructure (Objective 13).

The operation of this Option will likely produce significant beneficial effects in relation to two SEA objectives:

- **Obj 3: 'To protect and enhance the quantity and quality of surface, groundwater, estuarine, coastal waterbodies and water dependent habitats'**, due to awareness campaigns, retrofitting, metering and leakage reduction works resulting in water being kept within the environment. reduced resource pressures, protection of water resources and increasing availability for water dependant habitat and species.
- **Obj 4: 'To protect and enhance biodiversity, priority species, vulnerable habitats and habitat connectivity and achieve biodiversity net gain'**, due to awareness campaigns, retrofitting, metering and leakage reduction works resulting in water being kept within the environment, the protection of water resources, reduced pressures on water supplies and improved efficiency.

These beneficial effects can be considered of local scale but long term and can be considered permanent.

Non-Essential Use Ban (NEUB)

Table 10-7: Non-Essential Use Ban (NEUB)

Supply Side Option	SEA Objective												
	1	2	3	4	5	6	7	8	9	10	11	12	13

Non-Essential Use Ban (NEUB)														
Construction	Positive Residual Effects	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Negative Residual Effects	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Operation	Positive Residual Effects	+	0	+	+	0	+	+	0	0	0	0	+	0
	Negative Residual Effects	0	0	0	-	-	0	0	-	0	-	-	0	-

This Option would apply to the whole of the SES area. NEUBs target non-domestic users and may only be implemented following approval of an Ordinary Drought Order by the Secretary of State. Typically, NEUBs would include:

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

There is no construction phase associated with this Option thus no effects on the SEA objectives emerging from construction. In relation to operational effects, while no significant beneficial effects have been identified, there are anticipated to be a number of slight beneficial effects, and these are mainly associated with the outcome of reducing demand and potentially reducing abstraction / treatment. This is considered likely to have beneficial effects in terms of increasing resilience (Objective 1). Reduced abstraction will help maintain river and groundwater levels (Objective 3). Slight beneficial effects are anticipated in relation to Biodiversity (Objective 4) as more water will remain in the environment, with consequent benefits for water dependant species and habitats. Reduced treatment and pumping will reduce air, noise and carbon emissions (Objectives 6 and 7). Reduced abstraction, treatment and pumping will also reduce the use of resources and waste produced (Objective 12).

It is considered that all slight beneficial effects will be at the very local scale, short term and temporary.

It is not anticipated that the operation of this option will produce significant adverse effects in relation to any of the SEA objectives. A number of slight adverse effects have been identified though. In relation to Biodiversity (Objective 4), the restrictions on watering plants and using hosepipes may have minor adverse effects on pollinators, insects, fish (domestic ponds) and birds (bird baths) where gardens are found to support such biodiversity. There could also be effects on soils (Objective 5) through dust generation and erosion e.g. in gardens or other such open spaces. Lack of ability to water open spaces, or operate ornamental fountains etc. could impact visual amenity and landscapes (Objective 8). Non-essential use ban is likely to have minor negative effects on the community and social well-being (Objective 10) as there will be restrictions on irrigation of gardens and allotments and use of water for recreational purposes. There may also be a small increased risk of fires in allotments as vegetation dries out. Risk to human health and wellbeing may also be increased where dust suppression measures cannot be implemented and cleaning of paths and other infrastructure restricted. This may increase health and safety risks. Assuming commercial properties including gardens are exempt from bans and restrictions there is likely to be only a minor effect on tourism and recreation (Objective 11). Non-commercial tourism sites may be affected. In addition, while temporary, the Option is likely to impact on the maintenance of buildings and industrial plant (Objective 13).

It is considered that all slight adverse effects will be short term and temporary and confined to the local scale.

Temporary Use Ban (TUB)

Table 10-8: Temporary Use Ban (TUB)

Supply Side Option		SEA Objective												
		1	2	3	4	5	6	7	8	9	10	11	12	13
Temporary Use Ban (TUB)														
Construction	Positive Residual Effects	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Negative Residual Effects	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Operation	Positive Residual Effects	+	0	+	+	0	+	+	0	0	0	0	+	0
	Negative Residual Effects	0	0	0	-	-	0	0	-	0	-	-	0	-

This Option would apply to the whole of the SES area. TUBs are restrictions which cover the outdoor use of water for household purposes and can be introduced quickly. It is considered that these would be introduced in phases and include the following components:

Phase 1

- Watering a garden using a hosepipe

Phase 2

- Cleaning a private motor-vehicle using a hosepipe
- Watering plants on domestic or other non-commercial premises using a hosepipe
- Cleaning a private leisure boat using a hosepipe
- Filling or maintaining a domestic swimming or paddling pool
- Drawing water, using a hosepipe, for domestic recreational use
- Filling or maintaining a domestic pond using a hosepipe
- Filling or maintaining an ornamental fountain
- Cleaning walls, or windows, of domestic premises using a hosepipe
- Cleaning paths or patios using a hosepipe

No construction activities are required in relation to this option and as such no effects on SEA objectives emerging from construction have been identified. In relation to operational effects of this option, while no significant beneficial effects are identified, there are a number of slight beneficial anticipated and these are mainly associated with the outcome of reducing demand and potentially reducing abstraction / treatment. This is considered likely to have beneficial effects in terms of increasing resilience (Objective 1). The option aims to reduce the water required for supply, therefore resulting in a reduction in abstraction which will help maintain river flows and protect ground water and surface water bodies (Objective 3). Slight beneficial effects are anticipated in relation to Biodiversity (Objective 4) as more water will remain in the environment, with consequent benefits for water dependant species and habitats. Reduced treatment and pumping will reduce air, noise and carbon emissions (Objectives 6 and 7). Reduced abstraction, treatment and pumping will also reduce the use of resources and waste produced (Objective 12).

It is considered that all slight beneficial effects will be at the very local scale, short term and temporary.

It is not anticipated that the operation of this option will produce significant adverse effects in relation to any of the SEA objectives. A number of slight adverse effects have been identified though. In relation to Biodiversity (Objective 4), the restrictions on watering plants and using hosepipes may have minor adverse effects on pollinators, insects, fish (domestic ponds) and birds (bird baths) where gardens are found to support such biodiversity. There could also be effects on soils (Objective 5) through dust generation and erosion e.g. in gardens or other such open spaces. Lack of ability to water open spaces, or operate ornamental fountains etc. could impact visual amenity and landscapes (Objective 8). Non-essential use ban is likely to have minor negative effects on the community and social well-being (Objective 10) as there will be restrictions on irrigation of gardens and allotments and use of water for recreational purposes. There may also be a small increased risk of fires in allotments as vegetation dries out. Wellbeing impacts associated with reduced water based recreational activities which improve tolerance and capacity to enjoy higher temperatures. Assuming commercial properties including gardens are exempt from bans and restrictions there is likely to be only a minor effect on tourism and recreation (Objective 11). Non-commercial tourism sites may be affected. In addition, while temporary, the option is likely to impact on private assets / residential properties (Objective 13).

It is considered that all slight adverse effects will be short term and temporary and confined to the local scale.

10.3.2. Supply Side Options

The following provides an overview of assessment results for Supply Side Options considered. Note that the assessment of significance is presented in terms of residual effects (i.e., after any additional mitigation is applied) in respect of construction and operation. A discussion on these assessment results follows, with full details of the assessment for each Option provided within Appendix D.

Outwood Lane

Table 10-9: Outwood Lane

Supply Side Option		SEA Objective												
		1	2	3	4	5	6	7	8	9	10	11	12	13
Outwood Lane														
Construction	Positive Residual Effects	0	0	0	0	0	0	0	0	0	0	0	0	0
	Negative Residual Effects	0	0	0	0	0	0	-	0	0	0	0	-	0
Operation	Positive Residual Effects	+	0	+	0	0	0	0	0	0	0	0	0	0
	Negative Residual Effects	-	0	--	-	0	-	-	0	0	0	0	0	0

This scheme seeks an increase in daily licence from 3Ml/d to 8 Ml/d and requires an equivalent increase in pump capacity. The hydraulic capacity of the source has been proved during previous test pumping. The increase in PDO associated with the scheme would be 5 Ml/d. Potential for an ADO scheme has been considered by comparing the Woodmansterne group daily average licence limit with abstraction returns for the group from 2010-2016. The group licence offers an average headroom of 3.4 Ml/d if the borehole can be made to yield it.

It is anticipated that this option would not result in any significant adverse or beneficial effects during its construction. No slight beneficial effects during construction were identified either, though slight adverse effects are anticipated during construction in respect of Objective 7 as carbon will be generated from materials used to construct the new infrastructure (embodied carbon). Slight adverse effects are also anticipated in relation to Objective 12 (resource use) as an increase in pump capacity is required which will require some material consumption.

It is anticipated that all construction effects would be local, short term and temporary to the construction phase.

It is anticipated that this option would not result in any beneficial effects during its operation. During operation, slight beneficial effects are anticipated in respect of Objective 1 as the option may increase the resilience of the surface water environment to climate change as it would be using an alternative source. Slight beneficial effects are also anticipated in relation to water (Objective 3) as the works will supply water on completion and therefore reduce pressure on other sources.

Slight adverse effects are anticipated in relation to Objective 1 as resilience of the groundwater environment to climate change likely to be affected by increased abstraction. Chipstead SSSI may be adversely affected by increased abstraction during the operational phase thus slight adverse impacts are expected for Objective 4 (biodiversity). Slight adverse effects would be associated with increased pumping requirements in relation to noise, air and carbon emissions (Objective 6 and 7).

The operation of this pipeline will likely produce significant (moderate) adverse effects in relation to one SEA objective:

- **Objective 3: 'To protect and enhance the quantity and quality of surface, groundwater, estuarine, coastal waterbodies and water dependent habitats'**, as the WFD assessment finds significant adverse effects on Epsom North Downs Chalk (Ground waterbody) cannot be ruled from the increased abstraction during operation.

It is anticipated that the operational effects would be at the local scale, but would be long term (as per the lifespan of the infrastructure) and effectively permanent.

Raising of Bough Beech reservoir

Table 10-10: Raising of Bough Beech reservoir

Supply Side Option		SEA Objective												
		1	2	3	4	5	6	7	8	9	10	11	12	13
Raising of Bough Beech reservoir														
Construction	Positive Residual Effects	0	0	0	0	0	0	0	0	0	0	0	0	0
	Negative Residual Effects	0	-	-	-	0	-	-	-	-	-	-	-	-
Operation	Positive Residual Effects	++	0	+	++	0	0	0	0	0	0	0	0	0
	Negative Residual Effects	0	0	--	0	0	0	-	-	-	0	0	0	0

Raising the Bough Beech reservoir embankment would increase the volume of stored water, which would provide an increase in the average yield from the reservoir. This option has been included to demonstrate the costs and likely increases in average yield from such a scheme. Based on available drawings of the earth dam alignment, a 3m raising of the embankment would appear to be feasible. It is likely that some realignment of the embankment locally to the small housing development on the north side of the embankment would be required. A detailed study would be necessary to confirm the viability of this scheme. A 3m raising of the embankment would increase the storage volume of the reservoir by approximately 3,600Ml. The Aquator model of the Bough Beech reservoir system was used to estimate the additional yield created by the dam raising. It is estimated that the scheme would provide an additional annual average yield of 5.5Ml/d, but no increase in peak output which is constrained by the WTW capacity.

It is anticipated that this option would not result in any significant adverse or beneficial effects during its construction. No slight beneficial effects during construction were identified either, though slight adverse effects are anticipated during construction in respect of Objective 2 as the reservoir is largely within Flood Zones 2 and 3 and construction works may increase risk of pollution incidents due to flooding. Impacts are anticipated in relation to water (Objective 3) as the option requires construction works in proximity to an existing surface water receptor with potential to result in deterioration of water quality/flow. Due to the potential permanent loss of Ancient Woodland slight adverse impacts are anticipated for Biodiversity (Objective 4). There is potential for temporary deterioration in air and noise environment (Objective 6) during construction. Also, carbon will be generated from materials used to construct the new infrastructure (embodied carbon) thus slight adverse impacts are anticipated for Objective 7. The option is partially within Kent Downs AONB and London Area Greenbelt and there will potentially be minor effects on landscape character and visual amenity (Objective 8) as a result of raising an existing embankment. There is potential for the option to adversely impact heritage assets (Objective 9) during construction, particularly listed buildings in close proximity as well as buried archaeology. Slight adverse effects are also anticipated from construction on the local community using the area for recreation, tourism and water based recreation (Objectives 10 and 11), resource use and waste production (Objective 12) and built assets due to disruption to the local road network (Objective 13).

It is anticipated that all construction effects would be small scale, short term and temporary to the construction phase.

During operation, slight beneficial effects were identified for Objective 3 as the option will facilitate increased water storage.

The operation of this pipeline will likely produce significant (moderate) adverse effects in relation to two SEA objectives:

- **Objective 1: 'To reduce vulnerability of built infrastructure to climate change risks and hazards'** as by storing more water, the reservoir is anticipated to increase resilience to drought events which are expected to be exacerbated by climate change.

- **Objective 4: 'To protect and enhance biodiversity, priority species, vulnerable habitats and habitat connectivity and achieve biodiversity net gain'** as works may give rise to opportunities to improve on existing habitat within the immediate area.

Slight adverse effects during operation are anticipated during operation in relation to Objective 7 as carbon will be generated during operation. Slight adverse effects on landscape character and visual amenity (Objective 8) will continue through operation though reducing as planting and landscaping/reinstatement becomes established. The setting of heritage assets (Objective 9) including listed buildings in close proximity may be adversely affected during operation.

The operation of this pipeline will likely produce significant (moderate) adverse effects in relation to one SEA objective:

- **Objective 3: 'To protect and enhance the quantity and quality of surface, groundwater, estuarine, coastal waterbodies and water dependent habitats'**, as until further WFD assessment has been undertaken the potential for significant adverse effects on the Lower Eden during operation cannot be ruled out.

It is anticipated that the operational effects would be at the local scale, but would be long term (as per the lifespan of the infrastructure) and effectively permanent.

Hackbridge drought permit

Table 10-11: Hackbridge drought permit

Supply Side Option		SEA Objective												
		1	2	3	4	5	6	7	8	9	10	11	12	13
Hackbridge drought permit														
Construction	Positive Residual Effects	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Negative Residual Effects	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Operation	Positive Residual Effects	++	0	++	0	0	+	+	0	0	++	0	++	+
	Negative Residual Effects	-	0	-	-	-	-	--	-	0	-	-	0	0

The Hackbridge licence is complicated due to the recharge component, which determines how much water can be abstracted in the following summer, and the aggregation with Wandle Laundry. It is proposed that the drought option decouples abstraction from the volume recharged and allows abstraction to be maximised (19 Ml/d) regardless of the volume recharged in the preceding winter. On the assumption that typically 250-350 Ml/d is recharged, which permits a 15 Ml/d abstraction in the following summer, this permit would generate 4 Ml/d benefit. A condition of this permit could be a commitment that a minimum volume is recharged in the preceding and following winter, subject to the drought not continuing into a multi-year drought (in which scenario the water may not be available for recharge). The Hackbridge Group licence comprises three sources in the confined Chalk: Hackbridge (two operational boreholes), Goatbridge (one operational borehole) and Bishopsford Road.

As a condition of the licence, outflow from Carshalton Ponds (as measured at the Grove on the River Wandle, also referred to as the Carshalton Gauging Station (GS)) has to be maintained at greater than 4.5 Ml/d before abstraction can take place at the Hackbridge Group boreholes along with a number of SES Water's other unconfined Chalk sources. To achieve this, SES Water operates an augmentation scheme whereby river water is drawn from the River Wandle at the Goatbridge intake and pumped back up to Carshalton Ponds. It is also possible to use the water from Goatbridge borehole which normally pumps into supply if required, although this option has never been required. The scheme essentially re-circulates the flow in the upper stretches of the Carshalton branch when the natural spring flow into the Ponds is less than 4.5 l/d.

The drought permit could potentially start at any time of the year, although the implementation of it is most likely to begin in during typical hydrological recession months (April to September). Should indicators of future water resource availability within the SES Water supply area return to sufficient levels to provide confidence that water supply can be maintained by normal licensed abstraction, the drought permit would be suspended.

No construction activities are required in relation to this option and as such no effects on SEA objectives emerging from construction have been identified. During operation, slight beneficial effects are anticipated in respect of air, noise and carbon (Objectives 6 and 7) as the drought permit has the potential to reduce the need for more resource intensive external transfers and abstractions which would result in more significant impacts. Slight beneficial impacts are also anticipated in respect of built assets and infrastructure should the drought permit act to alleviate demand restrictions which have the potential to impact on built assets and infrastructure (by enforcing cleaning and maintenance restrictions).

The operation of this pipeline will likely produce significant (moderate) beneficial effects in relation to four SEA objectives:

- **Objective 1: 'To reduce vulnerability of built infrastructure to climate change risks and hazards'** as the implementation of this measure will increase resilience to climate change.
- **Objective 3: 'To protect and enhance the quantity and quality of surface, groundwater, estuarine, coastal waterbodies and water dependent habitats'** as the option, as part of the wider Drought Plan will help ensure reliability and resilience of the water supply during extreme or prolonged dry periods.
- **Objective 10: 'To maintain and enhance the health and wellbeing of the local community, including economic and social wellbeing'** as its capacity to ensure provision of water during periods of drought will be beneficial to health and wellbeing.
- **Objective 12: 'To minimise resource use and waste production'** as the drought permit has the potential to reduce the need for more resource intensive external transfers and abstractions.

During operation, slight adverse effects are anticipated in respect of Objective 1 as climate change may exacerbate drought conditions within the river and therefore increase pressure on remaining water resources. During drought situations, where there is limited recharge to the aquifer system, the abstraction may mainly be at the expense of groundwater storage in the aquifer. This can, in the long run, delay groundwater level recovery and have a knock-on effect on baseflow contributions to watercourses and water dependent habitats (Objective 3). There may be potential impacts on priority species and therefore slight adverse impacts are anticipated for biodiversity (Objective 4). Slight adverse effects are also anticipated in relation to deposition of sediment in river (Objective 5) - lower flows result in the river having less energy to carry sediment. The hydrological changes are expected to result in only short term impacts on sediment dynamics, the river channel and/or the river bank, which are unlikely to lead to significant changes in wetted areas or the integrity of river function. While abstractions already take place this option would increase this abstraction thereby introducing additional pumping requirements and operational air and noise emissions (Objective 6). Waddon Ponds are an important feature for recreational use in the area, especially for walkers. A visual eyesore would be created should these ponds dry up which may adversely impact walkers. Whilst this may be a likely situation during an extreme drought, it is not anticipated as an outcome from the drought permit though it is possible that the drought permit may delay recovery to springflow and thereby extend the duration of drought impacts on the pond (Objective 8, 10 and 11).

The operation of this pipeline will likely produce significant (moderate) adverse effects in relation to one SEA objective:

- **Objective 7: 'To achieve SES target of reducing operational carbon emissions and contribute to national target of Net Zero by 2050'** as while abstractions already take place this option would increase this abstraction thereby introducing additional pumping requirements and operational carbon emission.

It is anticipated that operational effects would be at the local scale, with the exception of Biodiversity which would be at a regional scale. The effects would be long term (as per the lifespan of the infrastructure) and temporary.

Kenley and Purley drought permit

Table 10-12: Kenley and Purley drought permit

Supply Side Option		SEA Objective												
		1	2	3	4	5	6	7	8	9	10	11	12	13
Kenley and Purley drought permit														
Construction	Positive Residual Effects	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Negative Residual Effects	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Operation	Positive Residual Effects	++	0	++	0	0	+	+	0	0	++	0	++	+
	Negative Residual Effects	-	0	--	-	-	-	--	-	0	-	-	0	0

Kenley and Purley are licence constrained at MDO (22.79 Ml/d). The PDO (41.28 Ml/d) which is almost double that of the MDO, is constrained by pump capacity. Therefore, there is the potential for a drought option to increase the annual average licence such that the PDO could be sustained, generating up to 18.5 Ml/d. The capacity at the WTW and pump capacity limits the potential to increase PDO further.

Previous drought plans also included a drought option at Kenley and Purley. The option sought to increase the annual licence to allow the pumping at the then PDO rate of 24.9 Ml/d. The PDO has now significantly changed; in WRMP19 the PDO increased from 24.9 Ml/d to 41.28 Ml/d and has since been confirmed in WRMP24. There is therefore the potential for a larger drought option at Kenley and Purley than previously identified. However, this is not currently believed to be required. Whilst the results of the current round of water resource modelling are not yet available to clearly demonstrate this, initial modelling does not indicate larger deficits would be encountered than in previous plans. Therefore, it is assumed the volume of water provided by the previous drought permit/orders (9 Ml/d) remains sufficient, and consequently no adjustment to Kenley and Purley option is required.

The drought permit could potentially start at any time of the year, although the implementation of it is most likely to begin in during typical hydrological recession months (April to September). Should indicators of future water resource availability within the SES Water supply area return to sufficient levels to provide confidence that water supply can be maintained by normal licensed abstraction, the drought permit would be suspended.

No construction activities are required in relation to this option and as such no effects on SEA objectives emerging from construction have been identified. During operation, slight beneficial effects are anticipated in respect of air, noise and carbon (Objectives 6 and 7) as the drought permit has the potential to reduce the need for more resource intensive external transfers and abstractions which would result in more significant impacts. Slight beneficial impacts are also anticipated in respect of built assets and infrastructure should the drought permit act to alleviate demand restrictions which have the potential to impact on built assets and infrastructure (by enforcing cleaning and maintenance restrictions).

The operation of this pipeline will likely produce significant (moderate) beneficial effects in relation to four SEA objectives:

- **Objective 1: 'To reduce vulnerability of built infrastructure to climate change risks and hazards'** as the implementation of this measure will increase resilience to climate change.

- **Objective 3: 'To protect and enhance the quantity and quality of surface, groundwater, estuarine, coastal waterbodies and water dependent habitats'** as the option, as part of the wider Drought Plan will help ensure reliability and resilience of the water supply during extreme or prolonged dry periods.
- **Objective 10: 'To maintain and enhance the health and wellbeing of the local community, including economic and social wellbeing'** as its capacity to ensure provision of water during periods of drought will be beneficial to health and wellbeing.
- **Objective 12: 'To minimise resource use and waste production'** as the drought permit has the potential to reduce the need for more resource intensive external transfers and abstractions.

During operation, slight adverse effects are anticipated in respect of Objective 1 as climate change may exacerbate drought conditions within the river and therefore increase pressure on remaining water resources. There may be potential impacts on priority species and therefore slight adverse impacts are anticipated for biodiversity (Objective 4). Slight adverse effects are also anticipated in relation to deposition of sediment in river (Objective 5) - lower flows result in the river having less energy to carry sediment. The hydrological changes are expected to result in only short term impacts on sediment dynamics, the river channel and/or the river bank, which are unlikely to lead to significant changes in wetted areas or the integrity of river function. While abstractions already take place this option would increase this abstraction thereby introducing additional pumping requirements and operational air and noise emissions (Objective 6). Waddon Ponds are an important feature for recreational use in the area, especially for walkers. A visual eyesore would be created should these ponds dry up which may adversely impact walkers. Whilst this may be a likely situation during an extreme drought, it is not anticipated as an outcome from the drought permit though it is possible that the drought permit may delay recovery to springflow and thereby extend the duration of drought impacts on the pond (Objective 8, 10 and 11).

The operation of this pipeline will likely produce significant (moderate) adverse effects in relation to two SEA objectives:

- **Objective 3: 'To protect and enhance the quantity and quality of surface, groundwater, estuarine, coastal waterbodies and water dependent habitats'** as the EAR notes in summary that the Drought permit may create an interference drawdown with SES and Thames Water groundwater sources, also identifying 'Poor' and 'Bad' WFD status in associated waterbodies.
- **Objective 7: 'To achieve SES target of reducing operational carbon emissions and contribute to national target of Net Zero by 2050'** as while abstractions already take place this option would increase this abstraction thereby introducing additional pumping requirements and operational carbon emission.

11. Mitigation

11.1. Introduction

The term mitigation encompasses any approach that is aimed at preventing, reducing or offsetting any significant adverse environmental effects that have been identified. In practice, a range of measures applying one or more of these approaches is likely to be considered in mitigating any significant adverse effects predicted as a result of implementing the WRMP24. In addition, it is also important to consider measures aimed at enhancing positive effects. All such measures are generally referred to as mitigation measures.

However, the emphasis should be in the first instance on proactive avoidance of adverse effects. Only once alternative options or approaches to avoiding an effect have been examined, should mitigation then examine ways of reducing the scale / importance of the effect.

Mitigation can take a wide range of forms, including:

- Refining Intervention measures in order to improve the likelihood of positive effects and to minimise adverse effects;
- Technical measures (such as setting guidelines) to be applied during the implementation phase;
- Identifying issues to be addressed in project assessment, such as Environmental Impact Assessment and the development of Environmental Management Plans for certain projects or types of project;
- Proposals for changing other plans and programmes; and
- Contingency arrangements for dealing with possible adverse effects.

11.2. Mitigation approaches applied through the SEA

A number of mitigation approaches have been considered through the development of the Water Resource Management Plan, in order to mitigate potential effects (significant or otherwise). Of note is that within a number of proposed Options ‘embedded mitigation’ has been considered. ‘Embedded mitigation’ is mitigation that has been incorporated into the development of the Option and is set out for each Option in the following tables. Through the SEA process, further ‘additional mitigation’ has also been identified. ‘Additional mitigation’ is mitigation that is required to address specific issues relating to significant effects in addition to ‘embedded mitigation’ and identified through the SEA process. This is further set out in Table 11-1 to 11-8.

Table 11-1: Embedded and Additional Mitigation identified for the Outwood Lane option

Outwood Lane	
Embedded Mitigation considered in Option assessment	
None Identified	
Additional Mitigation derived from Option assessment	
Objective 1: To reduce vulnerability of built infrastructure to climate change risks and hazards	Monitor groundwater levels.
Objective 2: To reduce or manage flood risk, taking climate change into account	None identified
Objective 3: To protect and enhance the quantity and quality of surface, groundwater, estuarine, coastal waterbodies and water dependent habitats	Monitor groundwater levels at Epsom North Downs Chalk to ensure over abstraction is avoided and no deterioration in water quality. WFD Mitigation as follows: • Operational controls and monitoring of groundwater levels and associated surface water bodies. • Further assessment required re sustainability of GW licence amendment likely required by EA. • Abstraction licensing to be undertaken in accordance with EA legislation including S32 consent and water features surveys as applicable
Objective 4: To protect and enhance biodiversity, priority species, vulnerable habitats and habitat connectivity and achieve biodiversity net gain	Best practicable means to prevent change in GWDTE habitat as a result of changes in water levels/quality. This includes further investigation in respect of potential hydrogeological connection with chalk rivers
Objective 5: To Protect and enhance the functionality, quantity and quality of soils	None identified
Objective 6: To reduce and minimise air and noise emissions	Consider the use of renewable energy in pumping which would reduce emissions/adverse impacts on air quality.

Objective 7: To achieve SES target of reducing operational carbon emissions and contribute to national target of Net Zero by 2050	Investigate use of renewables during construction and operation for energy supply and use of materials with lower embodied carbon. Carbon footprint study could help identify areas for carbon savings or alternative materials. As the electricity grid is decarbonised, greener energy will be available.
Objective 8: To conserve, protect and enhance landscape, townscape and seascape character and visual amenity	None identified
Objective 9: To conserve, protect and enhance the historic environment and assets, including archaeology	None identified
Objective 10: To maintain and enhance the health and wellbeing of the local community, including economic and social wellbeing	None identified
Objective 11: To maintain and enhance tourism and recreation	None identified
Objective 12: To minimise resource use and waste production	None identified
Objective 13: To avoid negative effects on built assets / infrastructure	None identified

Table 11-2: Embedded and Additional Mitigation identified for the Raising of Bough Beech reservoir option

Raising of Bough Beech reservoir
Embedded Mitigation considered in Option assessment
None Identified
Additional Mitigation derived from Option assessment

Objective 1: To reduce vulnerability of built infrastructure to climate change risks and hazards	None identified.
Objective 2: To reduce or manage flood risk, taking climate change into account	Measures to reduce the impact on flooding during the construction phase may include a robust CEMP which outlines construction methods and measures such as the consideration of storm water runoff and dewatering operations to reduce risk of pollution incidents.
Objective 3: To protect and enhance the quantity and quality of surface, groundwater, estuarine, coastal waterbodies and water dependent habitats	Best practicable means to prevent impacts to surface water receptors such as the Lower Eden River. CEMP which outlines construction methods and measures to reduce risk of pollution incidents and works in proximity to water.
Objective 4: To protect and enhance biodiversity, priority species, vulnerable habitats and habitat connectivity and achieve biodiversity net gain	Best practice methods to be implemented to minimise disturbance effects and habitat loss including designing embankment to avoid loss of woodland habitat, in particular Ancient Woodland. Habitat to be reinstated on completion, or if unavoidable compensatory habitat to be considered to replace damaged or lost habitat. Future design will need to undertake ecology surveys. Integrate biodiversity improvement opportunities as part of works. This may be achieved through enhanced planting, wildflower banks, improved connectivity with woodland or integration of National Priority Focus Area objectives of Woods and Parks and Kent Downs.
Objective 5: To Protect and enhance the functionality, quantity and quality of soils	Land reinstated upon completion. Care of topsoil for future reuse.
Objective 6: To reduce and minimise air and noise emissions	Best practice mitigation measures to be implemented during construction e.g. ensuring all plant and machinery are well maintained and not emitting excessive fumes. Consideration of air and noise quality in CEMP.
Objective 7: To achieve SES target of reducing operational carbon emissions and contribute to national target of Net Zero by 2050	Investigate use of renewables during construction and operation for energy supply and use of materials with lower embodied carbon. Carbon footprint study could help identify areas for carbon savings or alternative materials. As the electricity grid is decarbonised, greener energy will be available.
Objective 8: To conserve, protect and enhance landscape, townscape and seascape character and visual amenity	Best practice measures to be implemented to minimise effects during construction and operation although effects may remain. CEMP to ensure that the character and quality of landscapes and townscapes are maintained as far as practical during construction.

Objective 9: To conserve, protect and enhance the historic environment and assets, including archaeology	Best practicable means to minimise disruption to heritage assets such as listed buildings during construction. Given there is potential to impact buried archaeology, an Archaeology Watching Brief may be required during the construction phase. Reinstatement of land once operational in order to minimise setting impacts on nearby heritage assets.
Objective 10: To maintain and enhance the health and wellbeing of the local community, including economic and social wellbeing	Engagement with local residents of proposed works and key activities, any disruption anticipated and alternative arrangements (e.g. access). Best practice mitigation measures e.g. noise management to be implemented to minimise effects during construction. This should be addressed in a CEMP.
Objective 11: To maintain and enhance tourism and recreation	Best practice mitigation measures e.g. noise management to be implemented to minimise effects during construction and land will be reinstated.
Objective 12: To minimise resource use and waste production	Seek opportunity to implement sustainable design measures, such as reuse and recycling of materials, including reuse of excavated material to reduce the impact, however it is likely that minor negative effects will remain. This may involve a Site Waste Management Plan and consideration of the waste hierarchy.
Objective 13: To avoid negative effects on built assets / infrastructure	Best practice measures including a Traffic Management Plan to be implemented to minimise disturbance during construction.

Table 11-3: Embedded and Additional Mitigation identified for the Hackbridge drought permit option

Hackbridge drought permit
Embedded Mitigation considered in Option assessment
SES Water provide alternative supplies for the duration of the impact
Cessation rules if water quality parameters fall below pre-agreed levels.
Ensure Carshalton augmentation scheme operates as normal for duration of permit
Agile mitigation. Options could include fish rescue, aeration devices, flushing flows and creation of refugia through localised modification of bed levels (temporary pools). Identification of need through catchment walkovers
Development of a plan for monitoring of fish stress and fish rescue/recovery implementation should it be required

Additional Mitigation derived from Option assessment	
Objective 1: To reduce vulnerability of built infrastructure to climate change risks and hazards	None identified
Objective 2: To reduce or manage flood risk, taking climate change into account	None identified
Objective 3: To protect and enhance the quantity and quality of surface, groundwater, estuarine, coastal waterbodies and water dependent habitats	None identified
Objective 4: To protect and enhance biodiversity, priority species, vulnerable habitats and habitat connectivity and achieve biodiversity net gain	None identified
Objective 5: To Protect and enhance the functionality, quantity and quality of soils	None identified
Objective 6: To reduce and minimise air and noise emissions	None identified
Objective 7: To achieve SES target of reducing operational carbon emissions and contribute to national target of Net Zero by 2050	None identified
Objective 8: To conserve, protect and enhance landscape, townscape and seascape character and visual amenity	None identified
Objective 9: To conserve, protect and enhance the historic environment and assets, including archaeology	None identified
Objective 10: To maintain and enhance the health and wellbeing of the local community, including economic and social wellbeing	None identified

Objective 11: To maintain and enhance tourism and recreation	None identified
Objective 12: To minimise resource use and waste production	None identified
Objective 13: To avoid negative effects on built assets / infrastructure	None identified

Table 11-4: Embedded and Additional Mitigation identified for the Kenley and Purley drought permit option

Kenley and Purley drought permit	
Embedded Mitigation considered in Option assessment	
SES Water provide alternative supplies for the duration of the impact	
Flow level monitoring during droughts and fluvial audit to improve assessment confidence for geomorphology	
Monitoring of OP, total ammonia, DO and parameters causing WFD failures (in respective waterbodies) before, during and after the drought permit is in operation. Data collected should be routinely reviewed by a water quality expert and triggers which indicate the need for further action should be agreed. Monitoring of surface water flows before, during and after the drought permit is in operation	
Development of a plan for monitoring of fish stress and fish rescue/recovery implementation should it be required. Agile mitigation. Options could include fish rescue, aeration devices, flushing flows and creation of refugia through localised modification of bed levels (temporary pools)	
Ensure Carshalton augmentation flow is maintained.	
Cessation rules if water quality parameters fall below pre-agreed levels	
Additional Mitigation derived from Option assessment	
Objective 1: To reduce vulnerability of built infrastructure to climate change risks and hazards	None identified
Objective 2: To reduce or manage flood risk, taking climate change into account	None identified

Objective 3: To protect and enhance the quantity and quality of surface, groundwater, estuarine, coastal waterbodies and water dependent habitats	None identified
Objective 4: To protect and enhance biodiversity, priority species, vulnerable habitats and habitat connectivity and achieve biodiversity net gain	None identified
Objective 5: To Protect and enhance the functionality, quantity and quality of soils	None identified
Objective 6: To reduce and minimise air and noise emissions	None identified
Objective 7: To achieve SES target of reducing operational carbon emissions and contribute to national target of Net Zero by 2050	None identified
Objective 8: To conserve, protect and enhance landscape, townscape and seascape character and visual amenity	None identified
Objective 9: To conserve, protect and enhance the historic environment and assets, including archaeology	None identified
Objective 10: To maintain and enhance the health and wellbeing of the local community, including economic and social wellbeing	None identified
Objective 11: To maintain and enhance tourism and recreation	None identified
Objective 12: To minimise resource use and waste production	None identified
Objective 13: To avoid negative effects on built assets / infrastructure	None identified

Table 11-5: Embedded and Additional Mitigation identified for the SES Demand: Gov-led B Hybrid option

SES Demand: Gov-led B Hybrid	
Embedded Mitigation considered in Option assessment	
None identified	
Additional Mitigation derived from Option assessment	
Objective 1: To reduce vulnerability of built infrastructure to climate change risks and hazards	None identified
Objective 2: To reduce or manage flood risk, taking climate change into account	None identified
Objective 3: To protect and enhance the quantity and quality of surface, groundwater, estuarine, coastal waterbodies and water dependent habitats	None identified
Objective 4: To protect and enhance biodiversity, priority species, vulnerable habitats and habitat connectivity and achieve biodiversity net gain	None identified
Objective 5: To Protect and enhance the functionality, quantity and quality of soils	None identified
Objective 6: To reduce and minimise air and noise emissions	None identified
Objective 7: To achieve SES target of reducing operational carbon emissions and contribute to national target of Net Zero by 2050	None identified
Objective 8: To conserve, protect and enhance landscape, townscape and seascape character and visual amenity	None identified

Objective 9: To conserve, protect and enhance the historic environment and assets, including archaeology	None identified
Objective 10: To maintain and enhance the health and wellbeing of the local community, including economic and social wellbeing	None identified
Objective 11: To maintain and enhance tourism and recreation	None identified
Objective 12: To minimise resource use and waste production	None identified
Objective 13: To avoid negative effects on built assets / infrastructure	None identified

Table 11-6: Embedded and Additional Mitigation identified for the Demand Basket Medium SES option

Demand Basket Medium SES	
Embedded Mitigation considered in Option assessment	
None identified	
Additional Mitigation derived from Option assessment	
Objective 1: To reduce vulnerability of built infrastructure to climate change risks and hazards	None identified
Objective 2: To reduce or manage flood risk, taking climate change into account	Measures to reduce the impact on flooding during the construction phase (leakage reduction works) should still be implemented.
Objective 3: To protect and enhance the quantity and quality of surface, groundwater, estuarine, coastal waterbodies and water dependent habitats	None identified

Objective 4: To protect and enhance biodiversity, priority species, vulnerable habitats and habitat connectivity and achieve biodiversity net gain	Ensure best practicable means to prevent loss of habitat during construction. Use of access shafts (or similar) for leakage works would be used to avoid ecologically sensitive locations.
Objective 5: To Protect and enhance the functionality, quantity and quality of soils	Land reinstated upon completion of leakage works. Best practice construction measures to be implemented.
Objective 6: To reduce and minimise air and noise emissions	Best practice mitigation measures implemented during construction. Consider use of electric vehicles to complete retrofitting, home visits and meter instillation.
Objective 7: To achieve SES target of reducing operational carbon emissions and contribute to national target of Net Zero by 2050	Investigate use of renewables during construction.
Objective 8: To conserve, protect and enhance landscape, townscape and seascape character and visual amenity	Best practice measures will likely be implemented to minimise effects during construction (leakage reduction works), however minor and temporary impacts may remain.
Objective 9: To conserve, protect and enhance the historic environment and assets, including archaeology	Best practice measures will likely be implemented to minimise effects during construction (leakage reduction works), however minor and temporary impacts may remain.
Objective 10: To maintain and enhance the health and wellbeing of the local community, including economic and social wellbeing	Best practice mitigation measures e.g. noise management to be implemented to minimise effects during construction (leakage reduction works). However, minor and temporary effects are likely to still occur.
Objective 11: To maintain and enhance tourism and recreation	None identified
Objective 12: To minimise resource use and waste production	None identified
Objective 13: To avoid negative effects on built assets / infrastructure	Best practice measures including a Traffic Management Plan to be implemented to minimise disturbance during construction (leakage reduction works). However, minor and temporary effects are likely to still occur.

Table 11-7: Embedded and Additional Mitigation identified for the Non-Essential Use Ban (NEUB) option

Non-Essential Use Ban (NEUB)	
Embedded Mitigation considered in Option assessment	
None identified	
Additional Mitigation derived from Option assessment	
Objective 1: To reduce vulnerability of built infrastructure to climate change risks and hazards	None identified
Objective 2: To reduce or manage flood risk, taking climate change into account	None identified
Objective 3: To protect and enhance the quantity and quality of surface, groundwater, estuarine, coastal waterbodies and water dependent habitats	None identified
Objective 4: To protect and enhance biodiversity, priority species, vulnerable habitats and habitat connectivity and achieve biodiversity net gain	Risk of INNS to be considered when banning washing of water craft. Consider mandating of visual inspections to ensure no transfer of INNS.
Objective 5: To Protect and enhance the functionality, quantity and quality of soils	None identified
Objective 6: To reduce and minimise air and noise emissions	None identified
Objective 7: To achieve SES target of reducing operational carbon emissions and contribute to national target of Net Zero by 2050	None identified
Objective 8: To conserve, protect and enhance landscape, townscape and seascape character and visual amenity	None identified

Objective 9: To conserve, protect and enhance the historic environment and assets, including archaeology	None identified
Objective 10: To maintain and enhance the health and wellbeing of the local community, including economic and social wellbeing	Allowing allotments limited supplies of water and ensuring high levels of communication before, during and following the implementation of these measures will mitigate these effects. Consider exemptions where dust suppression would alleviate impacts on particularly vulnerable groups e.g. construction works near hospitals, schools, nursery and care homes.
Objective 11: To maintain and enhance tourism and recreation	None identified
Objective 12: To minimise resource use and waste production	None identified
Objective 13: To avoid negative effects on built assets / infrastructure	None identified

Table 11-8: Embedded and Additional Mitigation identified for the Temporary Use Ban (TUB) option

Temporary Use Ban (TUB)	
Embedded Mitigation considered in Option assessment	
None identified	
Additional Mitigation derived from Option assessment	
Objective 1: To reduce vulnerability of built infrastructure to climate change risks and hazards	None identified
Objective 2: To reduce or manage flood risk, taking climate change into account	None identified
Objective 3: To protect and enhance the quantity and quality of surface, groundwater, estuarine, coastal waterbodies and water dependent habitats	None identified

Objective 4: To protect and enhance biodiversity, priority species, vulnerable habitats and habitat connectivity and achieve biodiversity net gain	None identified
Objective 5: To Protect and enhance the functionality, quantity and quality of soils	None identified
Objective 6: To reduce and minimise air and noise emissions	None identified
Objective 7: To achieve SES target of reducing operational carbon emissions and contribute to national target of Net Zero by 2050	None identified
Objective 8: To conserve, protect and enhance landscape, townscape and seascape character and visual amenity	None identified
Objective 9: To conserve, protect and enhance the historic environment and assets, including archaeology	None identified
Objective 10: To maintain and enhance the health and wellbeing of the local community, including economic and social wellbeing	Allowing allotments limited supplies of water and ensuring high levels of communication before, during and following the implementation of these measures.
Objective 11: To maintain and enhance tourism and recreation	None identified
Objective 12: To minimise resource use and waste production	None identified
Objective 13: To avoid negative effects on built assets / infrastructure	None identified

12. Cumulative, synergistic and indirect effects

12.1. Introduction

Within SEA, there is a requirement to consider cumulative, synergistic and indirect effects of implementation of the Drought Plan. Cumulative effects arise where several proposals or elements individually may or may not have significant effect but in-combination have a significant effect due to spatial crowding or temporal overlap. Synergistic effects are when two or more effects act together to create an effect greater than the simple sum of the effects when acting alone. Secondary and indirect effects are effects that are not a direct result of the Drought Plan, but which occur away from the original effect or as the result of a complex pathway.

12.2. Likely cumulative effects

SEA Objectives which have the potential for cumulative effects have been identified (as required by the SEA Regulations) from the analysis of plans and programmes, the baseline data, consultation responses and an examination of the identified key issues and cumulative, synergistic and indirect effects have also been considered during the SEA.

12.3. In-plan cumulative effects

The results of the direct effects of the WRMP options are discussed in Chapters 10 and 11. It is considered that the options can interact cumulatively across sustainability issues either through construction or operation.

In respect of Habitats Regulations Assessment, as each of the options were assessed as having no impact pathways, there is no scope for the options to have any effect on European Sites. Therefore, there is no potential for LSEs in-combination and an in-combination assessment is deemed not required.

With regards to the WFD Assessment, other than the drought permit options, which are temporary and cumulatively assessed within SES Water's Drought Plan SEA, only one permanent supply option is selected under the WRSE BVP before 2050 (R22 Outwood Lane). A further supply option (R1 Raising of Bough Beech reservoir) not selected by the BVP until 2055, has been included in cumulative impact assessment as its construction would need to commence before 2050 for this option to deliver supply benefit by 2055. The assessment finds that there is no potentially impacted water body common to the two BVP selected non-temporary water supply options. There is therefore considered to be negligible risk that implementation of these two options together would result in a cumulative impact on a WFD water body that is greater than the impact of the individual option on its own.

12.3.1. Construction In-plan cumulative effects

There are two supply side options that feature in the BVP however owing to their distance (over 20km from each other) cumulative effects as a result of any construction activities are considered unlikely.

In respect of demand management schemes, while there may be some construction activities associated with leakage management, it is not possible to say precisely where such activities will take place, it is anticipated that there will be no cumulative effects as these construction activities will be localised, with none or minimal spatial overlap and likely to take place at different times.

12.3.2. Operational In-plan cumulative effects

It is anticipated that savings in water as a result of wider demand management side schemes would likely have cumulative beneficial effects in respect of resilience to climate change (Obj. 1), the water environment (Obj. 3), biodiversity (Obj. 4), reducing air and noise emissions and reducing carbon, (Obj. 6 and Obj. 7), maintaining health and wellbeing (Obj. 10), as well as minimising resource use (Obj. 12). While some of the savings made are in themselves small and benefits would be slight, it is to be noted that cumulatively effects could be

significant and of importance particularly during drought situations when the environment is under increased stress.

The two supply side options that feature in the BVP are over 20km from each other and therefore any localised cumulative effects as a result of their operation is unlikely however, wider cumulative benefits associated with increased network resilience, security of supply and water availability across the SES Water operating area may be anticipated with resulting beneficial cumulative effects on the water environment (Obj.3) and maintaining health and wellbeing (Obj.10).

12.4. In-combination cumulative effects with other plans and projects

The SEA has considered other plans and projects that might lead to cumulative effects when combined with the WRMP, as outlined in Table 12-1.

Of note WRSE have undertaken a cumulative effects assessment for the programme of WRMP options selected before 2050 and post 2050 for each of its constituent water companies. Those options have been identified from the WRSE investment model within Situation 4 for each of the BVP, LCP and BESP.

The WRSE assessment considered the options identified in the three plans of each water company that were selected by 2050 are within 500m of the water company boundaries. Where an environmental receptor such as a designated site falls within the 500m buffer region, any options impacting these designated sites (even if the option is over 500m from the company boundary) were considered within the assessment. Options that do not have defined geographical locations such as temporary use bans (TUBS), non-essential use bans (NEUBS), catchment management options, media campaigns and demand management options are also considered within the WRSE cumulative effects assessment.

In respect of SES Water supply options, WRSE have identified the following options that were included in the WRSE cumulative assessment:

- Raising of Bough Beech Reservoir

WRSE consider that while option may not impact upon the same assets, there is the potential for cumulative effects on the historic environment as a whole, noting that Bough Beech Reservoir is located within a conservation area within the buffer between the Thames Water and SES Water boundaries.

Cumulative assessment of this option is provided in WRSEs Draft Regional Plan (Section 5) Table 5.2 – Table 5.4 and a summary of the assessment provided in Section 5.3.1.4 of that report.

Table 12-1: Cumulative effects with other plans and projects

Plan or Project	Overview	Potential for cumulative effects with the WRMP
As noted by the Infrastructure and Projects Authority[12], over the next 10 years (from 2021) total infrastructure investment across the UK is expected to be nearly £650 billion. As such, there are a range of major developments or infrastructure projects underway or expected to commence within the South	Each of the noted schemes (along with other developments not noted) will require significant construction activities, with potential implications for the environment.	While locationally spread across the South East of England and likely to be constructed at varying periods, such schemes have the potential to interact with Schemes derived from the WRMP and have a cumulative effect on the environment (beneficial or adverse). However, no significant cumulative effects are identified. Construction works associated with the WRMP are anticipated to be relatively small scale, with localised effects and for the most part likely to be spatially and temporally isolated from major infrastructure developments.

[12] Analysis of the National Infrastructure and Construction Pipeline 2021

Plan or Project	Overview	Potential for cumulative effects with the WRMP
East of England, across a range of sectors. Notable examples include (but are not limited to): Lower Thames Crossing, Flood defence works on River Itchen and Elmley Intertidal, HS2, M25 RTMC Replacement, Farlington Marshes, schools refurbishment / renewal.		It is also the case that any major infrastructure project will be subject to its own environmental assessment process and development of mitigation e.g. through EIA and Environmental Management Plans. Mitigation measures will be developed to minimise adverse effects and maximise beneficial effects.
There will also be a range of development projects set out in Local Plans – this would include housing, commercial and transport infrastructure.	New development will attract / accommodate increased population, with a requirement for additional water supplies.	Consideration of new development and population increases within the Plan is a key element for future planning through the iterations of WRMP. At present, a regional WRMP is being developed which will examine such issues across the South-East region and help to inform the development of company level plans.
Other water company plans (including Drought Plans) – note that surrounding SES Water are Thames Water, Affinity Water, South East Water and Southern Water.	Water companies adjacent to the SES Water area will also implement WRMPs and Drought Plans to ensure adequate supplies of potable water to the relevant Plan areas.	It is to be noted that consideration of options in other WRMPs and Drought Plans for water companies within the South-East region is being made by Water Resources South East (WRSE) where applicable. Iterative development of options will be made and considered in the context of wider water resource planning. See note above under Section 12.4 regarding cumulative assessment undertaken by WRSE. It is also the case that these plans for other companies / organisations are subject to review by the Environment Agency and Defra.

13. Monitoring

13.1. Introduction

The SEA Regulations state that those responsible for the Plan 'shall 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' (Part 4 Post Adoption Procedures Regulation 17). In addition, the Environmental Report should provide information on a 'description of the measures envisaged concerning monitoring' (Schedule 2 Information for Environmental Reports).

In line with the SEA Regulations, monitoring will cover significant effects of implementing the WRMP and it will involve measuring indicators that will enable the establishment of a causal link between the implementation of the WRMP and the likely significant effects (both positive and negative) being monitored.

13.2. Monitoring programme

It is important that the monitoring and assessment is kept up to date so that it uses the best available data. SES Water are aware that new River Basin Management Plans are due for publication, and therefore where possible will review and update the approach to monitoring to take account of any relevant information.

Baseline monitoring can be used to gain an understanding of the natural variation in water quality, ecology, fisheries, geomorphology and biodiversity that occurs in water bodies such as the River Eden, River Wandle and groundwater under a range of hydrological conditions.

It should be noted that many of the effects identified that would arise from implementation of the Options contained within the WRMP24 will be experienced during construction of infrastructure only and will not be experienced during operation of these facilities. In these circumstances monitoring will be restricted to the construction phase only.

It is also to be noted that as options are brought forward for development, further specific monitoring requirements may be incorporated 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 13-1: Proposed Monitoring

Objective	Overview of typical effect	Requirement for monitoring	Options to which monitoring applies
To reduce vulnerability of built infrastructure to climate change risks and hazards.	The climate is changing. This is anticipated to result in more extreme weather events which could disrupt or destroy infrastructure, including that related to water supply, on a more frequent basis.	• No. of days / hours when water infrastructure disrupted (loss of service) due to extreme weather events	Company wide and across all Options
To reduce or manage flood risk, taking climate change into account.	Increased occurrence of extreme weather events due to a changing climate could increase flood risk, or increase the area at risk of flooding. Flood risk can also occur due to the increase in areas of hardstanding or loss of floodplain due to the construction of infrastructure, including that related to water supply infrastructure.	• No. of days / hours when water infrastructure disrupted (loss of service) due to flooding • Area (Ha) of flood plain lost • No. of projects where flood risk compensation was required or increase provided	Company wide and across all Options
To protect and enhance the quantity and quality of surface, groundwater, estuarine, coastal waterbodies and water dependent habitats.	Construction and operation of the water supply network can have a wider range of effects on the water environment, resulting in changes in water quantity within the environment, for example due to increased abstraction and water quality through pollution incidents.	• Changes in WFD condition (positive or negative) of relevant waterbodies. • No. of pollution incidents (both during construction and operation) • Continuation of monitoring at raw water intakes.	Company wide and across all Options
To protect and enhance biodiversity, priority species, vulnerable habitats	Construction and operation of the water supply network can have implications for biodiversity, for	• Area (Ha) of designated site (including geological sites) directly affected by WRMP Options	Company wide and across all Options

and habitat connectivity and achieve biodiversity net gain.	example through loss of habitat or disturbance to species. There is a potential that invasive species can spread through activities associated with moving water around the network, or through activities such as maintenance.	• Area or length of Priority Habitat affected / restored or created • Area of Green / Blue Infrastructure created	
To protect and enhance the functionality, quantity and quality of soils.	Soil is a non-renewable resource and is vulnerable to erosion, degradation and contamination. Valuable soil resources can be lost of degraded due to construction of water supply infrastructure. Pollution incidents during construction and operation can lead to contamination of the soil resource.	• Area of Best and Most Valuable (Grade 1-3a) soils lost to WRMP Options • Total area of soil reinstated for agricultural use • No. of pollution / contamination incidents during construction or operation of water supply infrastructure.	Company wide and across all Options
To reduce and minimise air and noise emissions.	Construction or repair activities are likely to have implications for air and noise emissions. These could include dust or other particulate matter generated by the activities themselves or the required plant and vehicles. Treatment and pumping of water is likely to lead to an increase in air and noise emissions. While most facilities will operate using energy mains supply, there may be a requirement for standby generators.	• 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 • Number of electric generators in use and period of usage.	Company wide and across all Options
To achieve SES target of reducing operational carbon emissions to Net	As with air and noise, construction activities are likely to result in carbon	• Percentage of energy use from renewable sources	Company wide and across all Options

Zero by 2030 and contribute to national target of Net Zero by 2050.	emissions. Options would also result in embedded carbon, but also potentially ongoing emissions through the requirement for energy for pumping / treating water.	• Renewable energy generated on Company property • Tonnes of embedded carbon in construction of Option • Carbon emissions from Company operations • Area (Ha) planted / restored for sequestration • Net greenhouse gas emissions per Ml (million litres) of treated water (kg CO2 equivalent emissions per Ml) • Company fleet fuel consumption	
To conserve, protect and enhance landscape, townscape and seascape character and visual amenity.	Construction activities can lead to effects on landscape or visual amenity, though reinstatement would remove these effects or provide opportunities to improve visual amenity. Options may lead to the creation of new infrastructure in the landscape.	• Area / length of Option located within areas designated for landscape protection • Area / length of completed reinstatement	Company wide and across all Options
To conserve, protect and enhance the historic environment and assets, including archaeology.	Construction activities can lead to effects on historic assets, including unknown artefacts though reinstatement would remove these effects or provide opportunities to improve the setting of these assets. Dewatering of areas could damage buried assets. Archaeological investigation may provide opportunities	• Number of scheduled monuments or other historic asset damaged or enhanced by WRMP Option • Length of pipeline routes realigned to avoid heritage assets	Company wide and across all Options

	to understand the past history of the South East area better.		
To maintain and enhance the health and wellbeing of the local community, including economic and social wellbeing.	Construction activities could result in direct and indirect effects on health and wellbeing, as well as impact on access to community facilities or provision of services.	• Monitoring to be discussed and agreed in light of prevailing conditions with relevant Health Officers of Local Authorities in the Plan area, or any other relevant parties e.g. health or educational establishments. Consideration to be given to need for monitoring of air and noise emissions. • Number of days / hours when water supply to people on the vulnerable groups register is disrupted. • Duration of highways works • Number of complaints relating to construction works	Company wide and across all Options
To maintain and enhance tourism and recreation.	Tourism and recreation are two important sectors to the South East region. Construction and operation of WRMP Options could affect both tourism and recreational facilities through direct disturbance or loss. This could be both temporary or permanent.	• No net loss of important recreational / tourism amenity caused by WRMP Option • Generation of new recreational facilities • Area of greenfield / Open Space disturbed or lost • Km of PRoW affected / lost / created by WRMP Option	Company wide and across all Options

To minimise resource use and waste production	Construction activities are likely to result in resource use and waste production, as may some operational activities.	• Quantity of resources used and waste produced through construction • Quantity of resources used and waste produced through operation	Company wide and across all Options
To avoid negative effects on built assets / infrastructure.	Likely effects on built assets and infrastructure. This may include the maintenance and operation of public or private buildings, transport, amenity resource, machinery and plant. Major users such as hospitals, factories and food producers may be most susceptible unless protected.	• Number and nature of complaints to be measured and discussions to take place with sensitive operators in light of prevailing conditions. • Complaints / incidence of strategic infrastructure disruption or loss of service	Company wide and across all Options

14. Summary and Conclusions

SES Water is a supply-only water company supplying an area of 834 km^2 within Surrey, West Kent, and also the London Boroughs of Sutton, Croydon and Merton. SES Water supplies, on average, 160 million litres of water per day (Ml/d) in the area, however, during the summer period this can increase to above 200 Ml/d. SES Water's supply area, alongside those of Affinity Water, South East Water and Southern Water are classed as experiencing serious water stress and among the driest areas in the UK. The anticipated population and economic growth alongside the projected changes in climate will likely continue to place additional stress on water availability and the natural environment within the SES Water area.

The SEA and assessments of Biodiversity Net Gain, Natural Capital, Invasive Non Native Species, Habitats Regulation and Water Framework Directive have each been thorough and comprehensive. Assessment was made of an initial long list of sites and environmental issues were considered through all stages of short listing and Option development. This was at both a regional level (carried out by WRSE) and at a more 'local' level that considered issues in light of the environmental and planning policy context of the plan area. Consideration of both the regional and local level has meant that two SEA teams have been involved and have acted independently of each other, though liaison has been maintained and results of assessments shared. These teams have also liaised closely with the SES WRMP making team and have challenged the Plan development team when appropriate.

Based on the findings of the SEA, it is possible to recognise a number of key considerations and draw conclusions with regards to the WRMP24 and its 'environmental performance'. These are outlined as follows.

In the first instance, it is important to recognise that while WRMP24 clearly fits within a regional context, it also needs to reflect the issues and opportunities of the SES Water area. Similarly, there are a range of challenges and uncertainties facing both the region and the Plan area. The approach to assessment made, of considering wider regional issues (by WRSE), as well as considering a 'local' SES Water baseline and review of relevant plans and policies to develop a bespoke SEA Framework has resulted in an enhanced understanding of environmental issues in the Plan area and the surrounding region and this has allowed full and robust consideration of Options proposed under WRMP24.

The Adaptive plan approach that has been developed, recognises the inherent uncertainties involved in water resource planning and has been specifically designed to help water companies adopt a forward-looking approach to allow companies to plan for schemes that may be required from 2025 and beyond. The essence of this approach is that the Plan can adapt depending on which of the potential future scenarios identified occurs.

Consideration by WRSE of the adaptive planning approach identified the following three plans:

- Best Value Plan – Investment model pareto runs for Best Value Plan metrics (Customer Preference, SEA+, SEA-, Natural Capital, Carbon, Resilience (reliability, adaptability, evolvability), intergenerational equity), this is optimised on both individual Best Value Plan and cost metrics
- Least Cost Plan – Investment model run result when optimising on cost only
- Best Environmental and Societal plan - Removes the resilience metrics from the Best Value Plan

Examination was made of the trade-offs between the anticipated additional value that different portfolios of options could provide against the least cost criterion to try to derive something that is best value – for the environment, society and SES Water customers. The WRMP24 has taken the adaptive planning approach and having identified the three Plan types, further identified what is considered the most realistic scenario, alongside the most realistic future pathway and from this has outlined a series of supply options (i.e. those which in general will increase the amount of water in the supply system), alongside a series of demand options (i.e. those which will act to reduce the need for water). Having identified the Options in the Best Value Plan, WRSE carried out initial assessment of these for SEA and the associated environmental assessments of Habitats Regulations Assessment, Water Framework Directive, Biodiversity Net Gain, Natural Capital Assessment and Invasive Non-Native Species. These assessments were further built upon by SES Water, with a particular emphasis on trying to identify issues of note in a local context.

The Options identified in the Best Value Plan included both 'demand side' Options (measures that reduce demand for water) and 'supply side' Options (measures that increase supply). Assessment of the Options outlined considered both construction effects and those which are anticipated to occur during operation of the Option. A series of mitigation measures were also identified, with the aim of reducing or nullifying any adverse effects, while potentially maximising any beneficial effects from the Option.

For the most part, it is anticipated that the Options within WRMP24 will not require any construction activities and effects were only identified in relation to Outwood Lane, Raising of Bough Beech reservoir and the 'Demand Basket Medium SES' Options. None of the identified effects noted in relation to the implementation of these Options were considered significant.

In respect of Outwood Lane, slight adverse effects are anticipated during construction in respect of Objective 7 as carbon will be inherent in the materials used to construct the new infrastructure (embodied carbon). Slight adverse effects are also anticipated in relation to Objective 12 (resource use) as an increase in pump capacity is required which will require some material consumption.

Slight adverse effects are anticipated in relation to the construction of Raising of Bough Beech Reservoir in respect of Objective 2 as the reservoir is largely within Flood Zones 2 and 3 and construction works may increase risk of pollution incidents due to flooding. Impacts are anticipated in relation to water (Objective 3) as the option requires construction works in proximity to an existing surface water receptor with potential to result in deterioration of water quality/flow. Due to the potential permanent loss of Ancient Woodland being unlikely as the options concerns the raising of an existing embankment, slight adverse impacts are anticipated for Biodiversity (Objective 4). There is potential for temporary deterioration in air and noise environment (Objective 6) during construction. Also, carbon will be generated from materials used to construct the new infrastructure (embodied carbon) thus slight adverse impacts are anticipated for Objective 7. The option is partially within Kent Downs AONB and London Area Greenbelt and there will potentially be minor effects on landscape character and visual amenity (Objective 8) as a result of raising an existing embankment. There is potential for the option to adversely impact heritage assets (Objective 9) during construction, particularly listed buildings in close proximity as well as buried archaeology. Slight adverse effects are also anticipated from construction on the local community using the area for recreation, tourism and water based recreation (Objectives 10 and 11), resource use and waste production (Objective 12) and built assets due to disruption to the local road network (Objective 13).

For the 'Demand Basket Medium SES', during construction a number of slight adverse effects have been identified including on the vulnerability of built infrastructure to climate change (Objective 1) and on water quality (Objective 3) through the activities associated with repair works. There may be slight adverse effects on Biodiversity (Objective 4), where there may be minor effects such as disturbance or small areas of habitat loss during repair works. Similar slight adverse effects could be expected through the activities associated with repair works on air, noise and carbon emissions (Objective 6 and 7), landscape and visual amenity (Objective 8), the historic environment (Objective 9) and health and wellbeing due to disturbance causing effects on wellbeing (stress) induced by repair works (Objective 10). Repair works will also lead to the use of resources and increase waste (Objective 12), while there may be effects on built infrastructure (Objective 13) such as road surfacing.

Such construction adverse effects of these Options are anticipated to be local scale, short term and temporary to the construction / repair phase.

During operation, effects have been identified for all Options. Significant adverse effects been identified for Outwood Lane, Raising of Bough Beech Reservoir, Hackbridge drought permit and Kenley and Purley drought permit. Significant beneficial effects are anticipated in relation to Raising of Bough Beech Reservoir, Hackbridge drought permit, Kenley and Purley drought permit, SES Demand: Gov-led B Hybrid and Demand Basket Medium SES.

In respect of supply side options significant adverse effects are anticipated for Outwood Lane and Raising of Bough Beech Reservoir in terms of Objective 3. For Outwood Lane this is because the WFD assessment finds significant adverse effects on Epsom North Downs Chalk (Ground waterbody) cannot be ruled out from the increased abstraction during operation and for Raising of Bough Beech Reservoir until further WFD

assessment has been undertaken the potential for significant adverse effects on Lower Eden waterbody during operation cannot be ruled out.

Significant beneficial effects are anticipated in terms of Objectives 1 and 4 for the Raising of Bough Beech Reservoir. These are in relation to the option storing more water, increasing the reservoirs resilience to drought events which are expected to be exacerbated by climate change and the works potentially giving rise to opportunities to improve on existing habitat within the immediate area.

Each of the Drought Permits are associated with likely significant beneficial effects in respect of Objectives 1, 3, 10 and 12. The Drought Permits are in themselves responses to prolonged dry weather events which are anticipated to be exacerbated by climate change. As a result, significant beneficial effects are attributed to each of the Drought Permits for SEA Objective 1 (Increase resilience to climate change and reduce flood risk). They will also help ensure reliability and resilience of supply (Obj. 3 and Obj 10) and reduce the need for more resource intensive external transfers and abstractions (Obj. 12) during the period for which they are operational.

Significant adverse effects for both of the Drought Permits have been identified in respect of Obj. 7 (carbon emissions). Increased abstraction at any of the sites is associated with greater pumping requirements and therefore increased operational carbon emissions. In respect of the Kenley Group Drought Permit an additional significant adverse effect has been identified in respect of Obj.3 (water quality and resources). Watercourses in the area have unfavourable WFD statuses and the permit may create an interference drawdown with SES Water and Thames Water groundwater sources.

In terms of Demand Side options, significant beneficial effects are anticipated for Objective 3 for SES Water Demand: Gov-led B Hybrid and Demand Basket Medium SES options due to water being kept within the environment, reduced resource pressures, protection of water resources and increasing availability for water dependant habitat and species. Significant beneficial effects are also anticipated for Demand Basket Medium SES in relation to Objective 4 as biodiversity will also benefit from water being kept within the environment, the protection of water resources, reduced pressures on water supplies and improved efficiency.

While some moderate adverse effects are identified through the SEA as discussed, those associated with the Drought Permits are anticipated to be temporary in nature, and those associated with Outwood Lane and the Raising of Bough Beech Reservoir are anticipated to permanent. Mitigation (embedded and additional) is included to alleviate effects of the Plan where feasible.

It is important to recognise that the Demand Management Options will apply across the whole of the SES area and are anticipated to have cumulative beneficial effects from reducing the demand for water. For example, while Demand Management Options such as NEUBs and TUBs would typically be implemented in a phased, sequential manner, it is the intention that such measures will act to reduce pressure on water resources by reducing demand for water and as such, reduce the need for abstraction, treatment and onward pumping. This will act cumulatively across the Plan area and into nearby / linked resource areas. Savings in water would likely have cumulative beneficial effects in respect of in respect of resilience to climate change (Obj. 1), the water environment (Obj. 3), biodiversity (Obj. 4), reducing air and noise emissions and reducing carbon, (Obj. 6 and Obj. 7), maintaining health and wellbeing (Obj. 10), as well as minimising resource use (Obj. 12). While some of the savings made are anticipated in themselves small and benefits would be slight, it is to be noted that cumulatively effects could be significant and of importance given that these will be implemented in a drought situation when the environment is naturally under stress. Other Demand Management measures would apply at all times and act cumulatively to continually reduce pressure on sources, with consequent permanent benefits for people and the environment.

It is recognised that WRMP24 will not act or be delivered in isolation and will influence and be influenced by, other Plans and Policies or developments across and beyond the SES Water area and the south east as a whole. While there is a potential for cumulative effects during construction, it is anticipated that for the most part construction works associated with the WRMP are anticipated to be relatively small scale, with localised effects and for the most part likely to be spatially and temporally isolated from major infrastructure developments.

It is also the case that any major infrastructure project, or other Plans and Policies, will be subject to their own environmental assessment process and development of mitigation e.g. through EIA and Environmental

Management Plans. Mitigation measures will be developed to minimise adverse effects and maximise beneficial effects.

It is important that SES Water understand the effect of the implementation of their WRMP24 and this SEA sets out a potential series of monitoring indicators / performance metrics that will be used to monitor the implementation of the WRMP24. It is the intention that monitoring will enable the establishment of a causal link between the implementation of the WRMP24 and the likely significant effects (both positive and negative) being monitored. This will be of particular importance as this is an Adaptive Plan which will be able to react to changes in the environment, as well as changes in factors such as economic or population growth. This monitoring will also be of particular benefit to those involved with the further iterations of the WRMP and if required, will allow early remediation to be undertaken of any identified adverse effects.

In conclusion, SES Water have developed a Water Resource Management Plan (WRMP24) which has been subject to a set of thorough and comprehensive environmental assessments, at both a regional level and at a level local to the SES Water area. The assessments undertaken have been consistent in approach and resulted in iterative development of the Plan, thereby allowing the Plan to be developed in the context of a thorough understanding of the key environmental issues and constraints of the SES Water area and beyond. This allowed for a robust consideration of alternatives to the Plan and allowed identification of a Preferred set of Options. The range and significance of anticipated effects to be anticipated from implementation of the WRMP24, including both beneficial and adverse, have been identified and mitigation proposed where required. Monitoring will help to protect the environment by allowing action from unexpected effects to be taken and will help inform future iterations of the Plan. It is therefore concluded that the WRMP24 is a well-balanced Plan in terms of environmental protection, while still meeting the requirements for helping to ensure customers and communities have adequate water supplies available.

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