

Water Resources Management Plan 2019 Annex 14: Strategic Environmental Assessment

Main Report

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from
**Southern
Water** 

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1. Introduction

1.1 Background and purpose of report

Water companies in England and Wales are required to produce a Water Resources Management Plan (WRMP) every five years. The plan sets out how the company intends to maintain the balance between supply and demand for water over the long-term planning horizon in order to ensure security of supply in each of the water resource zones (WRZs) making up its supply area.

This Strategic Environmental Assessment (SEA) Environmental Report has been prepared in support of the development of Southern Water's WRMP19 which is being published in December 2019, following public consultation on the draft WRMP in 2018, and a request for further information by Defra in March 2019. Habitats Regulations Assessment (HRA) and Water Framework Directive (WFD) assessments have also been carried out in parallel to ensure an integrated approach to environmental assessment.

SEA is a statutory requirement for plans or programmes which could have significant environmental implications, and helps to identify where there are potential impacts and how any negative impacts might be mitigated. More information about SEA, and its role in supporting the development of the WRMP19, is provided in the following section.

In April 2017, the SEA Scoping Report was issued for consultation which summarised the environmental baseline and set out the proposed assessment framework. Comments and issues raised by consultees on the Scoping Report have been considered in preparing this Environmental Report (see Appendix A).

This Environmental Report is the output of the SEA process and was updated as part of the development of Southern Water's revised draft WRMP19 following consultation on the draft WRMP19 and associated SEA Environmental Report during early 2018. In response to feedback on the draft WRMP19 SEA report, we added a new appendix to this updated report (Appendix G) setting out our assessments of the impacts on Sites of Specific Scientific Interest (SSSIs) that we used to inform the SEA of the revised draft WRMP19. Following a request for further information by Defra in March 2019, the Environmental Report has been updated for the final WRMP19 to incorporate the relevant information from the Addendum to the Statement of Response which was published in June 2019.

Information regarding mitigation and monitoring of this plan during its implementation is provided in the section 12 of this report. Details of the quality assurance checklist are provided at Appendix E.

This updated SEA Environmental Report accompanies the publication of Southern Water's WRMP19.

1.2 Application of SEA to water resources management planning

1.2.1 Overview of SEA

SEA became a statutory requirement in the UK following the adoption of Directive 2001/42/EC (the SEA Directive) on the assessment of effects of certain plans and programmes on the environment. The Directive was transposed into national legislation by The Environmental

Assessment of Plans and Programmes Regulations 2004 (referred to as the SEA Regulations)¹.

The objectives of SEA are set out in Article 1 of the SEA Directive as follows:

‘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’.

The SEA Directive requires preparation of an Environmental Report in which the likely significant effects on the environment of implementing the plan or programme, and reasonable alternatives taking into account the objectives and geographical scope of the plan or programme, are identified, described and evaluated. It should be noted that, as stated in the Office of the Deputy Prime Minister (ODPM) SEA Guidelines (Office of the Deputy Prime Minister 2005), “*it is not the purpose of the SEA to decide the alternative to be chosen for the plan or programme. This is the role of the decision-makers who have to make choices on the plan or programme to be adopted. The SEA simply provides information on the relative environmental performance of alternatives, and can make the decision-making process more transparent.*” The SEA process has therefore been used to help inform decision-making, including the selection of options to be included within the WRMP19, and the timing and implementation of the measures in each strategy, as well as the consideration of appropriate monitoring and mitigation of identified environmental and social effects.

The range of environmental and social issues to be included in an SEA is set out in the SEA Regulations, and includes biodiversity, population, human health, fauna, flora, soil, water, air, climatic factors, material assets, cultural heritage, and landscape.

As identified above, the government has produced SEA guidance which sets out the stages of the SEA process (Office of the Deputy Prime Minister 2005). This, along with specific guidance for undertaking SEA and HRA of WRMPs (UKWIR 2012), has been used to inform the SEA of Southern Water’s WRMP19. The Water Resources Planning Guideline (Environment Agency and Natural Resources Wales, 2018) (WRPG) also provides guidance on the role of SEA within the water resources management planning process. These guidance documents and regulations have all informed Southern Water’s WRMP19 and the associated SEA process.

1.2.2 Requirement for SEA of Southern Water’s Water Resources Management Plan 2019

An SEA Scoping Report issued in 2017 set out the reasons why an SEA of the Southern Water WRMP19 was required. The SEA Scoping Report concluded that an SEA is required when taking into account a precautionary approach and uncertainties associated with whether the plan is likely to set a framework for future development consent and the risk that the HRA would identify the potential for likely significant effects on certain European (Natura, 2000) sites designated under the EU Habitats Directive and EU Birds Directive. A HRA has also been undertaken which accompanies the WRMP19 (Annex 15). A parallel WFD assessment (Annex 16) has also been carried out. These allied environmental assessments have informed the SEA.

Undertaking a SEA (and HRA and WFD assessments) of the WRMP19 has aided its development and Southern Water’s decision-making on the options to be included in the plan, their timing and phasing taking account the assessed environmental and social effects (adverse and beneficial). The application of the SEA (HRA and WFD assessments) from the

¹ The Environmental Assessment of Plans and Programmes Regulations 2004 (Statutory Instrument 2004 No. 1633) apply to any plan or programme which relates solely or in part to England.

very outset of the plan development has helped ensure strategic decisions affecting the environment were made throughout the WRMP19 development process.

1.3 Southern Water supply area and water resources management planning

Southern Water provides water supplies to just over 2.4 million customers across an area of 4,450km², extending from East Kent, through parts of Sussex, to Hampshire and the Isle of Wight in the west.

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

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

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

Western area – comprising the following seven WRZs:

- Hampshire Kingsclere (HK)
- Hampshire Andover (HA)
- Isle of Wight (IW)
- Hampshire Rural (HR)
- Hampshire Winchester (HW)
- Hampshire Southampton East (HSE)
- Hampshire Southampton West (HSW)

Central area – comprising the following three WRZs:

- Sussex North (SN)
- Sussex Worthing (SW)
- Sussex Brighton (SB)

Eastern area – comprising the following four WRZs:

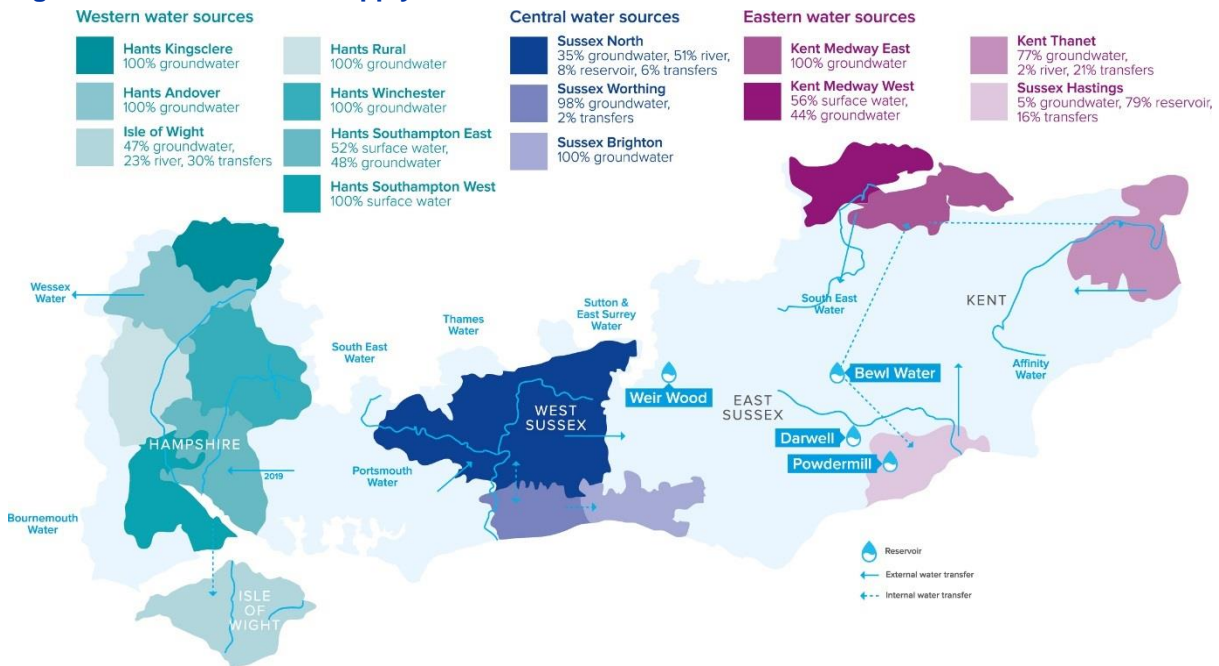
- Kent Medway East (KME)
- Kent Medway West (KMW)
- Kent Thanet (KT)
- Sussex Hastings (SH)

These areas contain a number of separate WRZs, but they are managed as semi-integrated blocks because there is significant bulk water transfer capability between the WRZs in each area.

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

- Thames Water
- Wessex Water
- Cholderton and District Water
- South East Water
- Affinity Water
- SES Water
- Bournemouth Water (now part of South West Water)
- Portsmouth Water

Figure 1 Southern Water Supply Area



1.3.1 Area under consideration for the SEA

The geographical area under consideration for the SEA covers all of Southern Water's WRZs as well as the river and/or groundwater catchments of those water sources and associated transitional and coastal. The area under consideration for the SEA reflects the spatial scope of the options considered for the WRMP19 which extends beyond the boundaries of the Southern Water supply area. The potential for bulk supply import options from outside the Southern Water supply and water source catchment boundaries is reflected in the broader spatial area under consideration for the SEA, including incorporating the supply zones of neighbouring water companies into the study area.

1.3.2 Temporal scope of the SEA

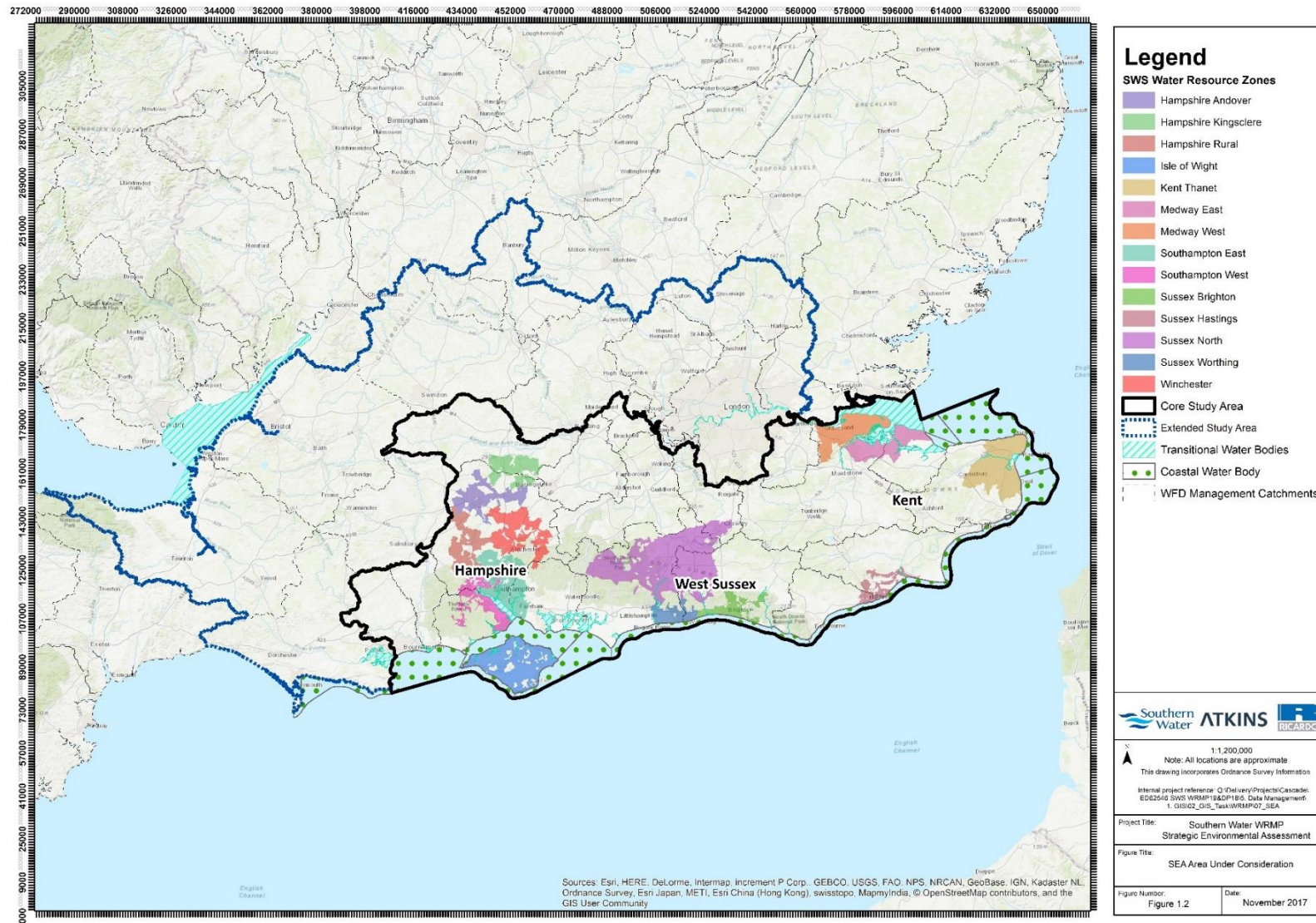
As discussed earlier, the temporal scope of the WRMP must cover a minimum statutory planning period of 25 years. However, due to the longer-term challenges of population growth and climate change, a 50-year planning horizon (i.e. from 2020 to 2070) is being considered by Southern Water.

In section 2 and Appendix C, the current environmental and social baseline for the SEA geographical area under consideration is described together with the likely future changes to this baseline as currently understood. Over the long-term planning horizon of this plan, there is uncertainty as to how the future baseline will evolve. Consequently, it is sensible to adopt a scenario approach to test the sensitivity of the WRMP against the central assessment of environmental and social effects based on the known or likely changes to the baseline conditions. In this way, the resilience of the this plan's options, programmes and the overall plan have been assessed and used to inform decision-making as well as recommendations for future monitoring to provide data for subsequent WRMPs and the associated SEA. Further details are set out in section 6 and in the WRMP19.

In considering this approach to the future environmental and social baseline, it is important to recognise that this plan's options for implementation beyond 2025 will be further assessed by the company through the next statutory WRMP due to be published in 2024; this will also be subject to SEA. This process is currently assumed to be repeated every subsequent five years.

This regular statutory update and review will ensure that actual changes to the baseline and updated forward projections can be taken into account in subsequent WRMPs and SEAs.

Figure 2 SEA Area under Consideration



1.4 Southern Water's water resources management planning process

1.4.1 Overview and timetable

Water resources management planning is undertaken by all water companies in England and Wales in order to ensure reliable, resilient water supplies over the long-term planning horizon. The process includes working out and forecasting how much water customers will need over the planning period (assessing demand) and how best to provide it (assessing options to reduce or constrain demand growth and/or augment reliable supplies of water) in an efficient, timely manner (programme appraisal). Companies seek to identify the preferred, 'best value' programme of demand management and water supply options to develop an overall strategy to maintain a balance between reliable supply and demand in each WRZ and for their supply area as whole (the WRMP).

Water companies in England and Wales have a statutory requirement to prepare a WRMP every five years; the latest WRMP for final publication in 2019 (WRMP19) was submitted in draft to the Secretary of State on 1 December 2017 and approval was granted to issue the draft plan for public consultation during early 2018. In light of consultation responses received, a revised draft WRMP19 was submitted to the Secretary of State along with a Statement of Response setting out how consultation comments had been taken into account in revising the draft plan.

Engagement with government, regulators, other licensed water suppliers and water companies, customers and a wide range of stakeholders is key to the WRMP process. The consultation programme for this plan commenced in 2016 and included a wide range of stakeholders and the regulators. Formal consultation on the draft WRMP19 took place in early 2018 along with the SEA Environmental Report. Following comments on the draft WRMP19 and SEA Environmental Report, a Statement of Response was prepared by the company setting out how it had taken account of the comments received in preparing a revised draft WRMP19. An updated SEA Environmental Report was submitted with the revised draft WRMP19.

Since publishing the Statement of Response and submitting the revised draft WRMP to the Secretary of State in September 2018, Southern Water have liaised closely with the Environment Agency in order to understand and address any concerns they may have relating to our WRMP. A meeting was held in November 2018 to discuss progress with outstanding issues and commitments made in the Statement of Response.

In March 2019, a request for further information was received from Defra, relating to the Western area strategy and requesting assurances that the preferred plan can be delivered. A meeting was held with the Environment Agency in March 2019 to discuss and clarify the requirements for the further information requested by Defra. An Addendum to the Statement of Response was produced to answer the questions posed by Defra, and this was published in June 2019. The final plan was given approval to be published by the Secretary of State in November 2019.

The Environment Agency also provided an annex of minor issues (March 2019) that it had identified from its review of the Statement of Response and revised draft WRMP it but did not consider them to be material to our plan. These have nevertheless been addressed in this document wherever possible.

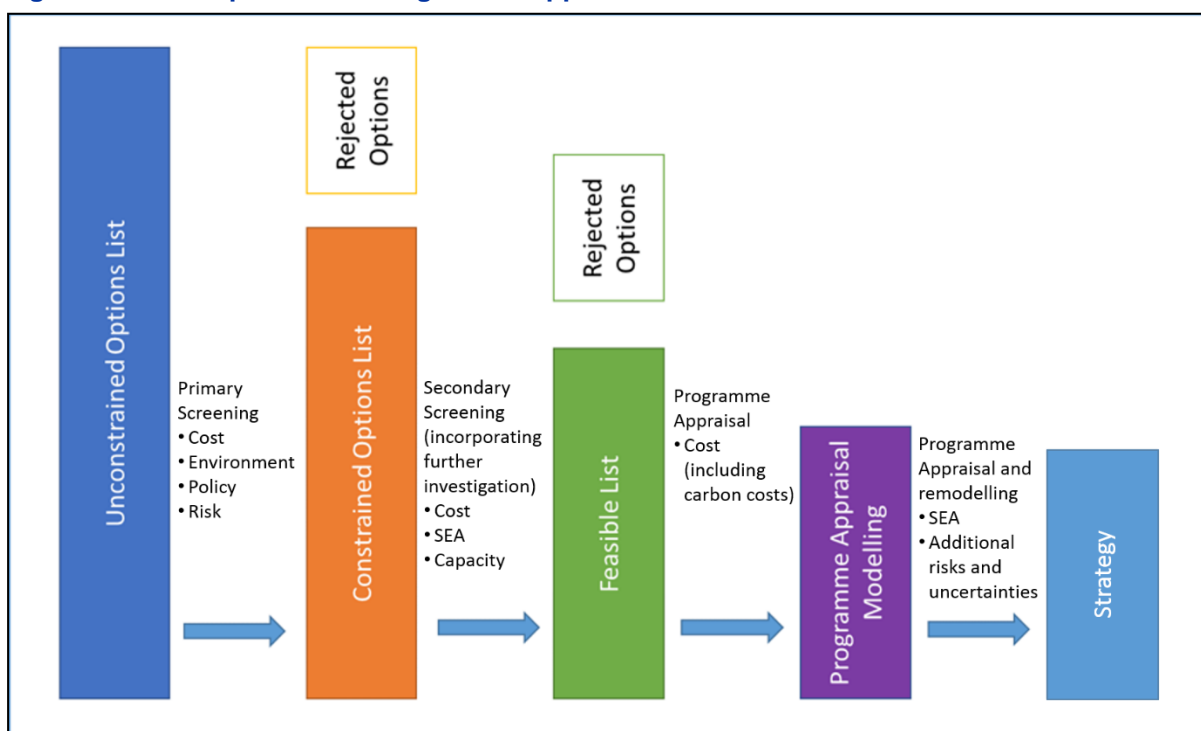
1.4.2 WRMP development

In developing our plan, we have examined the supply/demand balance for each WRZ and determined how any deficit between forecast demand and reliable water supply availability should be addressed over the planning period.

A wide range of alternative options to address any forecast supply deficits have been assessed to understand the costs, the benefits to the supply-demand balance, the effect on carbon emissions and the environmental and social effects (through the SEA process and associated HRA and WFD assessments). The options have been subsequently compared through a comprehensive programme appraisal process to determine the 'best value' programme (strategy) of options to maintain a supply-demand balance over the planning period for each WRZ – this is described fully in the WRMP19. Decisions on the best value programme have taken account of a range of factors, such as the implications for water bills, the resilience to future risks and uncertainties (e.g. climate change), deliverability considerations and the environmental and social effects of the programme (adverse and beneficial, as informed by the SEA). The preferred programmes (or strategies) developed for each of Southern Water's operational area collectively form the WRMP19.

The UKWIR guidance on integrating SEA into WRMPs and the WRPG provide clear directions as to how SEA outputs should be used in options and programme appraisal. Figure 3 summarises the overall approach to the evolution of the WRMP from the initial "unconstrained" list of options through to the defined strategy for each WRZ and operational area. The 'Assessment of WRMP feasible options' section explains in more detail how the SEA actively informed the WRMP process at each key stage.

Figure 3 WRMP Options and Programme Appraisal



1.4.3 Water resources management options

There are two broad categories of water resources management options: demand management options and supply-side options, as described below.

Demand management options

Our WRMP19 adopts a ‘twin track’ approach to addressing the forecast supply-demand deficit, with demand management (including leakage reduction) options to reduce water demand within Southern Water’s supply area being considered alongside the development of options to enhance reliable water supply availability. Demand management options include:

- Water tariffs (‘rising block’ tariffs, seasonal and incentive tariffs)
- Metering activities to increase the proportion of householders that are metered as well to install more sophisticated metering devices (including Automatic Meter Reading devices – AMR – smart meters and telemetry)
- Leakage reduction (pressure management, active leakage control measures and mains renewal)
- Supply pipe leakage reduction (particularly linked to improved leak detection using data from AMR meter reading)
- Water efficient devices (e.g. taps, shower heads, triggers on hosepipes)
- Water conservation measures (e.g. household water audits, provision of water butts)
- Water conservation engagement, incentives and promotional activities

Demand management options are designed to reduce the demand for water and the various potential options that have been considered in developing this plan are set out in Table 1.

Table 1 Potential demand management options

Option	Description of option
Seasonal tariff	This tariff provides incentives to reduce discretionary water use at peak times and would see customers being charged more in summer months (June to September inclusive) and less during the rest of the year (October to May inclusive). Relies upon smarter metering being in place.
Rising block tariff	Tariff that increases as customers use additional water. Does not require smart meter technology although may be more effective if it was in place.
Meter reading activities	Meter all remaining customers
Supply pipe leakage reduction (using enhanced AMR meter reading strategy)	Enhanced AMR meter reading strategy for existing metered households: monthly meter readings
Smart metering activities	Introduce smarter meter technology which can provide continuous meter reading data to the customer and Southern Water
Mains renewal	Leakage-driven mains renewal scheme (replacement of non-poly ethylene (PE) plastic pipes)
Household water efficiency audit	Manned audit with retrofit of free water efficient devices where appropriate.
Leakage reduction – range of values considered	Range of leakage reduction activity through find and fix approaches in each WRZ.
Household rewards/incentives	Customers are offered a reward or incentive to be spent on items that could help them reduce their water consumption.

Option	Description of option
Telemetry for leakage control	Use of appropriate telemetry to gather flow and consumption data centrally improve leak repair times

Supply options

The range of supply options investigated to help meet the forecast supply deficit over the planning period can be broadly classified as follows:

- Bulk transfers of water (either inter-company, or inter-zonal within Southern Water's supply area, and either untreated (raw) water or treated water)
- Water recycling and reuse (potable, industrial and grey water)
- Desalination
- New surface water abstraction or relocation of surface water abstraction
- Surface water abstraction augmentation
- Borehole rehabilitation
- New groundwater sources
- Storage of water underground or in surface water reservoirs
- Catchment management
- River restoration measures
- Amendments to existing abstraction licence conditions
- Abstraction licence trading opportunities
- Asset enhancement

Potential supply options that have been considered in developing the WRMP19 are listed in Table 2.

Table 2 Potential feasible supply options

Option category	Western area	Central area	Eastern area
Bulk transfers	<ul style="list-style-type: none"> • Additional import from Portsmouth Water • Import from Bournemouth Water • Transfer from Thames Water potential new reservoir to Lower Itchen • Triplicate Cross Solent Main • Southampton Link Main • Hampshire grid system (reversible link between HSE and HW) • Hampshire grid system (reversible link between HW and HA) • Hampshire grid system (reversible link between HA and HK) • Woodside transfer valve (HSW to HSE) • Reversible connection HSW-HR 	<ul style="list-style-type: none"> • Pulborough winter transfer scheme Stage 1 • Pulborough winter transfer scheme Stage 2 • Pulborough winter transfer scheme Stage 3 	<ul style="list-style-type: none"> • South East Water to Southern Water KT WRZ • London Water Ring Main to Medway • Utilise full existing transfer capacity (from Faversham)
Water recycling and reuse	<ul style="list-style-type: none"> • Portsmouth Harbour WwTW indirect potable water reuse • Portswood WwTW indirect potable water reuse • Sandown indirect potable water reuse • Woolston WwTW Indirect Potable Reuse • Combined Woolston and Portswood WwTW Indirect Potable Reuse • Portsmouth Harbour WwTW and Fareham WwTW indirect potable reuse • Test Estuary WwTW industrial reuse 	<ul style="list-style-type: none"> • Littlehampton WwTW indirect potable reuse • Brighton WwTW indirect potable reuse 	<ul style="list-style-type: none"> • Medway WwTW indirect potable water reuse • Sandwich WwTW indirect potable water reuse • Bexhill and Hastings WwTW effluent to augment storage in Darwell Reservoir • Sittingbourne industrial water reuse
Desalination	<ul style="list-style-type: none"> • Fawley desalination • Test Estuary desalination • Sandown Coastal desalination Isle of Wight • Desalination plant at Sholling • Desalination on the Western Yar 	<ul style="list-style-type: none"> • Tidal River Arun desalination • Coastal desalination - Shoreham Harbour • Emergency desalination - Littlehampton 	<ul style="list-style-type: none"> • Camber desalination near Rye Bay • River Medway desalination • River Thames Desalination at Northfleet or Gravesend -"Swanscombe" • Desalination in Thanet

Option category	Western area	Central area	Eastern area
	<ul style="list-style-type: none"> Emergency desalination - Sandown 		<ul style="list-style-type: none"> Emergency desalination -Sheerness
Asset Enhancement	<ul style="list-style-type: none"> Newbury asset enhancement 	<ul style="list-style-type: none"> Asset enhancement - Lewes Road Rehabilitate Petersfield source Rehabilitate West Chiltington source 	<ul style="list-style-type: none"> N/A
New surface water abstraction or rehabilitation/relocation of surface water abstraction	<ul style="list-style-type: none"> N/A 	<ul style="list-style-type: none"> N/A 	<ul style="list-style-type: none"> Stourmouth WSW Stourmouth WSW New WSW near Minster
Borehole rehabilitation	<ul style="list-style-type: none"> Borehole rehabilitation near Cowes 	<ul style="list-style-type: none"> N/A 	<ul style="list-style-type: none"> Meopham groundwater source
Storage of water underground or in surface water reservoirs	<ul style="list-style-type: none"> Test Lake - convert Test Lake or extend and convert Test Lake 	<ul style="list-style-type: none"> River Adur offline reservoir ASR Scheme Lower Greensand (SW WRZ) 	<ul style="list-style-type: none"> Raising Bewl Water reservoir by 0.4m
Catchment management and river restoration	<ul style="list-style-type: none"> Various nitrate catchment management (and treatment) options; Winchester, Romsey, Twyford and Chilbolton River Test catchment management options and river restoration River Itchen catchment management options and river restoration 	<ul style="list-style-type: none"> Various nitrate catchment management (and treatment) options: Steyning, North Falmer A, North Falmer, Brighton, North Arundel, Long Furlong, Shoreham, Sompting, North Worthing and South Arundel Various pesticide catchment management (and treatment) options: Pulborough Surface, River Arun, Weir Wood Reservoir 	<ul style="list-style-type: none"> Various nitrate catchment management (and treatment) options: Strood, Gravesend, Deal, West Sandwich, Manston, North Dover, Ramsgate B, Birchington B, North Deal B, Birchington, North Deal, Hartlip Hill Pesticide catchment management (and treatment) options: River Medway Scheme
Amendments to existing abstraction licence conditions	<ul style="list-style-type: none"> N/A 	<ul style="list-style-type: none"> N/A 	<ul style="list-style-type: none"> West Sandwich and Sandwich WSW licence variation
Abstraction licence trading opportunities	<ul style="list-style-type: none"> N/A 	<ul style="list-style-type: none"> N/A 	<ul style="list-style-type: none"> Sittingbourne licence trade

1.4.4 Supporting information

Information to support the SEA was drawn from outline engineering design, scheme descriptions, water resource operational information and environmental datasets associated with the SEA topics for each option (see section 5), along with the HRA and WFD assessments.

1.5 Stages of SEA

SEA incorporates the following stages:

- Stage A: Setting the context, identifying objectives, problems and opportunities, and establishing the baseline – Scoping Report published in April 2017
- Stage B: Developing and refining options and assessing effects (impact assessment)
- Stage C: Preparing the Environmental Report (recording results) – draft report issued in early 2018; updated report issued with the revised draft WRMP19 in September 2018, final updated report issued December 2019
- Stage D: Consulting on the draft plan and the Environmental Report (seeking consensus): consultation on the plan has taken place since early 2018, including comments on the draft and revised draft WRMP19 documents, and Addendum to the Statement of Response. Revisions to the Environmental Report have taken place to reflect these consultations
- Stage E: Monitoring the significant effects of the plan or programme on the environment (verification) – this SEA Statement will be produced alongside the final WRMP19

This Environmental Report encompasses Stages B to D of the SEA process.

Table 3 is an extract from the Office of the Deputy Prime Minister (ODPM) Practical Guide (Office of the Deputy Prime Minister 2005) that sets out the main stages of the SEA process and the purpose of each task within the process. Specific guidance on the application of the SEA process to WRMPs is provided by UKWIR (UKWIR 2012).

Table 3 SEA Stages and Tasks

Stage / Task	Purpose
Stage A: Setting the context and objectives, establishing the baseline and deciding on the scope	
Task A1. Identifying other relevant plans, programmes and environmental protection objectives	To establish how the plan or programme is affected by outside factors to suggest ideas for how any constraints can be addressed, and to help identify SEA objectives.
Task A2. Collecting baseline information	To provide an evidence base for environmental problems, prediction of effects, and monitoring; to help in the development of SEA objectives.
Task A3. Identifying environmental problems	To help focus the SEA and streamline the subsequent stages, including baseline information analysis, setting of the SEA objectives, prediction of effects and monitoring.
Task A4. Developing SEA Objectives	To provide a means by which the environmental performance of the plan or programme and alternatives can be assessed.
Task A5. Consulting on the scope of the SEA	To ensure the SEA covers the likely significant environmental effects of the plan or programme.

Stage / Task	Purpose
Stage B: Developing and refining alternatives and assessing effects	
Task B1. Testing the plan or programme objectives against SEA objectives	To identify potential synergies or inconsistencies between the objectives of the plan or programme and the SEA objectives and help in developing alternatives.
Task B2. Developing strategic alternatives	To develop and refine strategic alternatives.
Task B3. Predicting the effects of the plan or programme, including alternatives	To predict the significant environmental effects of the plan or programme and its alternatives.
Task B4. Evaluating the effects of the plan or programme, including alternatives	To evaluate the predicted effects of the plan or programme and its alternatives and assist in the refinement of the plan or programme.
Task B5. Mitigating adverse effects	To ensure that adverse effects are identified and potential mitigation measures are considered.
Task B6. Proposing measures to monitor the environmental effects of plan or programme implementation	To detail the means by which the environmental performance of the plan or programme can be assessed.
Stage C: Preparing the Environmental Report	
Task C1. Preparing the environmental report	To present the predicted environmental effects of the plan or programme, including alternatives, in a form suitable for public consultation and use by decision-makers.
Stage D: Consulting on the draft plan or programme and the Environmental Report	
Task D1. Consulting the public and consultation bodies on the draft plan or programme and the Environmental Report	To give the public and the consultation bodies an opportunity to express their opinions on the findings of the Environmental Report and to use it as a reference point in commenting on the plan or programme. To gather more information through the opinions and concerns of the public
Task D2. Assessing significant changes	To ensure that the environmental implications of any significant changes to the draft plan or programme at this stage are assessed and taken into account.
Task D3. Making decisions and providing information	To provide information on how the Environmental Report and consultees opinions were taken into account in deciding the final form of the plan or programme to be adopted.
Stage E: Monitoring the significant effects of the plan or programme on the environment	
Task E1. Developing aims and methods for monitoring	To track the environmental effects of the plan or programme to show whether they are as predicted; to help identify adverse effects.
Task E2. Responding to adverse effects	To prepare for appropriate responses where adverse effects are identified.

1.6 Structure of the environmental report

This SEA Environmental Report presents the findings of Tasks B1 to C1 set out in Table 3, and provides the public, stakeholders and regulatory bodies with an opportunity to express their opinions on the findings of the assessment. The Environmental Report is structured as follows:

- **Introduction** (this section): describes the requirement for, purpose and process of the SEA, and its context in relation to the WRMP19
- **Policy context:** identifies key messages and environmental protection objectives from other relevant plans and programmes
- **Environmental baseline review:** draws out the key environmental issues Southern Water intends to consider in the SEA. Identifies the current and future baseline conditions within the area of potential influence of the WRMP19
- **Methodology:** provides details of the methods employed in undertaking the assessment including the cumulative effects assessment methodology
- **Environmental screening of WRMP options:** Describes the Environmental Screening of WRMP19 options was undertaken and summaries the results
- **Assessment of WRMP19 options:** presents the potential effects of the various WRMP19 feasible options against the SEA framework
- **Role of the SEA in WRMP19:** describes how the SEA has been used to inform the development of the WRMP19
- **Assessment of the WRMP19 strategies**
- **Cumulative Effects Assessment:** discusses the potential in-combination impacts of drought options (intra-zone and inter-zone), demand management options and other plans and projects in the region.
- **Summary of HRA, WFD and other Designated Sites Assessments**
- **Mitigation and Monitoring:** discusses measures envisaged to prevent, reduce and offset any significant adverse effects of implementing the WRMP19 and monitoring to track the environmental effects to show whether they are as predicted, to help identify any adverse impacts and trigger deployment of mitigation measures
- **Quality Assurance:** provides a checklist of requirements from the ODPM guidance
- **Conclusions**

1.7 Consultation

1.7.1 Consultation on the scoping report

Consultation bodies, stakeholders and the public were invited to express their views on the Scoping Report in accordance with SEA Regulation 12(5). The Scoping Report was issued on 28 April 2017 to the Environment Agency, Historic England and Natural England, and was made available to the public and stakeholders on our website. The consultation period ran until 2 June 2017. The responses to comments provided on the Scoping Report and how these have been taken into account in carrying out the SEA are presented in Appendix A.

1.7.2 Consultation on the environmental report

This Environmental Report has been produced taking into consideration the responses received from consultation bodies during the Scoping Report consultation, the comments received on the Environmental Report that accompanied the draft WRMP19, and the comments received on the revised draft WRMP19 and Statement of Response. It provides assessments of the potential effects (adverse and beneficial) of the water resources management options considered for the WRMP19 and sets out how the findings have been used to inform the development of the plan.

2. Policy context

2.1 Introduction

Annex 1 of the Strategic Environment Assessment (SEA) Directive (Directive 2001/42/EC) requires the following information to be included within the Environmental Report:

- *“an outline of the...relationship with other plans and programmes”*
- *“the relevant aspects of the current state of the environment and the likely evolution thereof without implementation of the plan or programme”*
- *“the environmental characteristics of areas likely to be significantly affected”*
- *“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 (the ‘Birds Directive’) and 92/43/EEC (the ‘Habitats Directive’)”*
- *“the environmental protection objectives, established at international, (European) Community or Member State level, which are relevant to the plan or programme and the way those objectives and any environmental considerations have been taken into account during its preparation”*

In accordance with the Directive, a review of relevant plans and programmes is presented in the ‘Policy context’ section. A summary of key policy objectives is presented in Table 4 (with the full review presented in Appendix B).

A summary of the environmental baseline key issues is presented in the ‘Environmental baseline review’ section (with the full environmental baseline information presented in Appendix C). The supporting figures can be found in Appendix F.

2.2 Review of policies, plans and programmes

2.2.1 Policies, plans and programmes reviewed

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

Potentially relevant plans and programmes were identified at the international, national, regional and local level. If the plan or programme was assessed as not having a significant effect on the objectives of this plan and/or this plan does not have a significant effect on achieving the objectives of the other plan or programme, it was not reviewed in detail.

The full list of international, national, regional and local policies, plans, programmes and strategies reviewed and the key policy objectives, targets and how they relate to SEA topics and SEA objectives are provided in Appendix B and listed in Table 4.

Table 4 Key policy objectives derived from the review of plans, policies and programmes

SEA Topic	Key Objectives	Plans, Policies and Programmes
Biodiversity, flora and fauna	<p>Conservation and enhancement of the natural environment and of biodiversity, particularly internationally and nationally designated sites and priority habitats and species (NERC act S41 for England), whilst taking into account future climate change.</p> <p>Promote a catchment-wide approach to water use to ensure better protection of biodiversity.</p> <p>To achieve favourable condition for priority habitats and species in particular designated sites.</p> <p>Avoidance of activities likely to cause irreversible damage to natural heritage.</p> <p>Support well-functioning ecosystems, respect environmental limits and capacities, and maintain/enhance coherent ecological networks, including provision for fish passage and connectivity for migratory/mobile species.</p> <p>Strengthen the connections between people and nature and realise the value of biodiversity.</p> <p>Protection, conservation and enhancement of natural capital. Ecosystem services from natural capital contributes to the economy and therefore should be protected and, where possible, enhanced.</p> <p>Avoidance of activities likely to cause the spread of Invasive Non-Native Species (INNS)</p> <p>A need to protect and enhance the green infrastructure network.</p>	<p><i>International:</i></p> <p>United Nations (1992) Convention on Biological Diversity (CBD)</p> <p>European Commission, Birds Directive (2009/147/EC)</p> <p>European Commission The Water Framework Directive (2000/60/EC)</p> <p>European Commission, Directive on Animal health requirements for aquaculture animals and products thereof, and on the prevention and control of certain diseases in aquatic animals (2006/88/EC)</p> <p>European Commission, Habitats Directive (1992/43/EEC)</p> <p>European Commission, The EU Biodiversity Strategy to 2020</p> <p>European Commission, Environmental Liability Directive (2004/35/EC)</p> <p>EC Regulation 1100/2007 of 18 September 2007 establishing measures for the recovery of the stock of European eel</p> <p>EU Regulation 1143/2014 of the European Parliament and of the Council of 22 October 2014 on the prevention and management of the introduction and spread of invasive alien species</p> <p>The Bonn Convention on the Conservation of Migratory Species of Wild Animals (1983)</p> <p>The Bern Convention on the Conservation of European Wildlife and Natural Habitats (1979)</p> <p>The Convention on Wetlands of International Importance (Ramsar Convention) (1971)</p> <p><i>National:</i></p> <p>Conservation of Habitats and Species Regulations 2017 (as amended)</p> <p>The Countryside and Rights of Way (CROW) Act 2000</p> <p>Environmental Protection Act 1990</p> <p>Water Resources Act 1991 (Amendment) (England and Wales) Regulations 2009 SI3104</p> <p>Wildlife and Countryside Act 1981 (as amended)</p> <p>Marine and Coastal Access Act 2009</p> <p>MHCLG (2018) National Planning Policy Framework 2018</p> <p>HM Government (2018) A Green Future: Our 25 Year Plan to Improve the Environment</p> <p>Defra (2016) Creating a great place for living: Defra's strategy to 2020.</p>

SEA Topic	Key Objectives	Plans, Policies and Programmes
		<p>Defra (2002) Working with the grain of nature: a biodiversity strategy for England</p> <p>Defra (2013) Catchment Based Approach: Improving the quality of our water environment</p> <p>Defra (2011) Water for Life - Water White Paper</p> <p>Defra (2011) The Natural Choice: Securing the value of nature. The Natural Environment White Paper</p> <p>Defra (2011) Biodiversity 2020: A Strategy for England's Wildlife and Ecosystem Services</p> <p>Defra (2010) Making Space for Nature: A Review of England's Wildlife Sites and Ecological Network</p> <p>Defra 2011 UK National Ecosystem Assessment and Defra, 2014, UK National Ecosystems Assessment Follow on, Synthesis of Key Findings</p> <p>Defra (2015) The Great Britain Invasive Non-native Species Strategy</p> <p>Defra (2008), England Biodiversity Strategy –climate change adaptation principles</p> <p>Defra (2016) Guiding principles for water resources planning for water companies operating wholly or mainly in England</p> <p>Environment Agency and RSPB (2004) SEA and Biodiversity: Guidance for Practitioners</p> <p>Environment Agency (undated) Hydroecology: Integration for modern regulation</p> <p>Environment Agency (undated) WFD River Basin Characterisation Project Technical Assessment Method - River abstraction and flow regulation</p> <p>Environment Agency (2008) Sea trout and salmon fisheries. Our strategy for 2002 – 2021</p> <p>Forestry Commission and Natural England (2014) Ancient Woodland and Veteran Trees: Protecting them from development</p> <p>The Environmental Damage (Prevention and Remediation) (England) Regulations 2015</p> <p>The Eels (England and Wales) Regulations 2009 (as amended)</p> <p>Natural England (2016) Conservation 21: Natural England's strategy for the 21st century</p> <p>Natural England's standing advice on protected species</p> <p>Natural Environment and Rural Communities Act 2006</p> <p>National Nature Reserves Management Plans</p>

SEA Topic	Key Objectives	Plans, Policies and Programmes
		<p>Salmon and Freshwater Fisheries Act 1975 (as amended) The Countryside and Rights of Way (CROW) Act 2000 Wildlife and Countryside Act 1981 (as amended) Water Resources Act 1991 (as amended) Water Industry Act 1991 (as amended) Water Resources Act 1991 (Amendment) (England and Wales) Regulations 2009 SI3104 The Environment Act 1995 The Water Environment (Water Framework Directive) (England and Wales) Regulations 2017</p> <p><i>Regional/Local:</i> Relevant Natural England Site Improvement Plans (SIPs) Relevant Natural England National Character Area (NCA) Profiles Environment Agency and Defra, (2015) River Basin Management Plan South East River Basin district Environment Agency and Defra, (2015) River Basin Management Plan Thames River Basin district Environment Agency, Catchment Abstraction Management Strategy (various dates for relevant catchments) England Biodiversity Forum (2009) South East Biodiversity Strategy Defra (2010). Eel Management plans for the United Kingdom. South East River Basin District Environment Agency, The Wild Trout Trust, Atlantic Salmon Trust (2011) South Coast Sea Trout Action Plan RSPB Pagham Harbour Local Nature Reserve Management Plan 2013-2018</p>
Population and human health	<p>Water resources play an important role in supporting the health and recreational needs of local communities and businesses.</p> <p>To ensure all communities have a clean, safe and attractive environment in which people can take pride.</p>	<p><i>International:</i> United Nations Economic Commission for Europe (1998) Aarhus Convention - Convention on Access to Information, Public Participation in Decision-making and Access to Justice in Environmental Matters The Environment Noise Directive (Directive 2002/49/EC) HM Treasury Infrastructure UK (2014) National Infrastructure European Commission The Water Framework Directive (2000/60/EC) The Natural Environment and Rural Communities (NERC) Act (2006) European Commission, Drinking Water Directive (1998/83/EC) and subsequent amendments</p>

SEA Topic	Key Objectives	Plans, Policies and Programmes
	<p>To ensure secure, safe, reliable, dependable, sustainable and affordable supplies of water are provided for all communities.</p> <p>Access to high quality open spaces and opportunities for sport and recreation can make an important contribution to the health and well-being of communities.</p> <p>Promotion of healthy communities and protection from risks to health and wellbeing.</p> <p>Promotion of a sustainable economy supported by access to essential utility and infrastructure services.</p>	<p>European Commission, The 7th Environmental Action Programme (EAP) Environment Action Programme to 2020 'Living well, within the limits of our planet' (1386/2013/EU)</p> <p>European Commission Blueprint to Safeguard Europe's Water Resources</p> <p><i>National:</i></p> <p>The Countryside and Rights of Way (CROW) Act 2000</p> <p>Environmental Protection Act 1990</p> <p>MHCLG (2018) National Planning Policy Framework 2018</p> <p>Defra (2005) Securing the Future; Delivering UK Sustainable Development Strategy</p> <p>Defra (2011) Water for Life -Water White Paper</p> <p>Defra (2011) The Natural Choice: securing the value of nature. The Natural Environment White Paper</p> <p>Defra, Environment Agency, Natural England, Forestry Commission England (2016) Creating a great place for living</p> <p>Environment Agency (2014) Corporate Plan 2014 – 2016</p> <p>HM Treasury (2015) Fixing the Foundations: Creating a More Prosperous Nation</p> <p>HM Treasury Infrastructure UK (2014) National Infrastructure Plan</p> <p>The Natural Environment and Rural Communities (NERC) Act (2006)</p> <p><i>Regional/Local:</i></p> <p>Southern Water (2011) Strategic Statement 2015-40 and Southern Water (2013) updated Strategic Statement 2015-40 (Parts 1 to 4)</p> <p>Southern Water (2013) Five Year Business Plan 2015-2020</p> <p>Adopted Local Plans of relevant local authorities</p> <p>Public Rights of Way Improvement Plans (ROWIPs)</p> <p>Local level green infrastructure plans</p>
Material assets and resource use	Promote sustainable production and consumption whilst seeking to reduce the amount of waste generated by using materials, energy and water more efficiently.	<p><i>International:</i></p> <p>United Nations (2002) Commitments arising from the World Summit on Sustainable Development, Johannesburg</p> <p><i>National:</i></p> <p>MHCLG (2018) National Planning Policy Framework 2018</p> <p>Defra (2011) Government Review of Waste Policy in England 2011</p>

SEA Topic	Key Objectives	Plans, Policies and Programmes
	<p>Consider issues of water demand, water supply and water quality in the natural environment and ensure a sustainable use of water resources.</p> <p>Contribute to a resource efficient, green and competitive low carbon economy. Maintain a reliable public water supply and ensure there is enough water for human uses, whilst seeking to maintain a healthy water environment.</p> <p>Minimise the production of waste, ensure waste management is in line with the 'waste hierarchy', and eliminate waste sent to landfill.</p> <p>Promote the sustainable management of natural resources.</p>	<p>HM Treasury Infrastructure UK (2014) National Infrastructure Plan Defra (2008) Future Water: the government's water strategy for England Environment Agency (2009) Water Resources Strategy for England and Wales Environment Agency (2010) Water Resources Action Plan for England and Wales Environment Agency (2009) Water Resources Strategy Regional Action Plan for Southern Region Environmental Protection Act 1990 Defra (2015) The government's response to the Natural Capital Committee's third State of Natural Capital report Defra (2008) Future Water: the government's water strategy for England HM Treasury (2015) Fixing the Foundations: creating a more prosperous nation.</p>
Water	<p>Promote sustainable and resilient water resource management, including a reduction in water consumption and improving security of supply for customers and the economy</p> <p>Maintain and improve water quality and water resources (surface waters, groundwater and bathing water).</p> <p>Meet protected area targets related to water quality and flow in the Water Framework Directive.</p> <p>Expand the scope of water quality protection measures to all waters, surface waters and groundwater.</p> <p>Improve the quality of the water environment and the ecology which it supports, and continue to provide high levels of drinking water quality.</p> <p>Ensure appropriate management of abstractions and protect flow and level variability</p>	<p><i>International:</i> European Commission Floods Directive (2007/60/EC) European Commission The Water Framework Directive (2000/60/EC) European Commission Drinking Water Directive (1998/83/EC) (amended 2015) European Commission Environmental Liability Directive (2004/35/EC) Directive 2006/118EC of the European Parliament and of the council of 12 December 2006 on the protection of groundwater against pollution and deterioration European Commission Directive 2006/7/EC of the European Parliament and of the Council of 15 February 2006 concerning the management of bathing water quality and repealing Directive 76/160/EEC European Commission Urban Waste Water Treatment Directive (91/271/EEC) European Commission Nitrates Directive (91/676/EEC)</p> <p><i>National:</i> Defra (2005) Making Space for Water Defra (2012) The UK Climate Change Risk Assessment 2012 Evidence Report Defra (2012) National Policy Statement for Waste Water</p>

SEA Topic	Key Objectives	Plans, Policies and Programmes
	<p>across the full range of regimes from low to high conditions.</p> <p>Prevent deterioration of water body status.</p> <p>Balance the abstraction of water for supply with the other functions and services the water environment performs or provides.</p> <p>Steer new development to areas with the lowest probability of flooding and manage any residual flood risk, taking account of the impacts of climate change.</p> <p>Promote measures to enable and sustain long term improvement in water efficiency.</p> <p>Promote a catchment based approach to the management and work with local stakeholders to deliver catchment-based solutions to water quantity and quality.</p> <p>Develop a resilient and flexible water management approach to cope with changing climate, population and economic conditions.</p> <p>Reduce flood risk to people, residential and non-residential properties, community facilities and key transport links, as well as designated nature conservation sites and heritage assets and landscapes of value.</p> <p>Reduce risk of flooding from reservoirs.</p>	<p>Defra (2011) Water for Life - Water White Paper</p> <p>Defra (2011) The Natural Choice: Securing the value of nature. The Natural Environment White Paper</p> <p>Defra (2008) Future Water: the government's water strategy for England</p> <p>Defra and Welsh Government (2014) River Basin Planning Guidance</p> <p>Defra (2013) Catchment Based Approach: Improving the quality of our water environment</p> <p>Defra (2002) Directing the Flow – Priorities for Future Water Policy</p> <p>Environment Agency (2010) Water Resources Action Plan for England and Wales</p> <p>Environment Agency (2009) Water Resources Strategy for England and Wales</p> <p>Environment Agency (2013) Managing Water Abstraction</p> <p>Environment Agency (2013) Evidence Climate change approaches in water resources planning – overview of new methods</p> <p>Environment Agency (2014) Corporate Plan 2014 – 2016</p> <p>Environment Agency (2015) Creating a Better Place: Environment Agency Corporate Strategy 2014-2016</p> <p>Environment Agency CAMS (various)</p> <p>Environment Agency and other lead authorities Shoreline Management Plans</p> <p>Environment Agency (2011) National Flood and Coastal Risk Management Strategy for England</p> <p>Environment Agency (2014) Working with natural processes to reduce flood risk. R&D Framework</p> <p>Forest Research (2011) Woodland for Water</p> <p>Flood and Water Management Act (2010)</p> <p>National Infrastructure Commission (2018). Preparing for a drier future: England's water infrastructure needs</p> <p>Natural England (2016) A narrative for conserving freshwater and wetland habitats in England</p> <p>The Water Act (2003)</p> <p>The Water Environment (WFD) (England and Wales) Regulations 2017</p> <p>Water Resources Act 1991 (Amendment) (England and Wales) Regulations 2009 SI3104</p> <p>The Water Resources Management Plan Regulations 2007</p> <p>Water Resources Act 1991 (as amended)</p>

SEA Topic	Key Objectives	Plans, Policies and Programmes
		<p>Water Industry Act 1991 (as amended) Water UK (2016) Water Resources Planning Framework (2015-2065) Wildlife and Countryside Link – Blueprint for Water 19: Environmental outcomes for the price review UKTAG on the WFD Guidance Documents (various dates) Defra (2016) Single Department Plan 2015 - 2020</p> <p><i>Regional/Local:</i> Drought Plans from adjacent water companies Southern Water (2013) Drought Plan Environment Agency, Catchment Abstraction Management Strategy (various dates for relevant catchments) Environment Agency (2007) Water for the Future – Managing Water in the South East of England Environment Agency (2009) Water Resources Strategy, Regional Strategy Actions for South East Region Neighbouring water company Water Resource Management Plans (2015-2040). Environment Agency (2011), Water Resources Strategy – A Regional Action Plan for Thames Region Environment Agency (2006) River Thames Alliance: Thames Waterway Plan 2006-2011 Environment Agency and Defra, (2015) South East River Basin District River Basin Environment Agency and Defra, (2015) River Basin Management Plan Thames River Basin district Environment Agency (2016) South East River Basin District, Flood risk Management Plan 2015-2021 Environment Agency and Defra, (2016) Thames River Basin District River Basin Management Plan Environment Agency (2016) Thames River Basin District Flood Risk Management Plan 2015-2021 Environment Agency (2007) Water for the Future - Managing Water in the South East of England. Environment Agency (2016) South West River Basin District Flood Risk Management Plan</p>

SEA Topic	Key Objectives	Plans, Policies and Programmes
		<p>Environment Agency and Defra (2015) River Basin Management Plan South West River Basin District</p> <p>Mayor of London (2011) Securing London's Water Future The Mayor's Water Strategy</p> <p>Water Resources in the South East (WRSE) Group (forthcoming) regional water resources strategy</p>
Soil, geology and land use	<p>Protect and enhance the quality and diversity of geology (including geological SSSIs) and soils, including geomorphology and geomorphological processes which can be lost or damaged by insensitive development.</p> <p>Ensure that soils will be protected and managed to optimise the varied functions that soils perform for society (e.g. supporting agriculture and forestry, protecting cultural heritage, supporting biodiversity, as a platform for construction), in keeping with the principles of sustainable development.</p> <p>Promote catchment-wide approach to land management by relevant stakeholders, in order to benefit natural resources, reduce pollution and develop resilience to climate change.</p> <p>Promote mixed use developments, and encourage multiple benefits from the use of land in urban and rural areas, recognising that some open land can perform many functions.</p> <p>Encourage the effective use of land by reusing land that has been previously developed (brownfield land), provided that it is not of high environmental value.</p>	<p><i>International:</i></p> <p>Council of Europe (2003) European Soils Charter</p> <p>European Commission (2006) Thematic Strategy for Soil Protection</p> <p><i>National:</i></p> <p>Defra (2009) Safeguarding our Soils – A Strategy for England</p> <p>Defra (2004) The First Soil Action Plan for England</p> <p>MHCLG (2018) National Planning Policy Framework 2018</p> <p>Defra (2004) Rural Strategy 2004</p> <p>Defra (2006) Sustainable Farming and Food Strategy: Forward Look</p> <p>Environment Agency (2007) Soil a precious resource: Strategy for protecting, managing and restoring soil</p> <p>The Countryside and Rights of Way (CROW) Act (2000)</p> <p>Wildlife and Countryside Act 1981 (as amended).</p> <p><i>Regional/local:</i></p> <p>National Character Area (NCA) profiles</p> <p>Environment Agency and Defra, (2015) River Basin Management Plan South East River Basin District</p> <p>Environment Agency and Defra, (2015) River Basin Management Plan Thames River Basin District</p> <p>Environment Agency and Defra (2015) River Basin Management Plan South West River Basin District</p>

SEA Topic	Key Objectives	Plans, Policies and Programmes
Air and climate	<p>Reduce greenhouse gas emissions. Targets include: reduce the UK's greenhouse gas emissions by at least 80% (relative to 1990 levels) by 2050.</p> <p>Reduce the effects of air pollution on ecosystems.</p> <p>Improve overall air quality.</p> <p>Minimise energy consumption, support the use of sustainable/renewable energy and improve resilience to climate change.</p> <p>Build in adaption to climate change to future planning and consider the level of urgency of associated risks of climate change impacts accordingly.</p> <p>Need for adaptive measures to respond to likely climate change impacts on water supply and demand.</p> <p>Sustain compliance with and contribute towards EU limit values or national objectives for pollutants, taking into account the presence of Air Quality Management Areas and the cumulative impacts on air quality from individual sites in local areas.</p> <p>Minimise energy consumption, support the use of sustainable/renewable energy and improve resilience to climate change.</p>	<p><i>International:</i></p> <p>The Cancun Agreement (2011) and Kyoto Agreement (1997)</p> <p>European Commission (2008) Ambient Air Quality Directive (2008/50/EC)</p> <p>European Commission (2009) Promotion of the use of energy from renewable sources Directive (2009/28/EC)</p> <p>European Commission (2005) Thematic Strategy on Air Pollution</p> <p>COP21 climate change summit, Paris, 2015</p> <p><i>National:</i></p> <p>MHCLG (2018) National Planning Policy Framework 2018</p> <p>Defra (2012) The UK Climate Change Risk Assessment 2012 Evidence Report</p> <p>Defra (2008), England Biodiversity Strategy –climate change adaptation principles</p> <p>DECC (2007) Energy White Paper: Meeting the Energy Challenge</p> <p>Environment Agency (2014) Corporate Plan 2014 – 2016</p> <p>Environment Agency (2015) Creating a Better Place: Environment Agency Corporate Strategy 2014-2016</p> <p>The Climate Change Act 2008</p> <p>The Energy Act 2013</p> <p>UKCIP (2009) UK Climate Projections UKCP09 (2009)</p> <p>Defra (2013) The National Adaptation Programme: Making the country resilient to a changing climate.</p> <p>Defra (2007) The Air Quality Strategy for England, Scotland and Wales</p> <p>Department of energy and climate change (2011) Planning our electric future: a White Paper for secure, affordable and low carbon electricity</p> <p><i>Regional/Local:</i></p> <p>Defra (2015) Climate adaptation reporting second round (for relevant water companies)</p>

SEA Topic	Key Objectives	Plans, Policies and Programmes
Archaeology and cultural heritage	<p>Built development in the vicinity of historic buildings and Scheduled Monuments could have implications for the setting and/or built fabric and cause damage to any archaeological deposits present on the site.</p> <p>Ensure active management of the Region's environmental and cultural assets.</p> <p>Ensure effects resulting from changes to water level (surface or sub-surface) on all historical and cultural assets are avoided. Consider effects on important wetland areas with potential for paleo-environmental deposits.</p> <p>Promote the conservation and enhancement of the historic environment, including the promotion of heritage and landscape as central to the culture of the region and conserve and enhance distinctive characteristics of landscape and settlements.</p> <p>Conserve and enhance the historic environment, heritage assets and their settings.</p>	<p><i>International:</i></p> <p>The Convention for the protection of the architectural heritage of Europe (Granada Convention)</p> <p>The European Convention on the protection of archaeological heritage (Valletta Convention)</p> <p><i>National:</i></p> <p>Ancient Monuments and Archaeological Areas Act 1979</p> <p>MHCLG (2018) National Planning Policy Framework 2018</p> <p>English Heritage (2008), Climate Change and the Historic Environment</p> <p>English Heritage (2010), Heritage at Risk</p> <p>Historic England (2013) SEA, Sustainability Appraisal and the Historic Environment</p> <p>Historic England (2015) The Setting of Heritage Assets, Historic Environment</p> <p>Historic England (2015) Historic Environment Good Practice Advice in Planning Note 3</p> <p>Department for Culture, Media and Sport (2001) The Historic Environment – A Force for the Future (2001)</p> <p>Planning (Listed Buildings and Conservation Areas) Act 1990</p>
Landscape and visual amenity	<p>Protection and enhancement of landscape (including designated landscapes, landscape character, distinctiveness and the countryside)</p> <p>Abstraction and low river flows could negatively affect landscape and visual amenity.</p> <p>Enhance the value of the countryside by protecting the natural environment for this and future generations.</p> <p>Improve access to valued areas of landscape character in sustainable ways to enhance its enjoyment and value by visitors and stakeholders.</p>	<p><i>International:</i></p> <p>Council of Europe (2006) European Landscape Convention</p> <p><i>National:</i></p> <p>MHCLG (2018) National Planning Policy Framework 2018</p> <p>Defra (2011) The Natural Choice: Securing the value of nature. The Natural Environment White Paper</p> <p>Defra (2010) Making Space for Nature: A Review of England's Wildlife Sites and Ecological Network</p> <p>The Countryside and Rights of Way (CROW) Act (2000)</p> <p>Wildlife and Countryside Act 1981 (as amended)</p> <p><i>Regional/Local:</i></p>

SEA Topic	Key Objectives	Plans, Policies and Programmes
		<p>A Strategy for the West Sussex Landscape, West Sussex County Council (2005)</p> <p>Relevant Natural England National Character Area (NCA) Profiles</p> <p>North Wessex Downs AONB Management Plan 2009-2014</p> <p>Isle of Wight AONB Management Plan 2009 – 2014, Isle of Wight AONB Partnership 2009</p> <p>Blackdown Hills AONB Management Plan 2014 to 2019</p> <p>Chichester Harbour AONB Management Plan</p> <p>Chiltern Hills AONB Management Plan 2014-2019</p> <p>Cotswolds AONB Management Plan 2013-2018</p> <p>Mendip Hills AONB Management Plan 2014-19</p> <p>Quantock Hills AONB Management Plan 2014-2019</p> <p>Surrey Hills AONB Management Plan 2014-2019 (Surrey Hills Board)</p> <p>Kent Downs AONB Management Plan 2014-2019</p> <p>High Weald AONB Management Plan 2014-2019 (High Weald Joint Advisory Committee)</p> <p>Dorset AONB - A Framework for the Future AONB Management Plan 2014 - 2019</p> <p>Cranborne Chase AONB Management Plan 2014-2019</p> <p>South Downs National Park (2013) Partnership Management Plan, Shaping the future of your south downs national park 2014-2019</p> <p>Partnership Plan for the New Forest National Park (2015) An update of the National Park Management Plan with actions for 2015 -2020</p> <p>West Sussex County Council (2005) A Strategy for the West Sussex Landscape</p>

3. Environmental baseline review

3.1 Introduction

An essential part of the SEA process is to identify the current baseline environmental conditions and their likely evolution during the life of the plan. The SEA Directive (Directive 2001/42/EC) also requires that the evolution of baseline conditions of the plan area (that would take place with or without implementation of the plan) is identified. This is useful when determining impact significance, particularly with regards to baseline conditions that may already be improving or worsening and the rate of such change.

Full environmental baseline data are presented in Appendix C and have been drawn from a variety of sources, including a number of the plans and programmes reviewed as part of the SEA process (as set out above in Table 4). This environmental baseline review also summarises the likely future trends for the environmental issues being considered (as far as information is available). The key issues arising from the review of baseline conditions are summarised in the 'Key issues' section. The best available projections for environmental and social characteristics have been considered and summarised, but there is significant uncertainty which increases with time.

A scenario approach has therefore been used by the company to assess the sensitivity of its Water Resources Management Plan (WRMP) to key uncertainties, such future changes in demand arising from housing and population growth. The approach is described in the WRMP19. In this way, the resilience of options, programmes and the overall plan has been assessed and used to inform decision-making, as well as informing future recommendations for monitoring of the effects of the plan to provide data for subsequent WRMPs and associated SEAs.

With knowledge of existing conditions and how these may evolve in the absence of this plan, the potential effects (adverse and beneficial) of this plan can be identified, mitigated where necessary and subsequently monitored.

3.2 Limitations of the data and assumptions made

The principal limitations surround the future social and environmental baseline where there is substantial differences in the availability and temporal resolution of robust projections across the various SEA topic areas: for example, whilst our plan covers a 50 year planning horizon and climate change estimates extend to 2080, regional population and housing forecasts rarely go beyond a 20-30 year horizon and forecasts of how the natural environment may change are very limited. As discussed above, a scenario-based approach has therefore been adopted to test central forecasts (and 'best view' assumptions where forecasts are lacking or do not extend sufficiently far ahead) as part of the assessment process. This included an Environmental Scenarios report (Annex 4 of the WRMP19), drawing on the SEA data review and other data sources.

The study area for the SEA is relatively large and covers a number of different geographical and political regions, which makes establishing a baseline at the sub-regional level challenging. There are also challenges around extrapolating information from data collated at differing spatial resolutions. Spatial data have been obtained for most of the SEA topics, and the baseline is presented graphically as mapped information where appropriate. In some instances, reporting cycles mean that available information is dated.

SEA is a high level assessment aimed at highlighting potential environmental concerns. The environmental data to be used in this assessment is based on that which is readily available from existing sources (e.g. statutory organisations and government agencies). No primary research or survey work has been carried out

specifically to inform the SEA and therefore it is possible that at the individual option level, there may be additional environmental issues that could have an influence on a WRMP option and which would be explored as part of the detailed design and assessment of the option to support planning and environmental permit applications.

3.3 Key issues

3.3.1 Biodiversity, fauna and flora

The key sustainability issues arising from the baseline assessment for biodiversity are:

- The need to protect or enhance and support the achievement of favourable condition the region's biodiversity, particularly within designated sites, species and habitats of principal importance
- The need to avoid activities likely to cause irreversible damage to natural heritage
- The need to take opportunities to improve connectivity between fragmented habitats to create functioning habitat corridors and habitat patches or stepping stones
- The need to control the spread of Invasive Non-Native Species (INNS) and the diseases they carry.
- The need to recognise the importance of allowing wildlife to adapt to climate change
- The need to engage more people in biodiversity issues so that they personally value biodiversity and know what they can do to help, including through recognising the value of the ecosystem services
- The need to recognise the high levels of anthropogenic pressures which are of specific relevance to both the need for water and the baseline condition of the environment, and therefore its ability to withstand additional pressures of climate change, new water resources and future growth

3.3.2 Population and human health

The key sustainability issues arising from the baseline assessment for population and human health are:

- The need to ensure water supplies remain affordable especially for deprived or vulnerable communities, reflecting the importance of water for health and wellbeing
- The need to ensure continued improvements in levels of health across the region, particularly in urban areas and deprived areas
- The need to ensure water quantity and quality is maintained for a range of uses including tourism, recreation, navigation and other use such as agriculture
- The need to ensure a balance between different aspects of the built and natural environment that will help to provide opportunities for local residents and tourists, including opportunities for access to, protecting and enhancing recreation resources, green infrastructure and the natural and historic environment
- The need to accommodate an increasing population and housing growth through provision of essential services including water supply
- The need to protect sites of nature conservation importance, heritage assets, water resources, important landscapes and public rights of way contribute to recreation and tourism opportunities and subsequently health and wellbeing and the economy

3.3.3 Material assets and resource use

The key sustainability issues arising from the baseline assessment for material assets and resource use are:

- The need to minimise the consumption of resources, including water and energy
- The need to reduce the total amount of waste produced in the region, from all sources, and to reduce the proportion of this waste sent to landfill
- The need to reduce the proportion of waste sent to landfill

- The need to continue to reduce leakage from the water supply system to help reduce demand for water
- Daily consumption of water is relatively high and consequently there is a continued need to encourage more efficient water use by consumers

3.3.4 Water

The key issues arising from the baseline assessment for water are:

- The need to further improve the quality of the regions river, estuarine and coastal waters taking into account WFD objectives
- The need to maintain the quantity and quality of groundwater resources taking into account WFD objectives
- The need to improve the resilience, flexibility and sustainability of water resources in the region, particularly in light of potential climate change impacts on surface water and groundwater
- The need to ensure sustainable abstraction to protect the water environment and meet society's needs for a resilient water supply
- The need to ensure that people understand the value of water
- The need to reduce and manage flood risk

3.3.5 Soil, geology and landscape

The key sustainability issues arising from the baseline assessment for soil, geology and land use are:

- The need to protect and enhance geological features of importance (including geological SSSIs) and maintain and enhance soil function and health
- The need to manage the land more holistically at the catchment level, benefitting landowners, other stakeholders, the environment and sustainability of natural resources (including water resources)
- The need to make use of previously developed land (brownfield land) and to reduce the prevalence of derelict land in the region

3.3.6 Air and climate change

The key sustainability issues arising from the baseline assessment for air and climate are:

- The need to reduce air pollutant and greenhouse emissions and limit air emissions to comply with air quality standards
- The need to reduce greenhouse gas emissions (industrial processes and transport)
- The need to adapt to the impacts of climate change for example through, sustainable water resource management, water use efficiencies, specific aspects of natural ecosystems (e.g. connectivity) as well as accommodating potential opportunities afforded by climate change

3.3.7 Archaeology and cultural heritage

The key sustainability issues arising from the baseline assessment for archaeology and cultural heritage are the need to conserve or enhance sites of archaeological importance and cultural heritage interest, particularly those which are sensitive to the water environment.

3.3.8 Landscape and visual amenity

The key sustainability issues arising from the baseline assessment for landscape and visual amenity are:

- The need to protect and improve the natural beauty of the area's Areas of Outstanding Natural Beauty (AONBs), National Parks and other areas of natural beauty
- The need to protect and improve the character of landscapes and townscapes

3.4 Inter-relationships

It is noted that there are inter-relationships between SEA topics. Inter-relationships that result in changes to individual effects are considered through the assessment of synergistic effects.

4. Methodology

4.1 Environmental assessment approach for WRMP19

The SEA has been undertaken in parallel with the HRA and WFD assessment to ensure an integrated approach to environmental assessment to support and inform development of the WRMP19, as well as to ensure its overall compliance with relevant environmental legislation. Figure 4 and Figure 5 show the overall process for integrating SEA into the development of the WRMP19.

Figure 4 Integrating SEA into the WRMP19 decision-making alongside HRA and WFD assessments

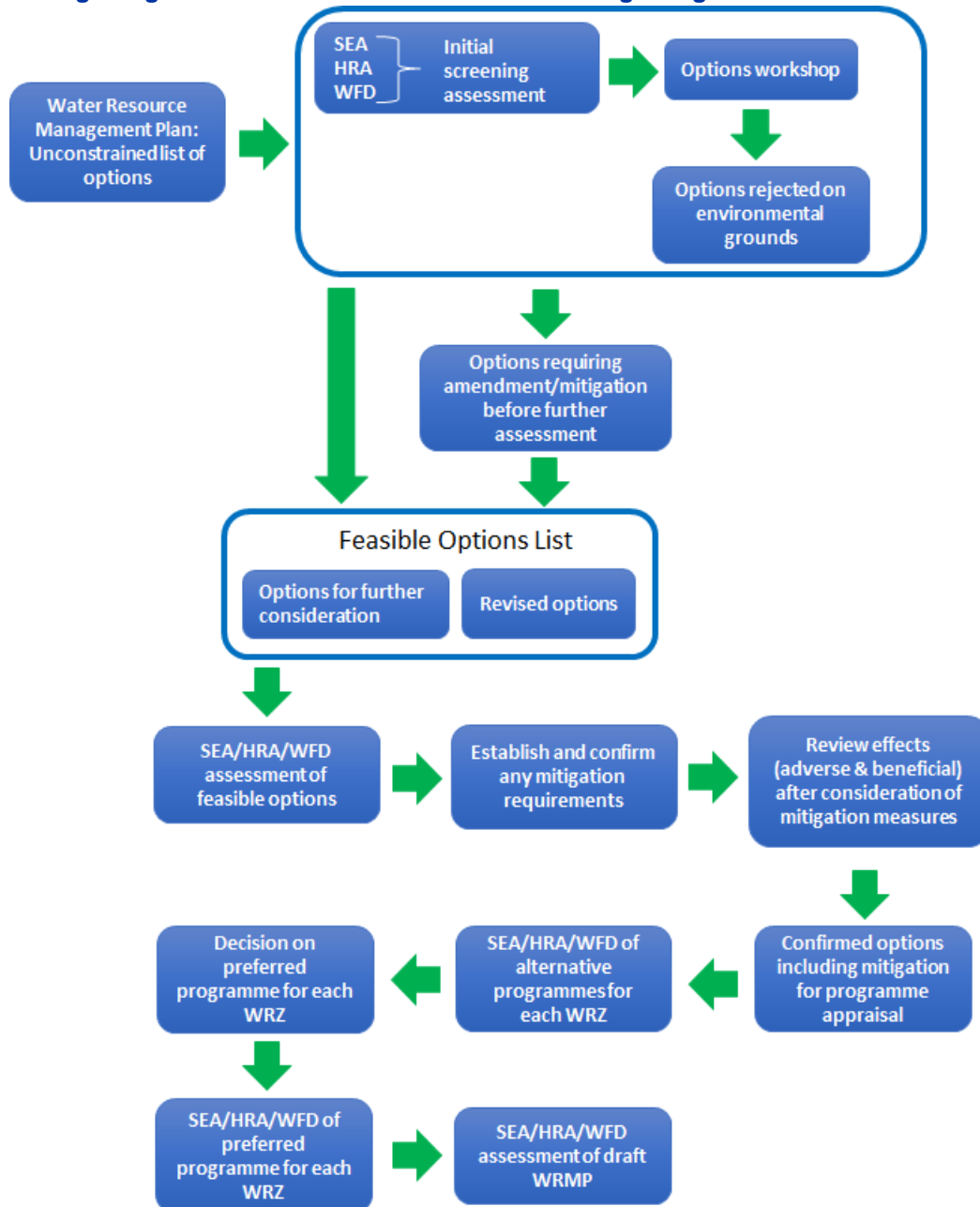
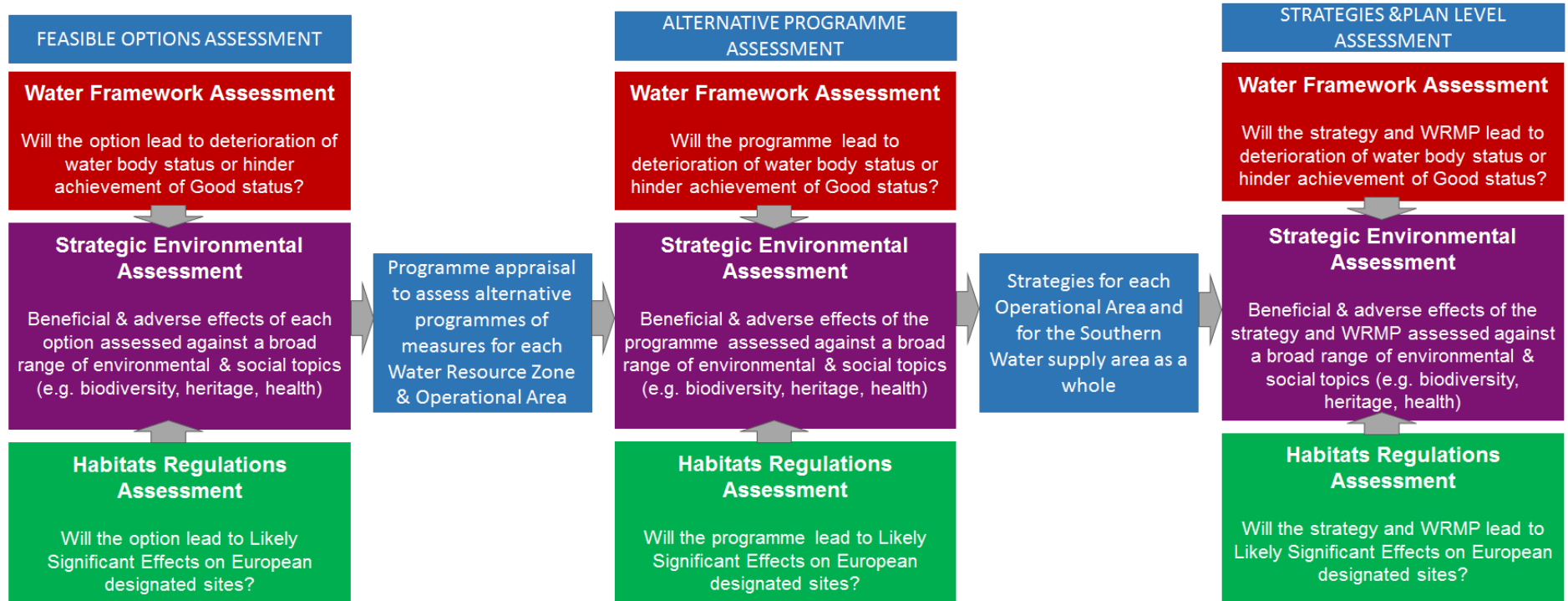


Figure 5 Integrating SEA into the WRMP19 development alongside HRA and WFD assessments



As described in Figure 4 and Figure 5, a staged assessment approach has been followed in developing the WRMP19. A high level SEA (and HRA and WFD) screening review was applied initially to an ‘unconstrained’ list of potential options using SEA topics as screening criteria to exclude any options that had unacceptable environmental impacts (see the ‘Assessment framework’ section). More detailed SEA (and HRA and WFD) screening using SEA topics as screening criteria was subsequently applied to the resulting ‘constrained’ list of potential options (see the ‘Assessment framework’ section) to help make decisions on the options to be retained in a ‘feasible’ list of options. This included screening out options where the SEA (HRA or WFD) assessment identified significant environmental effects for which mitigation was unlikely to be able to address to reduce the effects to an acceptable level. The feasible list of options was then subject to detailed assessment in accordance with the SEA methodology described in this section.

4.2 SEA methodology

This section outlines the methodology that has been used to undertake the SEA of the feasible list of options in our WRMP19, taking account of the relevant key parts of the SEA Regulations:

Regulation 12:

- (2) *“The report shall identify, describe and evaluate the likely significant effects on the environment of –*
- (a) *implementing the plan or programme; and*
 - (b) *reasonable alternatives taking into account the objectives and the geographical scope of the plan or programme”*

Schedule 2:

“The Environmental Report should include:

- (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.*
- (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.”*

4.2.1 Assessment methodology and SEA framework

The environmental and social assessment of the alternative WRMP19 feasible options adopts an ‘objectives-led’ approach. Establishing assessment objectives is a recognised way of considering the environmental effects of a plan and comparing the effects of alternatives. The SEA objectives are derived from environmental and social objectives established in law, policy or other plans and programmes, as well as from the review of baseline information and environmental problems associated with the SEA topics.

An assessment framework of objectives has been developed based on:

- The key policy objectives and environmental and social protection objectives identified in the review of policies, and other plans and programmes (see the ‘Policy context’ section). This helps to highlight any area where this plan will support or hinder the achievement of the objectives of policies, other plans and programmes.
- The current state of the environment in the area under consideration, its likely future evolution and the key environmental issues identified (see the ‘Environmental baseline review’ section).

The SEA objectives are set out in Table 5. These take in to consideration comments received on the draft SEA objectives presented in the SEA Scoping Report (see Appendix A). Comments received identified additional policies and environmental baseline information which led to the identification of additional key policy and strategy objectives. The comments received and additional objectives were checked and run through the assessment framework and associated SEA objectives, to confirm they were adequately represented. This included the following key changes made to the information presented in the Scoping Report:

- *Natural England's Narrative for Freshwater Habitats* has been considered within the review of plans, policies and programmes and this is used to define the objectives and is covered under Objective 1.1.
- A new key policy objective was identified: *The need to recognise the potential issues relating to high population and development pressures in the water supply area which are likely to impact on the need for water and related condition of the environment, and subsequently its ability to withstand additional pressures of climate change, new water resources and future growth*
- A key policy objective concerning INNS was updated to account for the diseases that can be provide the pathway for their spread: *The need to control the spread of INNS and the diseases they carry*
- The assessment framework was updated in response to comments regarding the enhancement of environmental features, for example, the key policy objective concerning green infrastructure was updated to: *A need to protect and enhance the green infrastructure network*

The following sections describe how the final SEA objectives have been used in the assessment of the environmental and social effects of the potential WRMP19 options. By assessing each option against these objectives, the effects of the different water resources management options can be objectively compared and the findings used to help determine the options to be included in this plan, their timing and phasing of implementation.

As well as the overall SEA objectives, a number of key questions were developed for each SEA topic. These key questions prompted the assessment and ensured it considered all the relevant aspects. These key questions have been updated from those presented in the SEA Scoping Report in light of comments received from consultees.

The assessment of each option included consideration of the following information:

- Details of each potential option (design, implementation and operation assumptions)
- Likelihood and predicted frequency of deployment/utilisation of the option
- Construction (where applicable) and operational/implementation details
- Benefits to the water supply-demand position (taking uncertainty into account)
- Key elements of the baseline environment, such as location of designated sites, priority habitats and species, landscape areas or heritage assets, recreational facilities and other environmental features

Table 5 SEA objectives and assessment approach

SEA topic	Policies, plans and programmes - key messages	Baseline - key issues	SEA objective	Key questions
Biodiversity, fauna and flora	<ul style="list-style-type: none"> Conservation and enhancement of the natural environment and of biodiversity, particularly internationally and nationally designated sites and priority habitats and species (NERC Act Section 41), whilst taking into account future climate change. Promote a catchment-wide approach to water use to ensure better protection of biodiversity. To achieve favourable condition for priority habitats and species in particular designated sites. Avoidance of activities likely to cause irreversible damage to natural heritage. Support well-functioning ecosystems, respect environmental limits and capacities, and maintain/enhance coherent ecological networks, including provision for fish passage and connectivity for migratory/mobile species. Strengthen the connections between people and nature and realise the value of biodiversity. 	<ul style="list-style-type: none"> The need to protect or enhance and support the achievement of favourable condition the region's biodiversity, particularly within designated sites, species and habitats of principal importance. The need to avoid activities likely to cause irreversible damage to natural heritage. The need to take opportunities to improve connectivity between fragmented habitats to create functioning habitat corridors and habitat patches or stepping stones. The need to control the spread of INNS and the diseases they carry. The need to recognise the importance of allowing wildlife to adapt to climate change. The need to engage more people in biodiversity issues so that they personally value biodiversity and know what they can do to help, including through recognising the value of the ecosystem services. 	<p>1.1 To conserve and enhance biodiversity, including designated sites of nature conservation interest and protected habitats and species and to enhance natural capital.</p>	<ul style="list-style-type: none"> Will it contribute to favourable condition or favourable conservation status of the most important sites for nature conservation (SAC, SPA, Ramsar, SSSI)? Will it have Likely Significant Effects on Natura 2000 sites (with reference to the HRA undertaken in parallel)? Or will it cause significant harm to a SSSI or priority habitat? Will it protect and enhance aquatic, transitional and terrestrial priority species and habitats? Will it help to restore the natural ecosystem function? Will it ensure maintenance or support provision of fish passage with respect to migratory fish functioning habitat connectivity? Will it contribute to the sustainable management of natural habitats and ecosystems, i.e. within their limits and capacities? Will it promote wildlife's ability to adapt to climate change?

SEA topic	Policies, plans and programmes - key messages	Baseline - key issues	SEA objective	Key questions
	<ul style="list-style-type: none"> Protection, conservation and enhancement of natural capital. Ecosystem services from natural capital contributes to the economy and therefore should be protected and, where possible, enhanced. Avoidance of activities likely to cause the spread of INNS A need to protect and enhance the green infrastructure network. 	<ul style="list-style-type: none"> The need to recognise the high levels of anthropogenic pressures which are of specific relevance to both the need for water and the baseline condition of the environment, and therefore its ability to withstand additional pressures of climate change, new water resources and future growth. 		<ul style="list-style-type: none"> Will it affect WFD compliance e.g. good ecological potential/status? Will it protect or enhance natural capital and ecosystem services? Will it create areas of improved biodiversity in urban or deprived areas or easily accessible to those areas? Will it engage more people in biodiversity issues, including recognising the value of the ecosystem services?
			1.2 To avoid or introducing spreading INNS.	<ul style="list-style-type: none"> Will it limit, reduce or increase the risk of spread of INNS?
Population and human health	<ul style="list-style-type: none"> Water resources play an important role in supporting the health and recreational needs of local communities and businesses. To ensure all communities have a clean, safe and attractive environment in which people can take pride. To ensure secure, safe, reliable, dependable, sustainable and affordable supplies of water are provided for all communities. 	<ul style="list-style-type: none"> The need to ensure water supplies remain affordable especially for deprived or vulnerable communities, reflecting the importance of water for health and wellbeing. The need to ensure continued improvements in levels of health across the region, particularly in urban areas and deprived areas. The need to ensure water quantity and quality is maintained for a range of uses 	2.1 To protect and enhance health and well-being (including raising awareness of the importance and value of the water environment for health and well-being).	<ul style="list-style-type: none"> Will it help to ensure provision of access to a secure resilient and affordable supply of drinking water? Will it help to protect or improve drinking water quality? Will it raise awareness of the importance and value of the water environment for health and well-being? Will it assist in ensuring provision of essential services to support health and well-being?

SEA topic	Policies, plans and programmes - key messages	Baseline - key issues	SEA objective	Key questions
	<ul style="list-style-type: none"> Access to high quality open spaces and opportunities for sport and recreation can make an important contribution to the health and well-being of communities. Promotion of healthy communities and protection from risks to health and wellbeing. Promotion of a sustainable economy supported by access to essential utility and infrastructure services. 	<ul style="list-style-type: none"> including tourism, recreation, navigation and other use such as agriculture. The need to ensure a balance between different aspects of the built and natural environment that will help to provide opportunities for local residents and tourists, including opportunities for access to, protecting and enhancing recreation resources, green infrastructure and the natural and historic environment. The need to accommodate an increasing population and housing growth through provision of essential services including water supply. The need to protect sites of nature conservation importance, heritage assets, water resources, important landscapes and public rights of way contribute to recreation and tourism opportunities and subsequently health and wellbeing and the economy. 	<p>2.2 To protect and enhance the water environment for other users including sustainable recreation, tourism and navigation, as well as terrestrial recreational resources</p> <p>2.3 To promote a sustainable economy with good access to essential services, including a resilient, high quality and affordable supply of water.</p>	<ul style="list-style-type: none"> Will it protect or enhance opportunities for recreation and tourist activities such as public rights of way, including navigation, National Trails and Public Rights of Way? Will it help to promote healthy communities and protect from risks to health and wellbeing (for example through nuisance or resulting from traffic or transport changes, disruption to safe and reliable water /sewerage services)? Does it protect and enhance the green infrastructure network? Will it assist in ensuring provision of essential services to good access to essential services?
Material assets and resource use	<ul style="list-style-type: none"> Promote sustainable production and consumption whilst seeking to reduce the amount of waste generated by using materials, 	<ul style="list-style-type: none"> The need to minimise the consumption of resources, including water and energy 	<p>3.1 To reduce, and make more efficient, the domestic, industrial and commercial</p>	<ul style="list-style-type: none"> Will it help to minimise the demand for resources? Will it use natural rather than built solutions where appropriate?

SEA topic	Policies, plans and programmes - key messages	Baseline - key issues	SEA objective	Key questions
	<p>energy and water more efficiently.</p> <ul style="list-style-type: none"> Consider issues of water demand, water supply and water quality in the natural environment and ensure a sustainable use of water resources. Contribute to a resource efficient, green and competitive low carbon economy. Maintain a reliable public water supply and ensure there is enough water for human uses, whilst seeking to maintain a healthy water environment. Minimise the production of waste, ensure waste management is in line with the 'waste hierarchy', and eliminate waste sent to landfill. Promote the sustainable management of natural resources. 	<ul style="list-style-type: none"> The need to reduce the total amount of waste produced in the region, from all sources, and to reduce the proportion of this waste sent to landfill. The need to reduce the proportion of waste sent to landfill. The need to continue to reduce leakage from the water supply system to help reduce demand for water. Daily consumption of water is relatively high and consequently there is a continued need to encourage more efficient water use by consumers. 	<p>consumption of resources, minimise the generation of waste, encourage its re-use and eliminate waste sent to landfill.</p> <p>3.2 To promote and secure the efficient and sustainable use of water to ensure resilient water supplies for people and businesses.</p>	<ul style="list-style-type: none"> Will it minimise the use of energy and promote energy efficiency? Will it make use of existing infrastructure? Will it help to encourage sustainable design or use of sustainable materials (e.g. supplied from local resources)? Will it reduce the amount of waste generated and increase the proportion sent to reuse or recycling? <p>Will it enable efficient water use and ensure maintenance of water supplies?</p> <p>Will it help to minimise the demand for water?</p>
Water	<ul style="list-style-type: none"> Promote sustainable water resource management, including a reduction in water consumption. Maintain and improve water quality and water resources (surface waters, groundwater and bathing water). 	<ul style="list-style-type: none"> The need to further improve the quality of the regions river, estuarine and coastal waters taking into account WFD objectives. The need to maintain the quantity and quality of 	<p>4.1 To avoid adverse impact on surface and groundwater levels and flows, including when this impacts on habitats.</p>	<ul style="list-style-type: none"> Will it lead to a change in river flows, wetted width or river level? Will it alter the flow regime or residence time of surface waters? Will it lead to changes in groundwater levels and recharge?

SEA topic	Policies, plans and programmes - key messages	Baseline - key issues	SEA objective	Key questions
	<ul style="list-style-type: none"> Meet protected area targets related to water quality and flow in the Water Framework Directive. Expand the scope of water quality protection measures to all waters, surface waters and groundwater. Improve the quality of the water environment and the ecology which it supports, and continue to provide high levels of drinking water quality. Ensure appropriate management of abstractions and protect flow and level variability across the full range of regimes from low to high conditions. Prevent deterioration of water body status. Balance the abstraction of water for supply with the other functions and services the water environment performs or provides. Steer new development to areas with the lowest probability of flooding and manage any residual flood risk, taking account of the impacts of climate change. 	<ul style="list-style-type: none"> groundwater resources taking into account WFD objectives. The need to improve the resilience, flexibility and sustainability of water resources in the region, particularly in light of potential climate change impacts on surface waters and groundwaters. The need to ensure sustainable abstraction to protect the water environment and meet society's needs for a resilient water supply. The need to ensure that people understand the value of water. The need to reduce and manage flood risk. 	<p>4.2 To protect and enhance surface and groundwater quality and protect and enhance estuarine waterbodies.</p>	<ul style="list-style-type: none"> Will it promote a catchment based approach to the management and work with local stakeholders to deliver catchment-based solutions to water quantity? Will it contribute towards improving the awareness of water sustainability and its true value? Will it promote measures to enable improvements in water efficiency and assist in reducing water abstraction? Will it lead to a temporary or permanent deterioration to WFD water body status? Will it present a risk to water quality of groundwater, surface water or estuarine waters? Will it promote a catchment based approach to the management and work with local stakeholders to deliver catchment-based solutions to water quality? Will it achieve WFD compliance? e.g. good ecological potential/status, prevent deterioration of WFD status between status classes? Will it prevent water pollution?

SEA topic	Policies, plans and programmes - key messages	Baseline - key issues	SEA objective	Key questions
	<ul style="list-style-type: none"> Promote measures to enable and sustain long term improvement in water efficiency. Promote a catchment based approach to the management and work with local stakeholders to deliver catchment-based solutions to water quantity and quantity. Develop a resilient and flexible water management approach to cope with changing climate, population and economic conditions. Reduce flood risk to people, residential and non-residential properties, community facilities and key transport links, as well as designated nature conservation sites and heritage assets and landscapes of value. Reduce risk of flooding from reservoirs. 		<p>4.3 To ensure appropriate and sustainable management of water whilst protecting ecosystem functions and services that rely on water resources</p> <p>4.4 To reduce or manage flood risk.</p>	<ul style="list-style-type: none"> Will it affect WFD protected areas? Will it achieve an appropriate balance of supply with other functions and services (including agriculture and navigation)? Will it ensure sustainable abstractions, taking account of water resources availability status? Will it contribute towards improving the awareness of water sustainability and its true value? Will it promote achievement of protected area targets on flow or water quality? Will it promote measures to enable improvements in water efficiency and assist in balancing supply and demand? Will it provide flood plain storage, or opportunities to improve flood risk management?
Soil, geology and land use	<ul style="list-style-type: none"> Protect and enhance the quality and diversity of geology (including geological SSSIs) and soils, including geomorphology and geomorphological processes which can be lost or 	<ul style="list-style-type: none"> The need to protect and enhance geological features of importance (including geological SSSIs) and maintain and enhance soil function and health. 	5.1 To protect and enhance geology, geomorphology and the quality and quantity of soils	<ul style="list-style-type: none"> Will it avoid damage to and protect geologically important sites (e.g. geological SSSIs)? Will it protect and enhance geomorphology and geomorphological processes?

SEA topic	Policies, plans and programmes - key messages	Baseline - key issues	SEA objective	Key questions
	<p>damaged by insensitive development.</p> <ul style="list-style-type: none"> Ensure that soils will be protected and managed to optimise the varied functions that soils perform for society (e.g. supporting agriculture and forestry, protecting cultural heritage, supporting biodiversity, as a platform for construction), in keeping with the principles of sustainable development. Promote catchment-wide approach to land management by relevant stakeholders, in order to benefit natural resources, reduce pollution and develop resilience to climate change. Promote mixed use developments, and encourage multiple benefits from the use of land in urban and rural areas, recognising that some open land can perform many functions. Encourage the effective use of land by reusing land that has been previously developed (brownfield land), provided that it is not of high environmental value. 	<ul style="list-style-type: none"> The need to manage the land more holistically at the catchment level, benefitting landowners, other stakeholders, the environment and sustainability of natural resources (including water resources) The need to make use of previously developed land (brownfield land) and to reduce the prevalence of derelict land in the region. 		<ul style="list-style-type: none"> Will it protect and enhance the quality of soils? Will it prevent soil erosion? Will it contribute towards a catchment-wide approach to land management e.g. contribute flood attenuation, pollutant filtration and nutrient cycling. Will it make use of previously developed land (brownfield land)?
Air and Climate	<ul style="list-style-type: none"> Reduce greenhouse gas emissions. Targets include: 	<ul style="list-style-type: none"> The need to reduce air pollutant and greenhouse emissions and 	6.1 To reduce air pollutant emissions.	<ul style="list-style-type: none"> Will it reduce or minimise air pollutant emissions?

SEA topic	Policies, plans and programmes - key messages	Baseline - key issues	SEA objective	Key questions
	<p>reduce the UK's greenhouse gas emissions by at least 80% (relative to 1990 levels) by 2050.</p> <ul style="list-style-type: none"> Reduce the effects of air pollution on ecosystems. Improve overall air quality. Minimise energy consumption, support the use of sustainable/renewable energy and improve resilience to climate change. Build in adaption to climate change to future planning and consider the level of urgency of associated risks of climate change impacts accordingly. Need for adaptive measures to respond to likely climate change impacts on water supply and demand. Sustain compliance with and contribute towards EU limit values or national objectives for pollutants, taking into account the presence of Air Quality Management Areas and the cumulative impacts on air quality from individual sites in local areas. Minimise energy consumption, support the use of sustainable/renewable energy 	<p>limit air emissions to comply with air quality standards.</p> <ul style="list-style-type: none"> The need to reduce greenhouse gas emissions (industrial processes and transport). The need to adapt to the impacts of climate change for example through, sustainable water resource management, water use efficiencies, specific aspects of natural ecosystems (e.g. connectivity) as well as accommodating potential opportunities afforded by climate change. 	<p>6.2 To reduce energy consumption and greenhouse gas emissions.</p> <p>6.3 To adapt and improve resilience to the threats of climate change.</p>	<ul style="list-style-type: none"> Will it increase emissions to air in an areas sensitive to emissions (e.g. in proximity to an AQMA or to sensitive habitat or more deprived area)? Will it reduce or minimise greenhouse gas emissions? Will it result in an increase in greenhouse gas emissions? Will it reduce vulnerability or increase resilience to risks associated with climate change effects (e.g. drought)? Will it create opportunities to benefit from potential effects of climate change? Will it make use of renewable energy? Will it improve resilience/adaptability to likely effects of climate change, e.g. by increasing water storage capacity, or transferring water from areas with surplus?

SEA topic	Policies, plans and programmes - key messages	Baseline - key issues	SEA objective	Key questions
	and improve resilience to climate change.			
Archaeology and cultural heritage	<ul style="list-style-type: none"> ▪ Built development in the vicinity of historic buildings and Scheduled Monuments could have implications for the setting and/or built fabric and cause damage to any archaeological deposits present on the site. ▪ Ensure active management of the Region's environmental and cultural assets. ▪ Ensure effects resulting from changes to water level (surface or sub-surface) on all historical and cultural assets are avoided. Consider effects on important wetland areas with potential for paleo-environmental deposits. ▪ Promote the conservation and enhancement of the historic environment, including the promotion of heritage and landscape as central to the culture of the region and conserve and enhance distinctive characteristics of landscape and settlements. ▪ Conserve and enhance the historic environment, heritage assets and their settings. 	<ul style="list-style-type: none"> ▪ The need to conserve or enhance sites of archaeological importance and cultural heritage interest, particularly those which are sensitive to the water environment. 	7.1 To conserve and enhance the historic environment, heritage assets and their settings and protect archaeologically important sites.	<ul style="list-style-type: none"> ▪ Will it avoid damage to and protect the historic environment, heritage assets and their settings, places and spaces that enhance local distinctiveness? ▪ Will it maintain and enhance the historic environment, including palaeo-environmental deposits? ▪ Will the hydrological setting of water-dependent assets be altered, such as important wetland areas with potential for paleo-environmental deposits? ▪ Will it improve access, value, understanding or enjoyment of heritage assets and culturally/historically important assets in the region?

SEA topic	Policies, plans and programmes - key messages	Baseline - key issues	SEA objective	Key questions
Landscape and visual amenity	<ul style="list-style-type: none"> Protection and enhancement of landscape (including designated landscapes, landscape character, distinctiveness and the countryside) Abstraction and low river flows could negatively affect landscape and visual amenity. Enhance the value of the countryside by protecting the natural environment for this and future generations. Improve access to valued areas of landscape character in sustainable ways to enhance its enjoyment and value by visitors and stakeholders. 	<ul style="list-style-type: none"> The need to protect and improve the natural beauty of the area's AONBs, National Parks and other areas of natural beauty. The need to protect and improve the character of landscapes and townscapes. 	8.1 To protect, enhance the quality of and improve access to designated and undesignated landscapes, townscapes and the countryside.	<ul style="list-style-type: none"> Will it avoid adverse effects and enhance designated landscapes at a strategic level? Will it help to protect and improve non-designated areas of natural beauty and distinctiveness (e.g. woodlands) and avoid the loss of landscape features and local distinctiveness?

4.3 Assessment framework

4.3.1 SEA screening of unconstrained options and constrained options

At the outset of developing the alternative options to be considered for this plan, SEA principles were used to carry out a high level screening assessment of the options in the 'unconstrained' list. This included consideration of several key environmental and social criteria as listed below (key planning risks were also considered):

- Risks to international and national designated sites
- HRA and WFD compliance risks
- Key risks to the water environment
- Key risks to important landscape, recreation and heritage features
- Key planning risks
- Key societal risks

This screening helped identify several options that would likely lead to unacceptable adverse effects on the environment or society; these options were therefore excluded from the 'constrained' list of options.

More detailed environmental and social assessment was applied to the screening of the 'constrained' list of options. . Each option was assessed specifically against the following criteria:

- Risk of WFD water body status deterioration
- Likely significant effects on European designated conservation sites under the Habitats Regulations
- Potential effects on biodiversity, flora and fauna (including invasive non-native species)
- Potential effects on the water environment (including hydrology, hydrogeology, water quality and flood risk)
- Potential effects on archaeology and cultural heritage
- Potential effects on landscape and visual amenity
- Potential effects on other SEA topics (population and human health; air and climate; material assets; soils and geology)

HRA and WFD risks were assessed on a scale from negligible to high; other potential effects were assessed against the SEA effects scale ranging from major beneficial to major adverse. The findings from the constrained options screening process were shared and discussed with the Environment Agency and Natural England, along with key stakeholders at stakeholder meetings. . Feedback from this engagement, along with the findings of the screening assessment, resulted in several options being excluded from the feasible options list due to the potential for unacceptable adverse effects on the environment and/or on society.

4.3.2 Assessment of feasible options

The appraisal framework set out in Table 6 (below) has been used to assess each of the potential WRMP19 feasible options against the SEA objectives. The outcomes of the assessment were used to inform the development of the WRMP19, primarily the selection and phasing of options for inclusion in the strategies for each of Southern Water's operational areas. .

The first and second columns set out the SEA topics and objectives. The third column provides commentary and evaluation of the impact of each alternative measure on the objectives for

each topic, with reference to the key questions set out above in Table 5. The assessment assumes the implementation of standard industry best practice methods in implementing the options as well as any defined mitigation measures (which are set out in the commentary) such that the significance of effects relates to the residual effects after the application of any mitigation measures in line with the ODPM Practical Guide and UKWIR SEA national guidance.

Mitigation measures that are assumed to be standard best practice and available within the option costings are summarised below (they may not be re-emphasised in the assessment commentary if not considered appropriate):

- Invasive species on site are to be identified and removed in advance of construction
- HGV routing, cap on movements, appropriate working hours
- Screening around the perimeter of works at the start of construction (creation of landscaping/planting for large scale construction)
- Footpath diversions established regarding construction work including pipelines
- Resources for construction of the scheme would be sourced locally where possible;
- Minimising removal of spoil from construction sites
- Runoff from the construction sites would be attenuated and the quality managed according to best construction practices
- Appropriate pipeline laying techniques regarding river crossings
- Flood risk management during construction (temporary flood defence and siting of spoil and contaminants away from areas at risk of flooding)
- Siting of temporary and permanent works to minimise impacts on setting of heritage and landscape features
- Archaeological watching briefs during excavation
- Noise abatement barriers where required
- Dust control measures: dampening dust emissions from groundworks and vehicle washing

The eighth column identifies the magnitude of the effect assessed against a scale of negligible to high. The effect magnitude includes consideration of the scale of the impact, likelihood, duration and permanence (fourth, fifth, sixth and seventh columns of Table 6) in compliance with criteria for determining the likely significance of effects specified in the SEA Directive Article 3(5) and Annex II, and the SEA Regulations Part 2, Regulation 9(2a) and Schedule 1. The value and sensitivity of the receptor(s) is identified in the ninth column on a scale of negligible to high. The scale of the effect, which might relate to either geographical scale or the size of the population affected, is identified in the sixth column on a scale of negligible to large. With respect to duration, short-term effects are defined as those that last for up to six months, medium term effects are those that extend beyond six months to two years whilst long term effects are assessed as those that continue for greater than two years.

The residual adverse and beneficial effects (after application of best practice approaches and any appropriate and explicitly defined mitigation measures) are identified in the tenth and eleventh columns respectively. These are identified separately so as to avoid mixing adverse and beneficial effects, in line with SEA best practice, so that these are clearly understood and the transparency of the effects is maintained throughout the WRMP decision-making process.

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

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

Table 6 SEA appraisal framework completed for each potential WRMP option

Column 1	2	3	4	5	6	7	8	9	10	11
Topic	SEA objective	Potential residual effect on sensitive receptors (assuming good practice construction methods)	Scale of effect: (Small/ Medium/ Large)	Certainty of effect (Low/ Medium/ High)	Duration of effect (Short/ Medium /Long term)	Permanence of effect (Permanent/ Temporary)	Magnitude of effect (Low/ Medium/ High)	Value/ sensitivity of receptor (Low/ Medium/ High)	Residual adverse effect	Residual beneficial effect
Biodiversity, fauna and flora	1.1 To conserve and enhance biodiversity, including designated sites of nature conservation interest and protected habitats and species and to enhance natural capital.									
	1.2 To avoid introducing or spreading INNS.									
Population and human health	2.1 To protect and enhance health and well-being (including raising awareness of the importance and value of the water environment for health and well-being).									
	2.2 To protect and enhance the water environment for other users including sustainable recreation, tourism and navigation, as well as terrestrial recreational resources									
	2.3 To promote a sustainable economy with good access to essential services, including a resilient, high quality and affordable supply of water.									

Column 1	2	3	4	5	6	7	8	9	10	11
Topic	SEA objective	Potential residual effect on sensitive receptors (assuming good practice construction methods)	Scale of effect: (Small/ Medium/ Large)	Certainty of effect (Low/ Medium/ High)	Duration of effect (Short/ Medium /Long term)	Permanence of effect (Permanent/ Temporary)	Magnitude of effect (Low/ Medium/ High)	Value/ sensitivity of receptor (Low/ Medium/ High)	Residual adverse effect	Residual beneficial effect
Material assets and resource use	3.1 To reduce, and make more efficient, the domestic, industrial and commercial consumption of resources, minimise the generation of waste, encourage its re-use and eliminate waste sent to landfill.									
	3.2 To promote and secure the efficient and sustainable use of water to ensure resilient water supplies for people and businesses.									
Water	4.1 To avoid adverse impact on surface and groundwater levels and flows, including when this impacts on habitats.									
	4.2 To protect and enhance surface and groundwater quality and protect and enhance estuarine waterbodies.									
	4.3 To ensure appropriate and sustainable management of water whilst protecting ecosystem functions and									

Column 1	2	3	4	5	6	7	8	9	10	11
Topic	SEA objective	Potential residual effect on sensitive receptors (assuming good practice construction methods)	Scale of effect: (Small/ Medium/ Large)	Certainty of effect (Low/ Medium/ High)	Duration of effect (Short/ Medium /Long term)	Permanence of effect (Permanent/ Temporary)	Magnitude of effect (Low/ Medium/ High)	Value/ sensitivity of receptor (Low/ Medium/ High)	Residual adverse effect	Residual beneficial effect
	services that rely on water resources									
	4.4 To reduce or manage flood risk.									
Soil, geology and land use	5.1 To protect and enhance geology, geomorphology and the quality and quantity of soils									
Air and Climate	6.1 To reduce air pollutant emissions.									
	6.2 To reduce energy consumption and greenhouse gas emissions.									
	6.3 To adapt and improve resilience to the threats of climate change.									
Archaeology and cultural heritage	7.1 To conserve and enhance the historic environment, heritage assets and their settings and protect archaeologically important sites.									
Landscape and visual amenity	8.1 To protect, enhance the quality of and improve access to designated and undesignated landscapes, townscapes and the countryside.									

The SEA appraisal framework was used to capture the assessment for each option (one table completed per option), alternative strategies and the WRMP19 as a whole.

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

The assessment of the options, alternative WRZ strategies and the overall WRMP19 has been carried out using the effects assessment matrix shown in Table 6 taking account of the scale, duration and permanence of the effect. The definitions for the effect significance are explained beneath Figure 6. The colour coding shown in Figure 6 have been used to complete the columns for residual effects in the SEA appraisal framework.

The effects assessment takes account of any standard mitigation measures and other option-specific mitigation measures incorporated into the option conceptual design and costs, i.e. it is the **residual effects after the application of mitigation that has been assessed**.

For each SEA objective, a residual effects assessment was determined against a significance of effects matrix (Figure 6) which takes into account the value/sensitivity of the receptor (e.g. species, air quality, river water quality, landscape value, heritage feature) and the magnitude of the assessed effect. This significance matrix comprises effects on a scale ranging from ‘major beneficial’ to ‘major adverse’. For the box signifying low magnitude and high receptor value/sensitivity, this could result in a greater than ‘moderate’ effects being assigned dependent on the sensitivity/value of the receptor. This colour coding was used to complete the columns for residual effects in the appraisal framework.

The resulting significance of effects was used to help us select the options for inclusion in the operational area strategies and this plan as a whole, as well as the subsequent timing and phasing of the selected options. Where major adverse effects are predicted, measures envisaged to prevent, reduce (and as far as possible, offset) these effects on the environment (as a result of implementing the measure) are outlined where relevant/appropriate.

Figure 6 Significance of effect matrix

Significance of Effect		Value/sensitivity of receptor		
		High	Medium	Low
Effect magnitude (includes scale of effect)	High	Major Beneficial / Major Adverse	Major Beneficial / Major Adverse	Moderate Beneficial / Moderate Adverse
	Medium	Major Beneficial / Major Adverse	Moderate Beneficial / Moderate Adverse	Minor Beneficial / Minor Adverse
	Low	Significance of effect dependent on value/sensitivity of receptor and magnitude	Minor Beneficial / Minor Adverse	Negligible

 = Significance of effect dependent on value/sensitivity of receptor and magnitude

4.3.3 General Significance Definitions

Major - effects represent key factors in the decision-making process. They are generally associated with sites and features of international, national or regional importance. If adverse, such resources/features are generally those which cannot be replaced or relocated.

Moderate - effects are likely to be important considerations at a regional or district scale. If adverse, they are likely to be of potential concern.

Minor - effects are not likely to be decision-making issues. Nevertheless, the cumulative effect of such issues may lead to an increase in the overall effects on a particular area or on a particular resource.

Negligible - effects which are not perceptible, being within normal bounds of variation or the margin of forecasting error.

For the **'high' effect magnitude** (top row), a major effect significance is assigned for both high and medium value receptors to reflect the magnitude of the effect.

For the **'low' effect magnitude and 'high' value receptor** (bottom left box), the significance of effect could be minor, moderate or major dependent on the precise nature of the impact or benefit.

All options (both supply-side options and demand management options) have been assessed at a level of detail consistent with the strategic nature of SEA and the WRMP19.

4.3.4 Summarising the effects assessment

The completed appraisal framework tables for each option are presented in Appendix D. The completed appraisal framework table for each option is also accompanied by a summary comprising an overview of the adverse and beneficial effects (presented in ascending order of effect significance) as presented in Table 7. In assessing each alternative option, the effects (beneficial or adverse) of any interactions between SEA topics are also identified, assessed and reported.

A summary visual evaluation matrix (see example in

Table 8) has been completed for each option. The summary of the assessment is presented in the 'Assessment of WRMP feasible options' and 'Assessment of the WRMP19 strategies' sections.

Table 7 Example SEA appraisal framework summary

[Water Resources Management Plan Option details]																					
Summary commentary of scheme adverse effects	[Summary]																				
SEA objectives adverse effects summary	<table border="1"> <tr> <td>1.1</td><td>4.4</td><td>4.5</td><td>1.2</td><td>4.2</td><td>6.1</td><td>7.3</td><td>8.1</td><td>2.3</td><td>3.1</td><td>4.3</td><td>1.3</td><td>2.1</td><td>2.2</td><td>3.2</td><td>4.1</td><td>5.1</td><td>6.2</td><td>7.1</td><td>7.2</td> </tr> </table>	1.1	4.4	4.5	1.2	4.2	6.1	7.3	8.1	2.3	3.1	4.3	1.3	2.1	2.2	3.2	4.1	5.1	6.2	7.1	7.2
1.1	4.4	4.5	1.2	4.2	6.1	7.3	8.1	2.3	3.1	4.3	1.3	2.1	2.2	3.2	4.1	5.1	6.2	7.1	7.2		
Summary commentary of scheme beneficial effects	[Summary]																				
SEA objectives beneficial effects summary	<table border="1"> <tr> <td>2.3</td><td>3.1</td><td>4.3</td><td>4.5</td><td>5.1</td><td>7.1</td><td>1.1</td><td>1.2</td><td>4.4</td><td>2.2</td><td>3.2</td><td>6.1</td><td>1.3</td><td>2.1</td><td>4.1</td><td>4.2</td><td>6.2</td><td>7.2</td><td>7.3</td><td>8.1</td> </tr> </table>	2.3	3.1	4.3	4.5	5.1	7.1	1.1	1.2	4.4	2.2	3.2	6.1	1.3	2.1	4.1	4.2	6.2	7.2	7.3	8.1
2.3	3.1	4.3	4.5	5.1	7.1	1.1	1.2	4.4	2.2	3.2	6.1	1.3	2.1	4.1	4.2	6.2	7.2	7.3	8.1		

Table 8 Example of a visual evaluation matrix

Water Resources Management Plan option	SEA objective – adverse effects									SEA objective – beneficial effects								
	Objective 1.1	Objective 1.2	Objective 1.3	Objective 2.1	Objective 2.2	Objective 2.3	Objective 3.1	Objective 3.2	Objective 4.1	Objective 1.1	Objective 1.2	Objective 1.3	Objective 2.1	Objective 2.2	Objective 2.3	Objective 3.1	Objective 3.2	Objective 4.1
[Option 1]	Negligible	Major adverse	Negligible	Minor adverse	Minor adverse	Negligible	Major adverse	Major adverse	Major adverse	Negligible	Moderate beneficial	Negligible	Moderate beneficial	Negligible	Moderate beneficial	Moderate beneficial	Moderate beneficial	Moderate beneficial
[Option 2]	Moderate adverse	Negligible	Minor adverse	Major adverse	Minor adverse	Minor adverse	Moderate adverse	Major adverse	Major adverse	Moderate beneficial	Negligible	Moderate beneficial	Negligible	Moderate beneficial	Moderate beneficial	Negligible	Moderate beneficial	Moderate beneficial

Key:

- Major adverse
- Moderate adverse
- Minor adverse
- Negligible beneficial or adverse
- Minor beneficial
- Moderate beneficial
- Major beneficial

4.3.5 Secondary, cumulative and synergistic environmental effects

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

A cumulative effects assessment has been carried out in order to identify if different options are mutually exclusive or whether combinations of options might lead to greater adverse impacts (or beneficial effects). This involved examining the likely significant effects of each of the WRMP19 options individually, in combination with each other (both inter- and intra- WRZ), and in combination with the implementation of other plans and programmes. A matrix has been used to help consider interactions between the options. In assessing these effects, consideration has been given to other factors which may affect the receiving environment during implementation of the options.

The following cumulative assessments have been undertaken (see ‘Cumulative effects assessment’ section for the assessment findings):

- An assessment of cumulative effects of options that could potentially be implemented at the same time. Mutually exclusive options (e.g. those that draw upon the same resource or use the same site)
- Assessment of cumulative effects of our WRMP19 with our Drought Plan, other water company Drought Plans and WRMPs, Environment Agency Drought Plans and other relevant water management plans. The potential for a neighbouring company implementing options under its WRMP simultaneously has been considered
- Assessment of potential cumulative effects of our WRMP19 with any other identified relevant programmes, plans and strategic projects that may be in place / implemented during the period of the WRMP. This includes, for example, River Basin Management Plans and the National Infrastructure Delivery Plan

A wide range of reasonable alternative options are being considered for the WRMP19 through the SEA. Section 5 and section 7 further below describe how the SEA has been used to inform the WRMP19 Strategies.

4.4 Limitations of the assessment

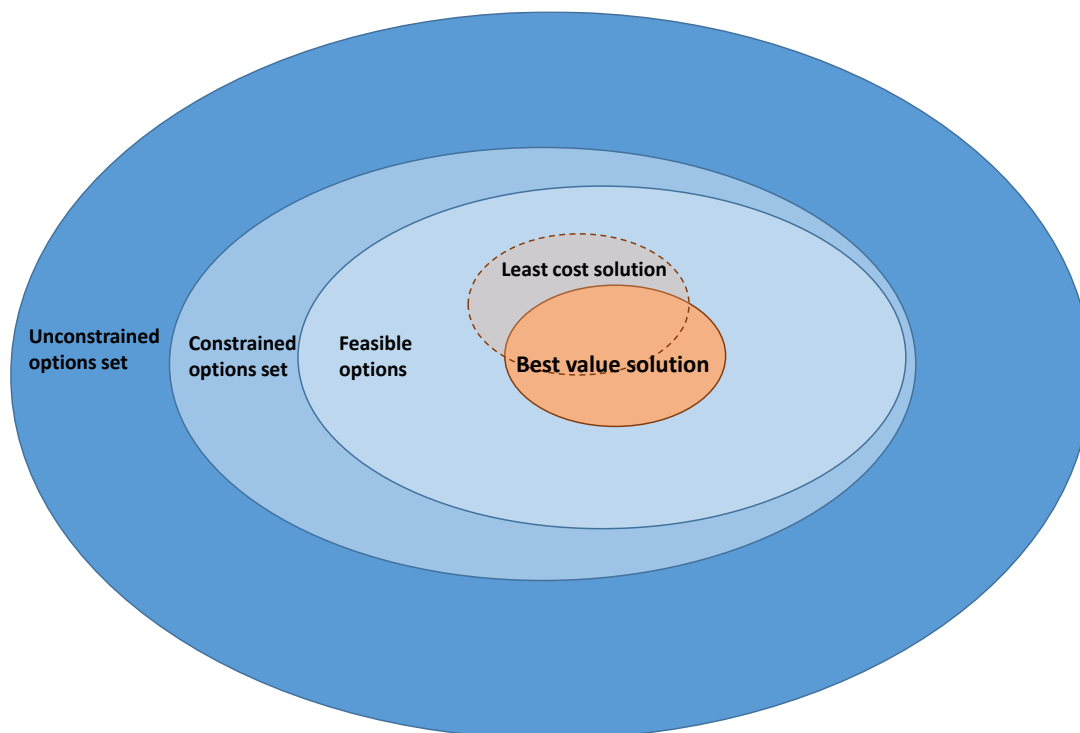
SEA is a planning level assessment aimed at highlighting potential environmental concerns at a strategic level. Where particular limitations or outstanding issues are known, these are described in the SEA appraisal tables for the relevant water resources management option concerned. Further detailed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

5. Environmental screening of WRMP options

5.1 Overview

Options appraisal is an overarching term for the specification and assessment of options under consideration for the WRMP19. The UKWIR guidance on integrating SEA into WRMPs and the WRPG provide clear directions as to how SEA outputs should be used in options and programme appraisal. We have considered SEA (and HRA and WFD) principles throughout the development of its plan in moving from the initial 'unconstrained' list of options to development of its feasible list of options - through this process, options which were found to have unacceptable adverse effects have been rejected from the options 'pool' and did not reach the constrained list of options subject to SEA and from which options were selected to form alternative programmes for consideration through SEA and modelling. This section describes the methodology and the results of this process. Figure 7 summarises the overall approach to the evolution of the WRMP from initial 'unconstrained' list of options through to the strategy for each operational area.

Figure 7 WRMP19 options and programme appraisal to determine the WRMP strategy for each WRZ



The unconstrained list of options is a high-level list including generic option types as well as taking account of government policy and aspirations. It is populated with previous options and studies from past WRMPs as well as new option ideas. We consulted with the Environment Agency and Natural England to discuss the draft unconstrained list.

5.1.1 Moving from the unconstrained option set to the constrained option set

As described in the 'SEA screening of unconstrained options and constrained options' section, high level screening assessment was carried out of the options in the 'unconstrained' list, which included consideration of several key environmental and social, criteria (e.g. HRA and WFD compliance risks; key risks to the water environment; key risks to important landscape,

recreation and heritage features). This identified options with unacceptable adverse environmental effects which were rejected from the unconstrained list and not taken further in the option appraisal process. For example, the raising of the dam by greater than 1m at Bewl Water reservoir was found to have the potential for major adverse effects on biodiversity and landscape and was rejected from the option set. Options that were not rejected were developed further and more detailed option information gathered to generate the constrained options set.

5.1.2 Moving from the constrained option set to the feasible list

More detailed environmental and social assessment was applied to the screening of the 'constrained' list of options as explained in the 'SEA screening of unconstrained options and constrained options' section. HRA and WFD risks were assessed on a scale from negligible to high; potential effects were assessed against the SEA topics on a scale ranging from major beneficial to major adverse. The intent of the screening was to reject options that perform poorly on environmental grounds. The assessment criteria contributed evidence as to why any options have been screened as per the WRMP guidance "...it should not include options with unalterable constraints that make them unsuitable for promotion (e.g. unacceptable environmental impacts that cannot be overcome)". The assessed performance of each scheme is reviewed against a red / amber / green classification system to help summarise the likely effects:

- Red – significant issue or constraint that may be very challenging to overcome
- Amber – issue or constraint, but potential for feasible mitigation measures to reduce impacts to an acceptable level
- Green – no constraint posed with no additional specific mitigation required beyond 'standard' best practice mitigation activities

The high-level SEA, WFD and HRA screening results summary is shown in Table 9 below.

Table 9 Summary of high level SEA, WFD and HRA screening of the constrained list

Option Area	Proportion of options with at least one criteria classified red	Proportion of options with criteria classified as amber but none red	Proportion of options with criteria classified as green only (%)
Western	37%	53%	10%
Central	29%	32%	39%
Eastern	16%	50%	34%
Demand management options (by type)	0	0	100%

In the Western area, the environmental screening results showed that almost two-thirds of the schemes were rated green and amber or just green. Significant issues were highlighted for:

- Several transfer schemes that related to landscape and WFD and/or HRA compliance risks
- Two desalination schemes, both with issues relating to biodiversity and one with issues also regarding landscape and archaeology and cultural heritage
- Two water reuse schemes, both with WFD and HRA risks

The screening concluded that the scale of risk relating to these issues did not necessarily represent unalterable constraints (but would present significant challenges) and therefore they were retained for inclusion in the feasible list but the environmental risks were flagged in the programme appraisal process and subsequent decision-making process.

In the Central area, the environmental screening results showed that most of the schemes were overall rated green and amber. Significant issues were highlighted for two reservoir options due to potential effects on biodiversity, landscape and the water environment. Two water reuse schemes were also classified as ‘amber’ with respect to potential effects on landscape and visual amenity due to development within a National Park. These issues were considered possible to overcome (but would present significant challenges) through design modifications and mitigation for all but one of these options (Pulborough reservoir) following further review following publication of the draft WRMP19 and SEA. The Pulborough reservoir option was removed from the feasible options list due to major planning constraints in the South Downs National Park and the need to demonstrate that there are no reasonable alternative options. The other options were retained for inclusion in the feasible list but the environmental risks were flagged in the programme appraisal process and subsequent decision-making process.

In the Eastern area, the SEA/ WFD/ HRA screening results showed that most of the schemes were overall rated green and amber. Significant issues were highlighted for a water re-use scheme (Bexhill and Hastings WwTW effluent to augment storage in Darwell reservoir) due to potential effects on landscape and visual amenity. Two desalination schemes (Camber desalination near Rye Bay and desalination on the Thanet coast) were flagged as presenting some environmental risks due to potential risks regarding HRA and potential effects on archaeology and cultural heritage (desalination in Thanet only). These issues were considered possible to overcome (but would present some challenges) and therefore the options were not excluded from the feasible list but the environmental risks were flagged in the programme appraisal process and subsequent decision-making process.

Screening of proposed drought management options drew on the information provided in the SEA, HRA and WFD assessments of Southern Water’s Drought Plan 2019. No long-term major adverse effects were identified in these assessments and so no drought management measures were excluded, but the scale of temporary environmental effects were particularly noted for the programme appraisal process and subsequent decision-making process.

The feasible options identified through the screening process (involving wider selection criteria beyond the environmental criteria describe above) were taken forward into the programme appraisal process. All the feasible options were then fully assessed against the SEA objectives as described in the section 6.

6. Assessment of WRMP feasible options

6.1 Assessment of feasible options against SEA objectives

Assessment of the WRMP19 feasible options has been carried out in accordance with the methodology described in the 'Methodology' section. Appraisal framework assessment tables have been completed for each option on the feasible list and are presented in full in Appendix D. The findings of the WFD assessments and the HRA have also been incorporated into the SEA assessment. Due to the very large number of options, analysis on the range of effects for each option category across the three operating areas has been undertaken and synthesised to help convey a summary of the assessment results in this section in an informative way (with the detail provided in Appendix D). Each option category has been summarised according to the below (which is based on the colour coding for effects significance in the individual appraisal framework tables as described earlier in the 'Methodology' section).

Legend:

Colour	Significance of Effect
Dark Green	Major beneficial effects likely
Mid Green	Multiple moderate beneficial effects
Light Green	Predominantly minor or negligible beneficial effects
Blue	Predominantly negligible adverse effects
Yellow	Predominantly minor or negligible adverse effects
Orange	Multiple moderate adverse effects
Red	Major adverse effects likely

Figure 8, Figure 9 and Figure 10 present the summary results across the Western, Central and Eastern operational areas respectively. The summaries characterise the effects identified that are common to each option type, summarise the most significant effects and provide specific examples.

Figure 8 Summary of effects for each option category in the Western area

Option Categories	Overall Adverse Effects	Overall Beneficial Effects
Demand Management	Predominantly minor or negligible effects	Predominantly negligible effects
Catchment Management	Major adverse effects likely	Predominantly minor or negligible effects
Asset Enhancement	Major adverse effects likely	Predominantly minor or negligible effects
Bulk Supply	Predominantly minor or negligible effects	Predominantly minor or negligible effects
Desalination	Multiple moderate adverse effects	Multiple moderate beneficial effects
Groundwater Abstraction	Multiple moderate adverse effects	Predominantly minor or negligible effects
Industrial Water Reuse	Major adverse effects likely	Multiple moderate beneficial effects
Enabling transfers (Inter-Zonal)	Multiple moderate adverse effects	Predominantly minor or negligible effects
Indirect Potable Water Reuse	Major adverse effects likely	Major beneficial effects likely
Water Treatment Works Enhancement	Multiple moderate adverse effects	Predominantly minor or negligible beneficial effects

Figure 9 Summary of effects for each option category in the Central area

Option Categories	Overall Adverse Effects	Overall Beneficial Effects
Demand Management	Predominantly minor or negligible adverse effects	Predominantly negligible effects
Catchment Management	Predominantly negligible adverse effects	Predominantly minor or negligible effects
Asset Enhancement	Predominantly minor or negligible adverse effects	Predominantly negligible effects
Aquifer Storage and Recovery	Predominantly minor or negligible adverse effects	Multiple moderate beneficial effects
Borehole Rehabilitation	Predominantly minor or negligible adverse effects	Predominantly negligible effects
Desalination	Multiple moderate adverse effects	Major beneficial effects likely
Enabling transfers (Inter-Zonal)	Predominantly minor or negligible adverse effects	Multiple moderate beneficial effects
Indirect Potable Water Reuse	Major adverse effects likely	Major beneficial effects likely
Reservoirs	Major adverse effects likely	Multiple moderate beneficial effects

Figure 10 Summary of effects for each option category in the Eastern area

Option Categories	Overall Adverse Effects	Overall Beneficial Effects
Demand Management	Predominantly negligible effects	Predominantly negligible effects
Catchment Management	Multiple moderate adverse effects	Predominantly minor or negligible effects
Borehole Rehabilitation	Major adverse effects likely	Predominantly minor or negligible effects
Bulk Supplies	Predominantly negligible effects	Predominantly negligible effects
Desalination	Predominantly minor or negligible effects	Predominantly minor or negligible effects
Groundwater Abstraction	Predominantly minor or negligible effects	Predominantly minor or negligible effects
Enabling transfers (Inter-Zonal)	Major adverse effects likely	Multiple moderate beneficial effects
Licence Trading	Major adverse effects likely	Multiple moderate adverse effects
Indirect Potable Water Reuse	Predominantly minor or negligible effects	Predominantly minor or negligible effects
Reservoirs	Major adverse effects likely	Multiple moderate beneficial effects
Surface Water Abstraction	Major adverse effects likely	Multiple moderate beneficial effects
Water Treatment Works Enhancement	Multiple moderate adverse effects	Predominantly minor or negligible beneficial effects

6.2 Demand management option assessment findings

The demand management options comprise leakage reduction activities (through increased detection and repair activities, pressure management and mains renewal/replacement), metering and water tariffs, and measures to encourage and promote water efficiency. Overall, demand management options serve to reduce pressure on water resources by reducing customer demand for water and thereby helping to reduce the volumes of water abstracted from the water environment. This, in turn, also contributes to reducing the amount of energy needed for water abstraction, treatment and distribution. The majority of schemes include limited and temporary effects associated with vehicle movements during their commissioning phases. Some options may also cause temporary disruption as a result of street works and associated nuisance, for example as a result of meter installations or leak repair activities.

6.3 Supply option assessment findings

6.3.1 Bulk supply and licence trading

Bulk supply and licence trading options range from those that involve minimal construction to those that require significant lengths of pipeline construction connecting different water supply areas. As a result, there is the potential for a range of adverse construction effects. The source of water for the bulk transfers is assessed by the donor water company provided within its SEA and other related environmental assessments: where these identify potential adverse effects, mitigation measures would need to be considered as necessary by the donor company, including in respect of WFD requirements.

The additional import options from Portsmouth Water (for supply to Western area) involves an initial additional 9Ml/d bulk import to the HSE WRZ distribution network using spare capacity of an existing treated water main. The scheme would only require the upgrade of a pumping station, therefore there are very few identified adverse effects. Conversely, a further 20Ml/d bulk import from Portsmouth Water will require the development of a new raw water reservoir by Portsmouth Water and provision of new water conveyance infrastructure.

The South West Water (Bournemouth Water) bulk supply option (for supply to Western area) involves the construction of a new treated water pipeline to the HSW WRZ water distribution network. The proposed pipeline route has been re-routed since the draft WRMP19 to avoid the New Forest National Park and New Forest Special Area of Conservation (SAC) in light of the effects identified in the draft WRMP SEA Report to reduce the magnitude of potential adverse environmental and social effects. Additional mitigation measures have also been considered since the draft plan to address potential adverse effects which are identified as mainly temporary in nature as set out in section 6 and Appendix D.

In addition to the beneficial effects associated with the additional reliable water supply provided by water transfers, these options also bring benefits by enabling the transfer of water between areas of relative surplus water availability to areas of 'water stress'. They also improve flexibility in the water supply network and therefore contribute to a more resilient, sustainable water resource system which helps to address potential future effects of climate change.

6.3.2 Catchment management

Catchment management options (and river restoration options) involve measures to enhance water source resilience and/or augment water source availability, for example by addressing diffuse pollution risks to water sources such as from pesticides and nitrates arising from agricultural activity on water source catchment land. Predominantly negligible adverse effects

are anticipated from these schemes along with generally negligible to minor beneficial effects for land management improvements, introduction or enhancement of natural habitat and reduced application of fertiliser or pesticides. The larger scale schemes will likely lead to moderate beneficial effects as they will affect larger areas of catchment land or provide improved resilience of river systems to abstraction during low flow conditions.

6.3.3 Desalination

Desalination scheme options involve the treatment of brackish estuarine water or sea water to provide potable drinking water supplies. Desalination uses relatively more non-renewable materials and energy than more 'traditional' water sources, and generates more waste by-products from the intensive treatment processes. Consequently, all the desalination options assessed have some significant adverse effects in common relating to the considerable use of non-renewable materials and generation of waste streams within the treatment process (SEA topic: material assets and resource use) and associated carbon emissions (SEA topic: air and climate). There are also several beneficial effects that are common to all desalination options which relate to the fact that they provide a reliable source of water, the availability of which is less influenced by drought risks associated with climate change (although not entirely for estuarine options as reduced freshwater flows to the estuaries may lead to increased salinity levels which may impact on the treatment processes and/or efficiency). Desalination schemes can therefore add resilience to the effects of climate change and also reduce the pressure on surface and groundwater sources during times of water stress/drought conditions.

The performance of the desalination options against the SEA objectives can differ depending on the specific setting and local environmental features that may be adversely affected during construction, the characteristics of the water body from which abstraction is made and the brine waste disposal arrangements during operation. For example, the development of a desalination plant that abstracts from and discharges to Southampton Water would bring a potential risk of deterioration in WFD status as a consequence of the relatively low natural dispersion and flushing characteristics of the estuary (salinity modelling suggests the residence times for hypersaline waters in Southampton Water may be greater than in a more exposed, coastal water body). In addition, there is potential risk of adverse effects to water quality and the aquatic ecology in Southampton Water due to the discharge of brine waste (SEA topics: water and biodiversity, flora and fauna). The assessment of other desalination options with brine discharges made to more exposed coastal water bodies (higher dispersion characteristics) conversely concluded less significant adverse effects with respect to these operational aspects (for example, the Shoreham desalination scheme).

A 2017² paper on desalination (referenced by Natural England in its response to the draft WRMP19 consultation) listed the environmental considerations (in addition to impacts on energy use, carbon and air quality) that should be made of desalination proposals as:

- Habitat alteration and changes in sediment transport
- Entrainment and impingement of marine biota
- Debris pollution (from intake screening)
- Biological effects of residual chemical additives (e.g. chlorine, pH modifiers) and their by-products
- Brine discharges (outfall) and impact on marine habitat: salinity, pH, dissolved oxygen, CO₂, nitrogen, temperature, density, residual chemicals (iron-hydroxide, metals, polymers, anti-scalants, biocides, anti-foamants, acids, coagulants, cleaning

² Lior N (2017) Sustainability as the quantitative norm for water desalination impacts. Desalination Volume 401, 2 January 2017, Pages 99-111

chemicals, coliform and other organics, TOC, floatables and suspended solids, turbidity) and particulate matter in the concentrate (biological and aesthetic impacts)

- Intake/outfall velocity and buoyancy effects, incl. those on natural currents and waves, volumetric flow rates
- Sea level changes, colouration
- Product water recovery ratio
- Protection of wildlife and biological diversity, rare and endangered species, sensitive habitats

Whilst at the strategic planning level it is not feasible to carry out an in-depth assessment of all of these potential risks, we have nevertheless considered the potential for such risks to arise in carrying out the SEA (and HRA and WFD assessments, as applicable). Where possible we have addressed these risks through review of the scheme design and consideration of mitigation measures, as well as setting out the further site-specific investigations that will need to address the above issues where they are applicable to the site-specific setting.

6.3.4 Groundwater sources and aquifer storage recovery

Recommissioning of groundwater sources involves direct abstractions from groundwater for subsequent treatment. Aquifer Storage and Recovery (ASR) options involve the artificial recharge of underground aquifers using surplus water resources during periods of low demand for storage and subsequent re-abstraction during periods of dry weather and/or high demand: this provides increased resilience to potential climate change risks. Where groundwater operate with abstraction from 'confined' aquifers and sustainable sources, negligible effects on the water environment have been identified. However, in some cases, it has been identified that some options may influence local groundwater levels and connected surface waterbodies with potential risk to some water-dependent habitats. Potential effects on water levels and/or surface water flows could affect other receptors reliant on certain thresholds of water level or flow. Groundwater abstraction related options often have relatively small scale surface infrastructure and have relatively limited potential for other types of adverse effects, apart from those associated with materials use and energy linked to the abstraction and treatment of water.

6.3.5 Water reuse

Indirect water reuse options and direct industrial water reuse options have been included in the feasible list. Water reuse is the process of actively managing returns of highly treated wastewater effluent. There is the potential for major beneficial effects associated with significant increases in reliable water supply. All of the indirect potable water reuse schemes have a high energy demand for treating the effluent to a high standard before discharge to the environment and then pumping the water back out downstream for treatment for water supply to customers. As the water source for these schemes (dry weather effluent from wastewater treatment works) is not vulnerable to drought, they are considered to be resilient to climate change effects. Due to the spatial distance between the water source and augmentation point for indirect reuse options, large scale pipeline construction requirements often required with associated potential adverse effects to nearby sensitive receptors. In operation, the indirect reuse options can result in significant variations in flow to the waterbody receiving the discharges which can have adverse effects on aquatic ecology, but water quality effects are mostly assessed as negligible to minor as the water will need to be treated to a high standard to meet WFD requirements (although changes in river temperature regime due to the discharge of effluent at a different temperature may be less easy to mitigate).

6.3.6 Managing existing assets

Maximising use of existing assets describes a number of options types: asset enhancements; enabling transfers between water resource zones; abstraction licence variations; and water supply works (WSW) improvements. These options vary considerably according to the scale of the scheme and the infrastructure required. However, in operation many of these options would improve the flexibility and resilience of the supply network, contribute to sustainable resource management and provide beneficial effects in respect of the risks of climate change impacts. Abstraction licence variations and WSW improvements (such as increasing the turbidity treatment capability) generally show limited potential for adverse effects as most construction would take place within our existing sites. Enabling transfers between zones has the potential for significant adverse effects where long pipeline construction requirements interact with sensitive features. For example, the transfer pipelines for the Hampshire Water Grid options were identified as having the potential for adverse effects to designated sites for nature conservation, heritage assets and landscape designations. Further modifications to the pipeline routes have been made since these effects were identified in the draft WRMP19 SEA to try and reduce the magnitude of potential effects alongside mitigation measures.

6.3.7 Reservoirs

Reservoir options range from adapting existing reservoirs or open water storage facilities (e.g. raising Bewl Water reservoir by 0.4m and converting an existing amenity lake to a water supply storage facility) to the construction of new pumped refill storage reservoirs (e.g. River Adur offline reservoir). The reservoirs could provide significant water storage and supply with low risks to the water environment in operation. They provide benefits regarding resilience to the effects of climate change by storing water when river flows are high for use during periods of dry weather when groundwater and river sources may not be available or provide a reduced supply of water. However, as the size of the reservoir expansion or development increases, the potential for significant adverse effects relating to construction increases along with risks of the potential for permanent adverse effects on landscape, local communities and heritage features. In particular, new reservoir options are assessed as having the potential for major adverse effects relating to significant material assets and resource use, adverse effects to designated sites during construction, flood risk, carbon emissions and landscape and visual amenity.

6.3.8 Surface water abstraction

Surface water abstraction options are limited in number as the vast majority of available surface water resources are already utilised by Southern Water. Subject to careful design and only abstracting water at times of high river flows, these new options can provide additional supplies but there is a residual risk of adverse effects on the overall river flow regime and associated effects on aquatic habitat. The two options in the feasible list also have the potential for significant adverse effects due to construction activities.

6.4 Existing assets assessment findings

As part of the SEA process, a review of Southern Water's existing water sources was also undertaken to identify any sources that pose significant environmental risks and which may need to be considered for reduced operation, or even no operation in the future with new alternative source options developed to replace them. A WFD screening exercise was also carried out to determine the risk of WFD status deterioration associated with the continued operation of each source and the findings were used to inform the SEA screening of existing sources. Where the SEA screening identified a medium to high level of adverse environmental risk (25 existing sources in total), these sources were taken forward for further appraisal against SEA topics. The SEA (and WFD assessment) of these sources indicated that some

may not be as sustainable as some of the alternative new options in the feasible list. In general, these sources were the same as those identified in the WRMP planning process as potentially requiring reduction in abstraction in the future (known as ‘sustainability’ reductions). Further assessments were only considered for those sources not already identified for sustainability reductions and/or environmental investigations over the coming years.

6.5 Drought Orders and Permits

As well as assessing the environmental effects of existing water sources, the development of this plan’ strategies included consideration of the environmental effects of the Drought Order and Drought Permit options contained in Southern Water’s Drought Plan 2019 using the findings from the updated SEA (and HRA and WFD assessments) of the Drought Plan. In this way, we are able to weigh up the relative environmental effects of developing new water sources to provide water supply resilience in drought conditions compared to reliance on applications for Drought Orders or Permits to temporarily vary the constraints set out in existing water abstraction licences (for example, reducing the river flow below which abstraction must cease). This information was actively used to help support decisions on the role of Drought Orders and Permits in the WRMP19 strategies for each operational area. The decisions reached for the WRMP19 are set out in section 7-9 of this report.

7. Role of the SEA in developing the WRMP19

7.1 Role of SEA in programme appraisal and WRMP19 decision-making

The updated SEA, along with the findings of the updated HRA and WFD assessments, have been used to help inform the development of the WRMP19. The overall process followed has been summarised earlier in Figure 5.

The findings of the SEA feasible option assessments were initially used (alongside the HRA and WFD assessments) to evaluate the environmental and social performance of a range of alternative strategies for maintaining a supply-demand balance in each operating area, with each alternative strategy comprising a different mix of options and option types.

For each alternative strategy, the likely scale of adverse and beneficial environmental and social effects for each option was considered, both on its own but also in combination with the other options included in that strategy. The potential effects in combination with any other relevant projects, plans or programmes (for example, any planned major infrastructure schemes that may be constructed and/or operated at the same time and affecting the same environment and/or communities) was also assessed. This appraisal of each alternative strategy also included consideration of the potential for any regulatory compliance risks associated with the Habitats Regulations and WFD, as well as other statutory obligations (including effects on SSSIs, National Parks, AONBs, heritage features and Marine Conservation Zones).

We used the environmental and social performance of each alternative strategy to help make decisions on which strategies to explore further through additional appraisal modelling and analysis, including SEA, HRA and WFD assessment. A series of programme appraisal workshops were held to review the alternative programmes and consider their environmental performance alongside other key decision-making criteria. These workshops were attended by environmental assessment specialists, planners, engineers, operational strategy managers, asset managers and water resource planners to ensure a wide cross-section of views were considered.

These further assessments, together with the consultation responses to the draft WRMP19, helped us to determine the appropriate strategies for each operational area for inclusion in the WRMP19. Several modifications to potential strategies were made as part of this review process to remove options where environmental and social effects were considered to be higher or unacceptable relative to the other alternative options available to meet the forecast supply deficit. In addition, further modifications were made to scheme designs for those options where material adverse environmental effects would preclude inclusion of the option in the strategy. For example, the River Stour desalination plant option in the Eastern area was removed from selection for the final strategy due to the risks identified in the SEA, HRA and WFD assessment about the effects on the Thanet Coast SAC and Thanet Coast and Sandwich Bay SPA and Ramsar site. Blackstone reservoir was excluded from the Central area strategy due to its relatively greater adverse environmental effects compared to other alternative options. The Brighton WwTW Indirect Potable Reuse option was initially removed as a strategic alternative option for the Central area due to significant concerns about impacts of the treated water pipeline route across the South Downs National Park and a sensitive terrestrial SAC. However, given the importance of ensuring a strategic alternative option was available for the Central area, the decision was taken to completely re-route the treated water

pipeline along the same route as the treated effluent pipeline to avoid major adverse environmental effects.

In some cases, due to the scale of the forecast supply deficit and the relatively short period in which the deficit arises, it was not considered feasible to remove all options with the potential for material adverse environmental effects from consideration for inclusion in the preferred strategy. This applies to several options for our Western operational area where we have used the SEA (and HRA and WFD assessments), along with consultation comments on the draft WRMP19, to refine the design of these options where feasible (e.g. re-routing pipelines or changing the location of new assets) as well as further developing the mitigation measures necessary to reduce the magnitude of identified environmental effects. This includes the Fawley desalination plant, the import from Bournemouth Water and the Sandown WwTW indirect potable reuse options, all of which need to be delivered by 2027.

Further details on the environmental assessment of these options are provided in Appendix D whilst the overall environmental assessment of the Western area strategy is set out in section 8 below. Annex 9 also provides a commentary on the decision-making underpinning the Western area strategy and how we intend to deliver it.

In addition to the commitments made in respect of drought permits/orders for the River Test and River Itchen, Southern Water has also sought to improve the overall resilience of the supply system to drought events to protect the environment and provide a more robust water supply service to customers. In developing the WRMP19, the company has therefore aimed to restrict the need for implementing drought permits/orders to extreme drought conditions only (i.e. worse than a 1 in 200 year drought event). The ability to achieve this aim was examined as part of developing the strategies for each of the three operational areas taking account of the costs, risks, feasibility and environmental effects of the measures required to deliver this objective. The assessment concluded that the objectives were achievable in the medium term, but in the short term, drought orders and permits in the Eastern area (until 2024), Central area (until 2024) and Western area (until 2027) would be required in less than extreme drought conditions. For the Western area, due to the size of the deficit to address and the dependency on the delivery of options such as the Portsmouth Water bulk supply (which is dependent on Havant Thicket reservoir development), a policy decision was made to continue to allow the **Test Drought Permit only** to be available in the severe drought condition for an additional two years until 2028/29 (inclusive). This reflects the scale of the supply deficit to be addressed and the time required for demand management and leakage reduction measures to take effect and for the new water sources included in the WRMP19 to be delivered. Annex 9 provides further details.

As well as the adverse effects of options, the beneficial effects of options were considered to help decide whether any options should be prioritised in view of the environmental or social benefits they may bring. This led to the decision to preferentially include additional water metering to increase household meter penetration in the Western and Central areas from 88% to 92%, and additional water efficiency measures in the each operational area as part of our target to help customers achieve an average per capita water consumption of 100 litres per day by 2040. This involves an intensive media and customer engagement campaign as part of an initial phase of the 'target 100' policy aimed at achieving average per person consumption of 100 litres per day by 2040. This will require actions to influence customers' water use behaviour over the longer term to achieve this aim. There are also various measures to further reduce water leakage levels in line with customer, regulatory, government and stakeholder expectations: overall, leakage reduction measures have been included to achieve a 15% reduction in leakage by 2025 and 50% reduction by 2050 in each operational area.

7.2 Assessment of reasonable alternative options and programmes

In accordance with the SEA Regulations, several reasonable alternative options and programmes were generated for each operational area to examine different combinations of options and their performance against environmental performance criteria, along with other key decision-making criteria (e.g. cost, resilience, customer preferences).

SEA of these alternative programmes was carried out of each of the options within the programme individually and then cumulatively to inform decisions on the final preferred strategy for each operational area, as discussed in sections 8 and 9 below.









8. Assessment of the WRMP19 strategies: Western area

8.1 Assessment Context

Through consideration of alternative options and programmes as part of the programme appraisal modelling and decision-making process, a final preferred strategy was developed for the Western operational area for the WRMP19. The strategy was subject to assessment against the SEA objectives (as well as being subject to HRA and WFD assessment), as described below.

The assessment matrices presented in the following sections inform the commentary on the effects of the final strategies for each operating area identified through the SEA. Note that the assessment tables provided in Appendix D provide a full commentary for all effects of each of the options individually as required by the SEA Directive. Appendix G provides details of the SSSI assessments for each of the supply options included in the strategies. Annex 15 and Annex 16 provide full details of the HRA and WFD assessments, respectively, that have informed the SEA. The key below each matrix gives the SEA topic represented by each numbered objective, and the levels of significance (based on the definitions given in Figure 6 in section 4). The colour coding in the matrices represents a range from significant adverse impact in red through to significant beneficial impacts in dark green as shown in the legend below. The table beneath shows the code number for each SEA topic and objective presented in the assessment matrices.

Legend for interpretation of significance of effect used in each assessment matrix:

Colour	Significance of Effect
	Dark Green Major Beneficial
	Mid Green Moderate Beneficial
	Light Green Minor Beneficial
	Blue Negligible
	Yellow Minor Adverse
	Orange Moderate Adverse
	Red Major Adverse
	None Not Applicable

SEA topics and objectives codes:

Key Environmental and Social Criteria								
Criteria	1. Biodiversity, plants and animals	2.1 Population and human health	2.2 Population and human health	2.3 Population and human health	3.1 Material assets and resource use	3.2 Material assets and resource use	4.1 Water	4.2 Water
Objective Description	To conserve and enhance the variety of plant and animal life, including important sites of nature conservation interest and protected habitats and species, to enhance the local natural resources (including geology, soil, air and water) and avoid the spreading of invasive species.	To protect and enhance health and well-being through raising awareness of the importance and value of the water environment.	To protect and enhance the water environment for other users including sustainable recreation, tourism and mobility, as well as land-based recreational resources.	To promote a sustainable economy with good access to basic services, including a quick to recover, high quality and affordable supply of water.	To reduce, and make more efficient, the household, industrial and commercial consumption of resources, minimise the generation of waste, encourage its re-use and eliminate waste sent to landfill.	To promote and secure the efficient and sustainable use of water to ensure quick to recover water supplies for people and businesses.	To avoid negative impacts on surface and groundwater levels and flows, including when this impacts on habitats.	To protect and enhance surface and groundwater quality and protect and enhance coastal waterbodies.
Criteria	4.3 Water	4.4 Water	5.1 Soil, geology and land use	6.1 Air and Climate	6.2 Air and climate	6.3 Air and climate	7.1 Archaeology and Cultural Heritage	8.1 Landscape and Visual Amenity
Objective Description	To ensure appropriate and sustainable management of water whilst protecting the biological, geochemical and physical processes and components that take place or occur within a biological community of interacting organisms and their physical environment that rely on water resources.	To reduce or manage flood risk.	To protect and enhance the physical features of the surface of the Earth and their relation to its geological structures and the quality and quantity of soils.	To reduce air pollutant emissions.	To reduce energy consumption and greenhouse gas emissions.	To adapt and improve flexibility to the threats of climate change.	To conserve and enhance the historic environment, assets (building, monument, site, place, area or landscape) identified as having a degree of importance, and their settings and protect important sites preserving evidence of past activity.	To protect, enhance the quality of and improve access to landscapes identified as having a degree of importance and unimportant landscapes, urban areas (towns) and the countryside.

8.2 Overview

Due to the scale of the forecast supply deficit in the Western area, it was not considered appropriate to remove any of the feasible options from consideration for inclusion in the preferred strategy. All options were therefore considered and the SEA findings (along with the HRA and WFD assessments) were actively used in reaching a decision on the WRMP strategy. A number of alternative options and option combinations were explored in developing the preferred strategy as well as a wide range of scenario testing model runs - the SEA, HRA and WFD assessments were used to compare the environmental performance of these alternative combination of options to inform and contribute to the decision-making process which also took into account other factors including cost, resilience and customer preference information. We also took account of the consultation responses on the draft WRMP19. This assessment and decision-making process led to the development of our preferred strategy (“Strategy A”) for the Western area.

Given the environmental benefits associated with demand management options as set out in the SEA, we have preferentially included in our “Strategy A” the early implementation of further measures to reduce demand for water in the Western area:

- Reduce leakage by a further 15% by 2025 and by 50% by 2050
- Water efficiency activities to help our customers reduce their consumption to an average of 100 litres per head per day by 2040 (‘Target 100’ programme). This involves an intensive media and engagement campaign as part of an initial phase of the ‘Target 100’ programme, concentrated throughout the period 2020-2025, but helping to influence customers’ water use behaviour over the longer term.
- Metering of more household properties to increase meter penetration from 88% to 92% which will support the achievement of the ‘Target 100’ programme

We have also included 6 catchment management schemes in our strategy to address nitrate

and/or pesticide water quality issues at some of our water sources, securing existing supplies and in several cases enabling more water to be made available for supply.

“Strategy A” also includes the desalination scheme at Fawley rather than indirect potable water reuse schemes reflecting the relatively lower magnitude of potential adverse environmental effects of the Fawley scheme, and ability to design mitigation into this scheme, compared to the reuse schemes that would involve discharges to the River Itchen Special Area of Conservation (SAC).

The ability to achieve our aim of restricting drought orders/permits to extreme drought conditions only to reduce the risk of adverse environmental effects was examined as part of developing the strategy taking account of the costs, risks, feasibility and environmental effects of the measures required to deliver this objective. Delivery of this objective requires several strategic schemes to be developed first, including the Fawley desalination scheme and three new bulk water imports from South West Water (Bournemouth Water) and Portsmouth Water. Consequently, until all of these schemes are delivered, drought orders/permits may be required in the Western area in the event that a severe drought arises in the period up to 2027, and **for the Test Drought Permit only** up to 2028-29 when the Portsmouth Water Havant Thicket Reservoir bulk import scheme is delivered. However, the other schemes will be delivered earlier than 2029 to progressively reduce the volume of water required from any drought permit/order in the period from 2024 onwards.

8.3 SEA of the preferred strategy

The SEA findings summary of the WRMP19 strategy (‘Strategy A’) for the Western area is presented in Figure 11.

Demand management measures are a core feature of the strategy, reflecting their environmental benefits and include: installation of AMR meters as part of increasing household meter penetration from 88% to 92%; further leakage reduction (15% by 2025 and 50% by 2050); and the ‘Target’ 100 water efficiency activities to reduce average per capita consumption to 100 litres per head per day by 2040. The SEA identified that the effects of these options are mainly beneficial but with some minor temporary adverse effects in respect of materials required for water leak repairs and metering, as well as the risk of temporary traffic disruption and associated carbon and air quality effects of street works for leak repair activities.

The strategy includes six catchment management options to improve nutrient and pesticide management through improvements to land-use practices. The SEA findings for the catchment management options are very similar and have been grouped together in one row in the table below. The effects of these options are assessed as beneficial in relation to many of the SEA objectives with predominately negligible or no adverse effects, except for minor adverse effects associated with carbon emissions for the extra water treatment necessary for the additional water made available by these schemes. These schemes also provide a beneficial effect in respect of WFD objectives to achieve good ecological status and wider environmental objectives for terrestrial ecosystems.

We have also included in-stream river restoration works for the River Itchen and the upper reaches of the River Test, in particular to provide increased environmental resilience to the abstraction of water from these rivers in times of drought. These measures are **additional** to those previously agreed with the Environment Agency and Natural England in connection with the Test drought permit/order and the Candover and Lower Itchen drought orders. The effects of these two options are assessed as beneficial in relation to many of the SEA objectives with only negligible adverse effects.

There are eleven supply-side options in our strategy, including one water reuse scheme which provide beneficial effects relating to the provision of additional reliable water supplies by reusing treated effluent and thereby increasing resilience to the future effects of climate change. . The **Sandown indirect potable water reuse scheme** could result in adverse effects regarding the Isle of Wight AONB due to the construction of a pipeline across part of the AONB which cannot be avoided. We will work closely with planners and Natural England to optimise the precise routing of the pipeline to minimise effects on landscape and ecology as part of the detailed design of the pipeline.

Further investigations are needed to confirm the magnitude of adverse effects on the ecology and geomorphology of the River Eastern Yar from discharges to the river of highly treated effluent at times of low flows which will elevate river flows and may possibly lead to a change in the water temperature regime. Although flow augmentation of this river already occurs, the WFD assessment indicated some uncertainty in respect of the risk of deterioration in WFD status class and that additional mitigation measures may be required to protect the environment. The nature of these mitigation measures will be determined from the further environmental investigations to be carried out for this option, but could include operational controls to reduce the volume of discharge relative to river flow and possibly treatment processes to manage the temperature of the effluent relative to the ambient river water temperature if required. We will work closely with the Environment Agency to scope the necessary environmental investigations and discuss the need for mitigation measures in light of the findings.

The HRA of this option concluded there would be no adverse effects on the Solent and Southampton Waters SPA and Ramsar site. No adverse effects are anticipated to the associated Brading Marshes to St. Helen's Ledges SSSI.

The **Fawley desalination scheme** brings major beneficial effects in respect of provision of a reliable water supply that is very resilient to the future effects of climate change. Typical of desalination schemes of this scale, some major adverse effects have been identified in relation to the operational use of non-renewable materials and generation of wastes in the treatment process, as well as carbon emissions. Additionally, as noted earlier in section 6.3.3, there are a range of risks to the marine environment which we have considered at a strategic level and the necessary mitigation measures that may be required to protect the marine environment. Since the draft WRMP19, we have further reviewed the design of the scheme and the mitigation measures that are likely to be required such that the assessed residual effect is reduced to no greater than moderate adverse effects on the marine environment. For example, we have:

- Changed the outfall design in light of our dispersion modelling evidence so that the discharge is made to deeper water to give more effective dispersion taking account of brine dispersion modelling results and to move the discharge further away from sensitive marine habitats
- Included for on-site treatment to deal with non-brine chemical waste products from the treatment process. This waste steam will be neutralised on site and then discharged via an existing wastewater treatment works
- Ensured provision of screening of the intake and outfall structures to avoid entrainment of aquatic fauna

With careful application of mitigation measures, there should be no adverse effects on the marine European sites on the landward side of the outfall and abstraction pipeline construction activity. More specific assessment and mitigation information is provided in

Appendix G (section 1.1 – SSSI effects), Annex 15 (HRA – Appendix B) and Annex 16 (WFD – Appendix B section 1.9-1.10)

Potential major adverse effects relating to biodiversity, fauna and flora as well as landscape and visual amenity may arise arising from construction of pipelines for the desalination scheme within or near to the New Forest National Park and associated designated European conservation sites. A pipeline is potentially required for the Fawley desalination plant to move water northwards to the distribution system of Southampton. On a precautionary basis we have assumed this pipeline will be required. A section of the pipeline will need to be routed either within or close to the New Forest SAC, SPA and Ramsar and the National Park. Discussions are ongoing with the Highways Agency about the viability of construction within the A326. However, if construction in the road is not permitted, we have also assessed a pipeline route that will utilise a less favourable area of habitat within the European sites and National Park boundary which is already an existing wayleave for overhead power cables just to the south of the A326. This wayleave is also the proposed routing for the Test Estuary Industrial Reuse pipeline described above. Further route optimisation will be carried out at the detailed planning stage to utilise the existing road network if possible to minimise environmental impacts.

Further information was requested by Defra in March 2019, with regards the viability of the Fawley desalination option, and how Southern Water would be addressing the uncertainties and environmental risks with the scheme. An Addendum to the Statement of Response was published in June 2019 providing this information, which is included in section 8.5 of this report.

The **import from Bournemouth Water** involves a proposed long-distance pipeline to bring water into our distribution system. Since the draft WRMP19, we have revised the pipeline route to avoid the New Forest National Park and associated designated European conservation sites so as to minimise the environmental effects of this scheme. The route avoids Whiteparish Common SSSI (a component of the SAC), as well as avoiding potential impacts to offsite habitat use of woodlands by woodlark. The route is also outside the Cranborne Chase and West Wilshire Downs AONB. Using the strategic level pipeline route, an assessment for the potential to impede groundwater flows and interrupt floodplain dynamics within the Avon Valley was completed (see Appendix C in Annex 15 HRA for full details). Further route optimisation will be carried out at the detailed planning stage to avoid any potential effects on groundwater and flood plain hydrological processes where the pipeline extends through the Avon Valley.

The **Southampton Link Main scheme** has the potential to result in adverse effects relating to biodiversity, flora and fauna due to the possible adverse effects to a designated European conservation site, but we have sought to minimise these effects through re-routing of the pipeline (including to avoid Ancient Woodland) wherever feasible and, where not feasible, developing mitigation measures. To minimise impacts, the crossing will be directionally drilled. The launch and receptor pits will be set up in the least impactful locations avoiding lowland fens, and wherever possible avoiding coastal and floodplain grazing marsh assuming this does not compromise the ability to directionally drill.

A suite of mitigation and compensation measures have been developed to avoid adverse effects of the Southampton Link Main option to the Solent and Southampton Water SPA and Ramsar, and River Test SSSI and Lower Test Valley SSSI. Further detailed assessment, including a hydrology assessment, will be required at the detailed design stage to confirm the mitigation proposed is sufficient to avoid adverse effects. Appendix G provides more information in relation to the effects on the River Test SSSI and required mitigation measures

whilst Appendix E of Annex 15 (HRA Report) provides similar information for the European sites.

For the **Hampshire Grid Main option**, the pipeline has been routed to avoid areas of ancient woodland and other irreplaceable priority habitat (e.g. chalk grassland). However, approximately 10km of pipeline will be required within the North Downs AONB given the destination of the pipeline. This cannot be avoided as the existing water supply asset is located within the AONB and therefore detailed route optimisation will be required at the planning stage to minimise impacts to the character of the area by utilising the local road networks and areas of poorer quality habitat. The pipeline will cross the River Test SSSI. To minimise impacts, the crossing will be directionally drilled. No land-take is proposed within the River Test SSSI, or the adjoining Chilbolton Common SSSI and Bransbury Common SSSI. Further details about the SSSI mitigation measures for this option are provided in Appendix G.

For all of these pipelines included in our strategy, careful design, planning and site environmental surveys to inform mitigation measures will be needed to minimise environmental effects.

The **borehole rehabilitation scheme near Cowes** is assessed as having predominantly negligible adverse effects. Minor to moderate adverse effects relate to energy and materials use and associated carbon emissions for materials for construction activities plus operational water pumping and treatment. Minor beneficial effects arise from making optimal use of existing water sources.

Figure 11 Visual evaluation matrix summary of WRMP preferred programme for the Western area

Option name	Residual Effects Significance	SEA objective															
		Biodiversity, flora and fauna		Population and human health			Material assets and resource use		Water				Soil, geology and landscape	Air and Climate			Archaeology and Cultural Heritage
		1.1	1.2	2.1	2.2	2.3	3.1	3.2	4.1	4.2	4.3	4.4	5.1	5.2	5.3	6.1	6.2
Romsey Town and Broadlands valve (HSW-HR reversible)	Adverse																
	Beneficial																
Import from Bournemouth Water	Adverse																
	Beneficial																
Additional Import from Portsmouth Water (additional 9M/d)	Adverse																
	Beneficial																
Additional Import from Portsmouth Water (Havant Thicket reservoir development)	Adverse																
	Beneficial																
Hampshire grid (reversible link HSE-HW)	Adverse																
	Beneficial																
Hampshire grid (reversible link HW-HA)	Adverse																
	Beneficial																
Sandown WwTW Indirect Potable reuse (8.5 M/d)	Adverse																
	Beneficial																
WSW near Cowes - reinstate & additional treatment	Adverse																
	Beneficial																
Newbury WSW asset enhancement	Adverse																
	Beneficial																
Southampton link main (reversible link HSW-HSE)	Adverse																
	Beneficial																
Fawley desalination (modular to 75M/d)	Adverse																
	Beneficial																

- Key:
- Major adverse
 - Moderate adverse
 - Minor adverse
 - Negligible beneficial or adverse
 - Minor beneficial
 - Moderate beneficial
 - Major beneficial



Overall, the environmental assessment has concluded that the preferred programme has predominately minor to moderate residual adverse effects and negligible to minor beneficial effects. However, given the scale of the schemes required to address the supply deficit, a small number of potential major adverse effects may arise – most are related to construction in or near to sensitive environments, but there are also some permanent effects, notably in respect of high energy use and carbon emissions associated with the large desalination scheme at Fawley. We have considered a range of mitigation measures to reduce the effects on the environment and these will be further developed as part of the detailed planning and design of the schemes.

We are committed to continuing dialogue with regulators, statutory bodies and interested stakeholders through a Steering Group and scheme-specific Working Groups in developing the detailed designs and carrying out the detailed environmental investigations for the preferred programme. These will inform the final design decisions for each scheme and confirm the precise details of any required mitigation measures. Further details on this approach are set out in the Technical Overview.

We recognise the particular environmental concerns raised by Natural England and Environment Agency in respect of the Fawley desalination scheme. Detailed investigations and surveys will be carried out, in agreement with the environmental regulators, to ensure that the scheme design and mitigation measures are optimised to minimise effects on the marine and terrestrial environments. This includes ensuring detailed studies to further evaluate the various risks to the marine environment set out earlier in as in section 6.3.3. The proposed approach to obtaining this information to reduce the uncertainties and risk surrounding the scheme, and timetable for work, was included in the Addendum to the Statement of Response submitted in June 2019. Section 8.5 provides the relevant information from this document. We will continue to discuss these investigations with Natural England and Environment Agency through the proposed Steering Group and Working Group for the scheme. The SEA is a strategic assessment of the option and more detailed assessment will be carried out in support of EIA and other statutory processes as the scheme is taken forward to the planning and design stage.

8.4 SEA of strategic alternative options for Western area

Consideration has also been given to several strategic alternative options identified through the development of preferred programme. These may be required if a strategic option in the preferred programme cannot be delivered following more detailed planning and further environmental assessment studies. The six options being considered are: Fawley desalination (100MI/d), in case some of the water import schemes could not be delivered to the full volume assumed; Sandown desalination (8.5MI/d) which would be an alternative to the Sandown WwTW indirect potable water reuse scheme; the Itchen Indirect Potable Reuse options (Portsmouth Harbour and Fareham WwTWs indirect potable reuse (90MI/d) or Woolston and Portwood WwTW indirect potable reuse (20.5MI/d)), which would be an alternative to a Fawley desalination scheme, the Test Estuary WwTW Industrial Reuse (9MI/d) and Woodside transfer valve (HSW to HSE).

As explained in Annex 9, we will initially commence further environmental, planning and design studies for these alternative options in the short term so as to minimise the risk of any delays to delivery of the strategy. These alternative options have been assessed as having overall slightly greater adverse environmental effects (after consideration of mitigation measures) compared to the schemes that form the preferred programme (see Figure 12) and the SEA concluded that:

- The **Fawley desalination 100MI/d scheme** has marginally greater adverse effects than those described above for the 75MI/d desalination scheme in respect of the increase in brine discharge to the Solent. There is no discernible environmental difference in effect in respect of the effects of the required pipeline construction which would follow the same routes as those for the 75MI/d option. Greenhouse gas emissions and the use of materials to operate the scheme would be slightly higher but recognising that the scheme would not be used continuously at the highest capacity (this would only be required in extreme drought conditions)
The same design considerations as set out above for the 75MI/d scheme in respect of protecting the marine environment apply equally to this larger scheme
- The **Itchen Indirect Potable Reuse options** would require long-distance pipelines, notably for the Portsmouth Harbour and Fareham WwTW indirect potable reuse option, and more pumping of water than for the Fawley desalination scheme and therefore greater greenhouse gas emissions and use of materials. There is a risk of greater adverse effects on the freshwater environment compared to the desalination scheme, but conversely there may be a beneficial effect on the marine environment by removing a significant discharge of treated sewage effluent into coastal waters that are currently high in nutrients
- The **Sandown desalination scheme** is considerably smaller than the Fawley scheme and consequently has a lower magnitude of adverse environmental effects. Effects on the marine environment are low due to the blending of the brine discharge with the existing treated sewage effluent. There are similar adverse effects associated with the pipeline route crossing an AONB to the Sandown WwTW indirect potable reuse scheme. Greenhouse gas emissions and material use would be marginally higher than the reuse scheme
- The **Test Estuary WwTW industrial use scheme** has a lower magnitude of adverse effects on the environment. The pipeline route for this scheme has been revised since the draft WRMP19 to minimise the potential effects on the New Forest National Park and New Forest SAC and SSSI. The route now follows an existing power line wayleave within the SAC, SSSI and National Park on dry grassland habitat. There will be no adverse effects on the Test Estuary and associated European sites and SSSIs
- The **Woodside transfer valve (HSW to HSE)** has limited environmental impacts as it is an existing transfer with the requirement for an additional booster station within the existing boundaries of the working site within a built up area

Figure 12 Visual evaluation matrix summary of strategic alternative options for the Western area

Western Area: Option name	Residual effect significance	SEA objective																	
		Biodiversity, flora and fauna		Population and human health			Material assets and resource use		Water				Soil, geology and land use	Air and Climate			Archaeology and Cultural Heritage		Land-scape and Visual Amenity
		1.1	1.2	2.1	2.2	2.3	3.1	3.2	4.1	4.2	4.3	4.4	5.1	6.1	6.2	6.3	7.1	8.1	
Sandown coastal desalination (IOW) (8.5MI/d)	Adverse	Orange	Yellow	Orange	Yellow	Blue	Red	Blue	Blue	Yellow	Blue	Blue	Blue	Yellow	Red	Blue	Yellow	Orange	
	Beneficial	Blue	Blue	Green	Blue	Green	Blue	Blue	Blue	Blue	Green	Blue	Blue	Blue	Blue	Green	Blue	Blue	
Fawley desalination (modular 75-100MI/d)	Adverse	Orange	Blue	Orange	Yellow	Blue	Orange	Blue	Blue	Yellow	Blue	Blue	Blue	Yellow	Red	Blue	Blue	Yellow	
	Beneficial	Blue	Blue	Green	Blue	Green	Green	Blue	Blue	Blue	Green	Blue	Blue	Blue	Blue	Green	Blue	Blue	
Test Estuary Industrial WTW Reuse (9MI/d)	Adverse	Orange	Blue	Orange	Yellow	Blue	Orange	Blue	Yellow	Blue	Blue	Blue	Blue	Yellow	Orange	Blue	Yellow	Yellow	
	Beneficial	Blue	Blue	Green	Blue	Green	Green	Blue	Blue	Blue	Green	Blue	Blue	Blue	Blue	Green	Blue	Blue	
Portsmouth Harbour and Fareham WwTW indirect potable reuse (90MI/d)	Adverse	Red	Yellow	Orange	Orange	Blue	Red	Blue	Yellow	Yellow	Blue	Blue	Yellow	Red	Red	Blue	Red	Orange	
	Beneficial	Blue	Blue	Green	Blue	Green	Green	Blue	Blue	Blue	Green	Blue	Blue	Blue	Blue	Green	Blue	Blue	
Woolston and Portswood WwTW indirect potable reuse (20.5MI/d)	Adverse	Red	Yellow	Orange	Yellow	Blue	Red	Blue	Blue	Blue	Blue	Blue	Blue	Orange	Red	Blue	Blue	Orange	
	Beneficial	Blue	Blue	Green	Blue	Green	Blue	Green	Blue	Blue	Green	Blue	Blue	Blue	Blue	Green	Blue	Blue	
Woodside transfer valve (HSW to HSE)	Adverse	Blue	Blue	Blue	Blue	Blue	Yellow	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Yellow	Blue	Blue	Blue	
	Beneficial	Blue	Blue	Green	Blue	Green	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	

- Key:
- Major adverse
 - Moderate adverse
 - Minor adverse
 - Negligible beneficial or adverse
 - Minor beneficial
 - Moderate beneficial
 - Major beneficial

8.5 Environmental Investigations: Next Steps

In dialogue with Defra, the Environment Agency and Natural England, Southern Water provided an Addendum to the Statement of Response in June 2019, to provide further information on the requirement for environmental investigations in support of its Western area strategy. This section sets out the additional information provided to Defra in June 2019.

8.5.1 Progress on early activities

Southern Water acknowledges there are delivery risks to meet the Section 20 Operating Agreement ('s20 agreement') timescales and recognises there are a substantial range of early actions that are required to progress the Fawley desalination scheme, and in parallel to carry out similar investigations into the alternative Itchen indirect water reuse options. Southern Water has made clear the need to undertake these actions in its regulatory dialogue with the Environment Agency, Natural England and Ofwat, as well as with key stakeholders.

In developing the WRMP19, it was recognised that there were a range of uncertainties and risks that needed to be managed. This was a key reason for adopting the Real Options approach to programme appraisal that enabled us to develop a detailed but adaptive plan that provides supply resilience in severe drought to a wide range of potential futures, as well as taking account of the potential step change in supply availability due to future possible sustainability reductions. The robustness of the final WRMP19 strategy has been tested against a range of assumptions, to help identify key alternative options that may need to be investigated in parallel with the preferred plan. As such, Southern Water needs to progress with investigating the Fawley desalination scheme and the Itchen indirect water reuse options at a variety of capacities while work is undertaken to reduce uncertainties and further assess the environmental risks of each option. The value of the Real Options approach, and the adaptive planning it supports, is that Southern Water can respond appropriately to changing circumstances whilst delivering improved supply reliability for its customers and minimising environmental impact. The Fawley desalination scheme and alternative Itchen indirect water reuse options are modular in nature allowing different combinations of scheme capacities to be considered depending on any changes to the forecast supply deficit.

We are committed to delivering to the s20 agreement timescales and since we submitted the revised draft WRMP19 in September 2018, we have continued to:

- Planning the investigations for the Fawley desalination scheme and the Itchen indirect water reuse options
- Expand our delivery team to develop the detailed delivery programme and commence pre-feasibility studies for the Fawley desalination and Itchen water reuse options
- Scoped out the water resources and hydraulic modelling work required to support detailed option design
- Keep our key stakeholders updated on our progress with the Fawley desalination and Itchen indirect water reuse options through our Western Area Water Resources Stakeholder Group, with meetings held in January and May 2019
- Engage with Portsmouth Water to discuss ongoing investigations and planning for delivery of the Portsmouth Water bulk supply schemes
- Discuss regulatory and environmental aspects with the Environment Agency and Natural England, including work to agree the scope of the WINEP investigations for assessing the impact of the revised Common Standards Monitoring Guidance for flow and water quality in the River Itchen which will help to inform the water reuse scheme investigations

- Take account of regulatory and policy developments, including Defra’s consultations on the draft National Policy Statement for Water Resources Infrastructure and on environmental net gain, both of which may influence delivery of the strategic water resource schemes for Hampshire
- Arrange to meet with relevant third parties to discuss land availability and future water supply arrangements in connection with the Fawley desalination scheme, including dialogue with a third party on a potential site for the desalination treatment plant located outside of the New Forest National Park

8.5.2 Planning approach and timetable

Strategic timeline

Southern Water is committed under the s20 agreement to use ‘all best endeavours’ to implement the long term supply-demand balance solution for Hampshire.

Figure 13 sets out the strategic timeline for the environmental investigations and assessments, planning processes and delivery of the Fawley desalination scheme and/or the alternative Itchen indirect water reuse options to meet the s20 agreement timescales.

The strategic timeline reflects:

- The need to proceed rapidly as the abstraction licences on the Test and Itchen have already been reduced
- The need to investigate the different options in parallel due to the tight timescales and in the face of a number of ongoing external uncertainties
- The need to effectively plan for different sizes / capacities of the options
- The need for early start activities, particularly in relation to the environmental uncertainties

Figure 13 shows the Itchen indirect water reuse options being developed to the same level of detail as the Fawley desalination option until the environmental feasibility of the desalination option at Fawley has been demonstrated (or if not, that the Itchen indirect water re-use options can be delivered to the agreed timescales). The parallel nature of developing the alternative Itchen indirect water reuse options will require multiple project teams to be set up and managed to progress the programme for each option, although it should be noted that some activities will be common to all options.

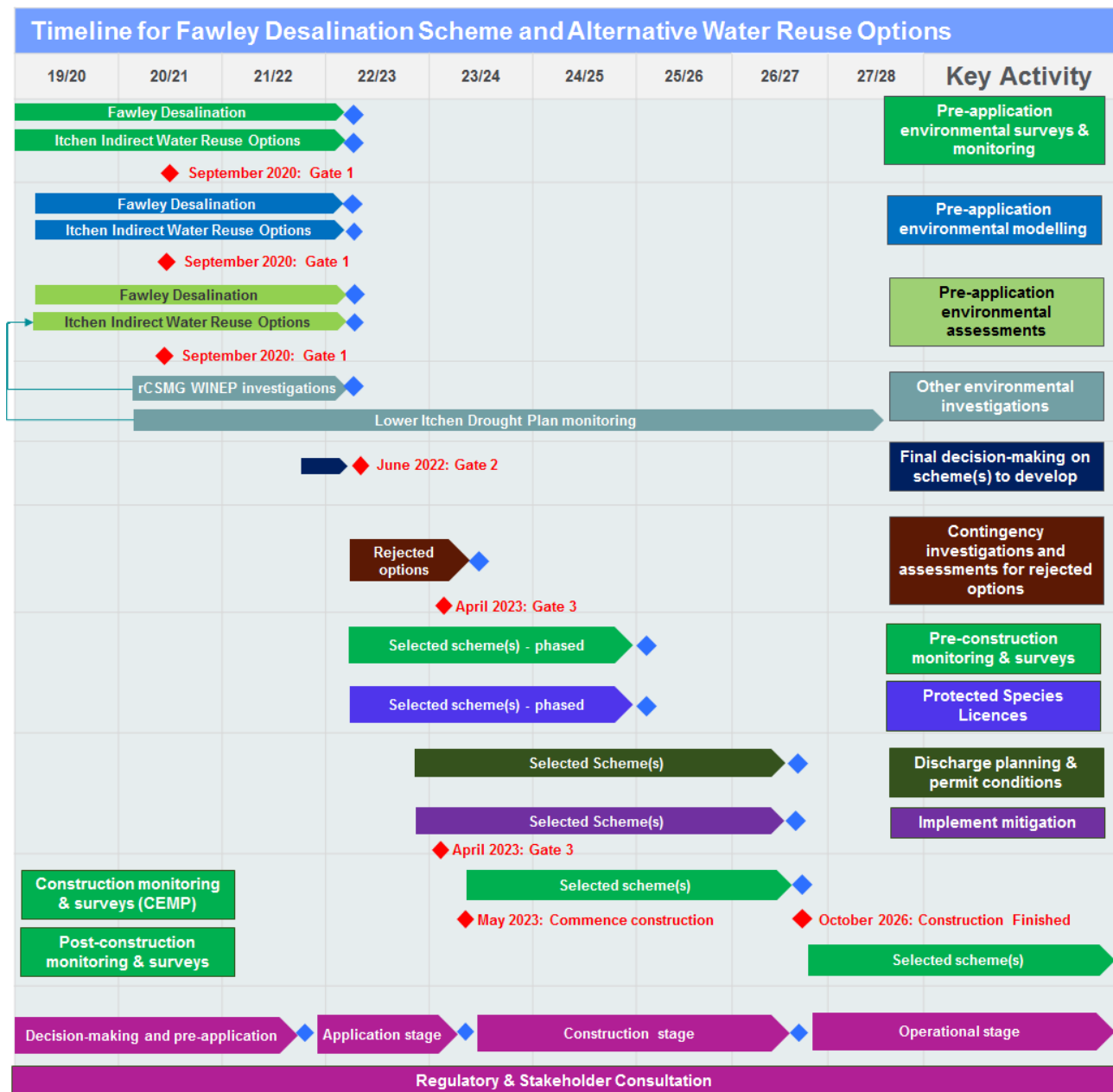
Southern Water set out in its Initial Assessment Plans (IAP) response to Ofwat in May 2019 its proposals for the “gated” process to represent the key decision-making processes necessary to meet the Section s20 agreement delivery timescales as shown in Figure 13:

- **Gate 1:** intended date of September 2020 – gate to review findings of the first phase of investigations and consider whether any options should cease to be progressed further (if it is possible to do so at this stage), although it is currently anticipated that work on all of the options will need to continue to Gate 2. Gate 1 review will also help determine the focus of the further environmental monitoring / surveys, modelling and assessments taking account of the findings from the first phase of investigation work
- **Gate 2:** intended date of June 2022 – gate for a final decision on the preferred option and the submission of applications for planning approvals and environmental permits

- **Gate 3:** intended date of April 2023 – gate for receiving final decisions from planning authorities on planning approvals and final decisions from regulators on environmental permits

The dates shown in Figure 13 are indicative and will be subject to further refinement following Ofwat’s final determination, and will therefore be updated accordingly. It should be noted that the dates shown for these ‘gates’ are indicative of when key decision-making processes would be expected to be carried out. These ‘gates’ are not a single date in time and are anticipated to extend over a period of up to several months of decision-making activities.

Figure 13 Indicative Timeline for Fawley desalination scheme and/or Itchen indirect water reuse schemes: key environmental activities linked to intended dates for key “gates”



There will be a number of critical decision points during the environmental investigations and planning period up to 2022 (i.e. Gate 2) at which a decision on which size variants and which schemes should be pursued and which should be stopped will be needed (if considered appropriate to do so, taking account of the assessed risks relating to the remaining option or options). It is important to note that these decisions do not lie entirely with Southern Water – many will require timely decision-making by regulators, including Ofwat, the Environment Agency, Natural England, DWI and Defra. The following are some of the critical decision points:

- Confirmation of the required funding through the 2019 Price Review process
- A decision on the planning approval route (whether a Development Consent Order is required), will be needed at Gate 1 based on the best available information at the time. This is partly dependent on further clarification from Defra following its consultation in late 2018 on the National Policy Statement for Water Resources Infrastructure
- A decision on whether there will be a further Hands-off Flow (HoF) increase on the River Itchen, and the scale of any change as soon as possible, ideally by Gate 1. This will determine the scale of further sustainability reductions that we need to address and is a critical factor to identifying the scale of the supply / demand deficit that we will need to address
- A decision from Defra, the Environment Agency and Natural England regarding whether the application of the revised Common Standards Monitoring Guidance (rCSMG) is to be implemented in this case as soon as possible, ideally by Gate 1, and to understand the full implications of this decision. This is critically important in determining whether the Itchen indirect water reuse options are viable or not. If rCSMG is made policy for abstraction licensing and environmental permitting, this could potentially make the Itchen indirect water reuse options infeasible, and therefore it is imperative that this policy decision is made in a timely manner. Timely review of the rCSMG WINEP investigation outcomes will also be important in this context
- A decision on which options to develop, in close association with the next WRMP which will be closely linked to the development of a regional plan for the South East (through the Water Resources in the South East (WRSE) group³) and associated environmental assessments, and in light of any changes identified to the supply demand balance, including the potential for an additional sustainability reduction on the River Itchen
- The results of the WRSE regional planning outputs supporting selection of the preferred delivery option, and incorporating decisions on all elements of the supply demand balance could be available around April-June 2022 (although the plans will not be published as early as that). This decision point aligns with our Gate 2

These decisions do not change the commitment given by Southern Water in the s20 agreement to use “all best endeavours” to deliver the long term water resources schemes, but they are nonetheless critical to ultimately achieving this commitment. Southern Water will work to deliver the necessary evidence required to support these decisions in a timely manner.

Given the current uncertainties as to planning and environmental permitting approvals, it has also been indicated in Figure 13 that work on the alternative options investigations may need to continue until planning approval has been granted for the selected scheme or schemes so that all alternative schemes are progressed to be “delivery ready” should they be necessary to meet the s20 agreement timescales in an adaptive manner and address the supply deficit. The final solution could involve a combination of a smaller Fawley desalination plant and an appropriately sized Itchen indirect water

³ Water Resources South East Group (WRSE) project is an alliance of the six south east water companies (Affinity Water, Portsmouth Water, South East Water, Southern Water, SES Water and Thames Water), the Environment Agency, Natural England, Ofwat, Consumer Council for Water and Defra.

reuse option if the investigations conclude this is the best overall solution to meeting the supply deficit.

The timescales for statutory environmental and planning activities recognise the regulatory complexity of the scheme delivery which will involve multiple statutory bodies and the consequent need for co-ordination from an early stage. Southern Water has established a regional strategic stakeholder group already and are in the process of setting up option-specific regulatory consultation groups to ensure an integrated approach to these aspects of the delivery programme. Consultation has already commenced with key regulators and stakeholders and will continue throughout the delivery programme as indicated in Figure 13.

Subject to timely determination of planning approvals and environmental permits / consents (Gate 3 - intended date of April 2023), there is sufficient time allocated for the construction period to discharge any environmental conditions set by planners or regulators, obtain any necessary Protected Species licences, carry out pre-construction monitoring and deliver agreed mitigation measures. Environmental monitoring will also continue for the selected scheme or schemes pre-construction, during construction (linked to specific agreed Construction Environmental Management Plans - CEMPs) and post-construction. As set out in the IAP response to Ofwat, it is currently anticipated that construction will start in May 2023 and finish at October 2026 (Figure 13).

Detailed timescales for environmental monitoring, modelling and assessment

As shown in Figure 13, the environmental monitoring, modelling and assessments have been prioritised for delivery early in the programme to reduce environmental uncertainties and risks by:

- Ensuring that any currently uncertain environmental constraints (for example, presence of protected species at specific construction sites) are identified in dialogue with regulators, relevant planning authorities and key stakeholders as early as possible to proactively inform scheme design, with the aim of avoiding adverse environmental effects wherever possible
- Providing environmental evidence in sufficient time to develop agreed mitigation measures where adverse effects cannot be avoided and incorporating the mitigation measures into the detailed design prior to the application for planning / environmental permissions or consents
- Providing data for environmental modelling in a timely manner to ensure modelling work can be carried out in sufficient time to inform scheme design and the development of mitigation measures
- Providing information to inform pre-application dialogue with local planning authorities and with regulatory bodies on environmental permitting requirements
- Enabling planning processes, notably EIA screening and scoping, to be implemented as early as possible
- Informing stakeholder dialogue so that any key environmental concerns from stakeholders are identified early and can be considered as part of the scheme design

Sufficient time has been allowed in the programme to carry out seasonally-dependent environmental surveys in advance of Gate 2 in June 2022 with contingency time available to cater for adverse weather or other external constraints on carrying out environmental surveys.

Southern Water will also take account of the Water Industry National Environmental Programme (WINEP), revised Common Standards Monitoring Guidance (rCSMG) investigations for flow and water quality for the River Itchen, as well as ongoing Drought Plan environmental monitoring for the lower River Itchen.

It will initially be necessary to carry out site surveys and investigations on a wider footprint to ensure we cover all potential receptors and locations that may be impacted by each potential option and for each capacity variants of both the Fawley desalination scheme and the Itchen indirect water reuse options. As the detailed scheme designs for each option are progressed, taking account of the environmental findings and external engagement activities, we will work with regulators and make decisions at Gate 1 as to whether we can narrow down the scope of the environmental investigations on a more focused footprint in preparation for environmental permitting and planning processes. However, for planning purposes, we currently assume that we will need to continue with the majority of the environmental investigation activities beyond Gate 1 and leading up to Gate 2.

Since submission of the revised draft WRMP19, Southern Water has further considered the sequencing of the early environmental survey, monitoring, modelling and assessment activities that will be critical to decision-making, planning and environmental permitting applications and approvals. Figure 14 (Fawley desalination scheme) and Figure 15 (Itchen indirect water reuse options) provide the indicative timelines for carrying out the key environmental monitoring, modelling and assessment activities necessary to inform decision-making with detailed environmental evidence over the period to Gate 2 (June 2022).

Figure 14 Fawley desalination scheme – indicative timeline to 2022 to Gate 2 (June 2022)

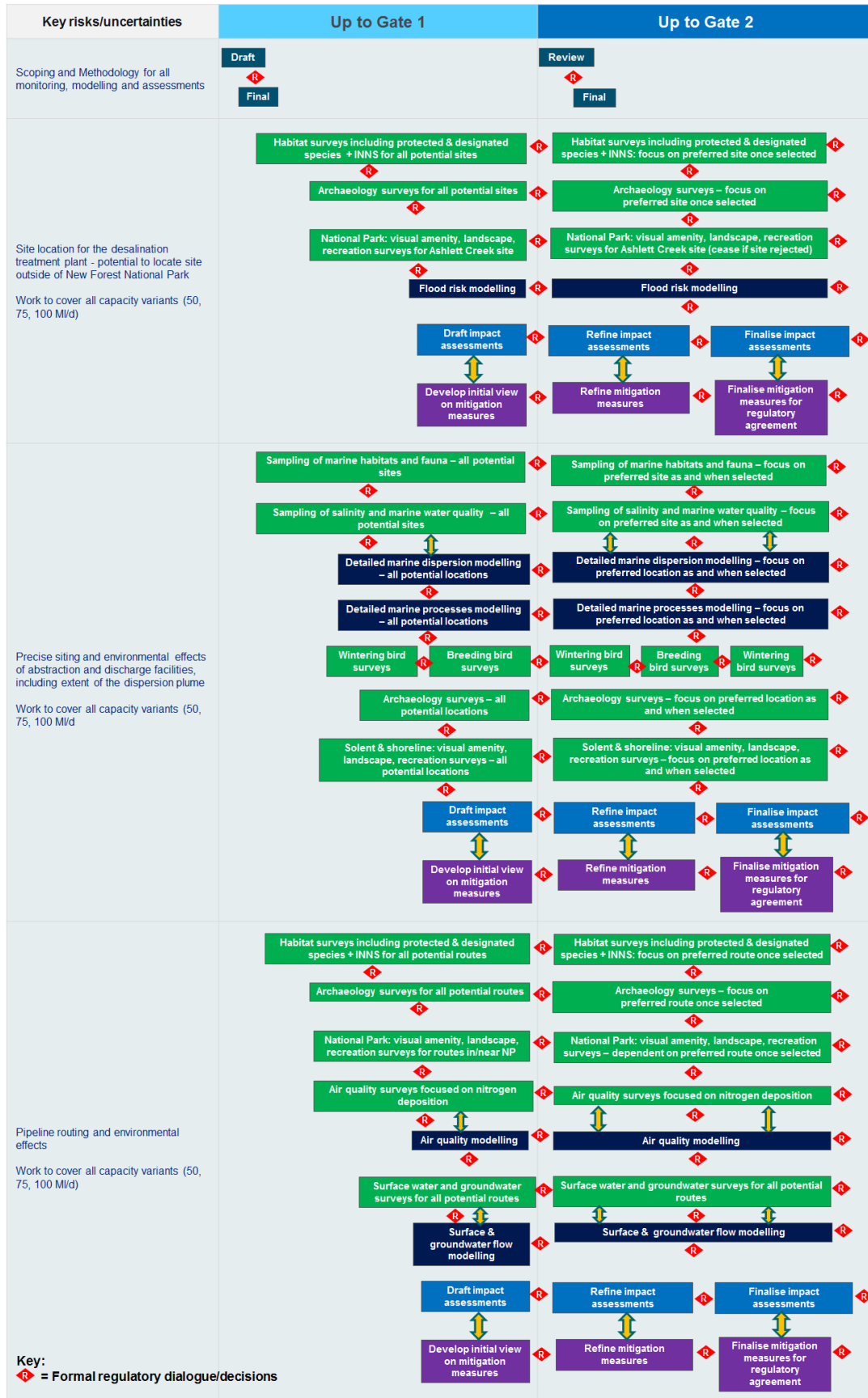
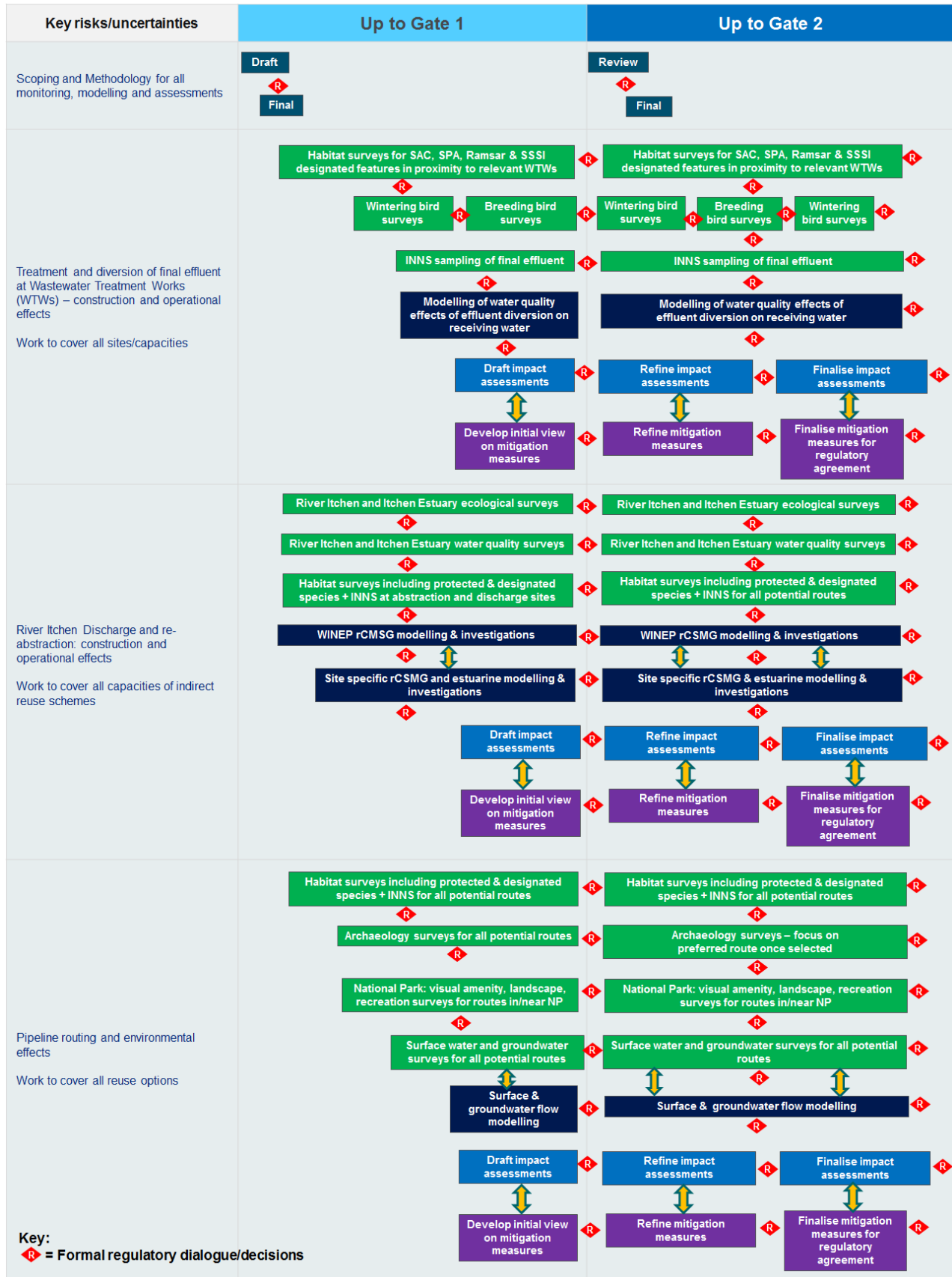


Figure 15 Itchen indirect water reuse – indicative timeline to 2022 to Gate 2 (June 2022)



The timelines indicate (as marked by the red diamonds) that Southern Water are committed to regular and extensive formal dialogue with the environmental regulators at all stages of these early environmental activities, so that there can be ongoing two-way feedback on the emerging evidence, modelling findings, assessments and development of mitigation measures. In this way, the aim is to minimise the risk of programme delays at a later stage during the planning and environmental permitting application processes.

8.5.3 Environmental survey, monitoring, modelling and assessments

Introduction

Southern Water fully recognises the need to carry out detailed environmental modelling, as well as environmental monitoring and assessment, to address concerns and uncertainties relating to the environmental impacts of the Fawley desalination plant to inform the environmental feasibility and deliverability of this option.

Environmental modelling, monitoring and assessments are therefore programmed early in the overall delivery process to address these concerns and uncertainties, as well as those relating to the Itchen indirect water reuse options. Southern Water will further assess the range of uncertainties and in-combination effects of the alternative schemes – beyond the detail provided to date in the strategic assessments in the WRMP19 - to demonstrate whether they are viable and deliverable alternatives should it be concluded that the Fawley desalination scheme cannot be delivered. Southern Water are committed to working closely with regulators and stakeholders as it carries out this work.

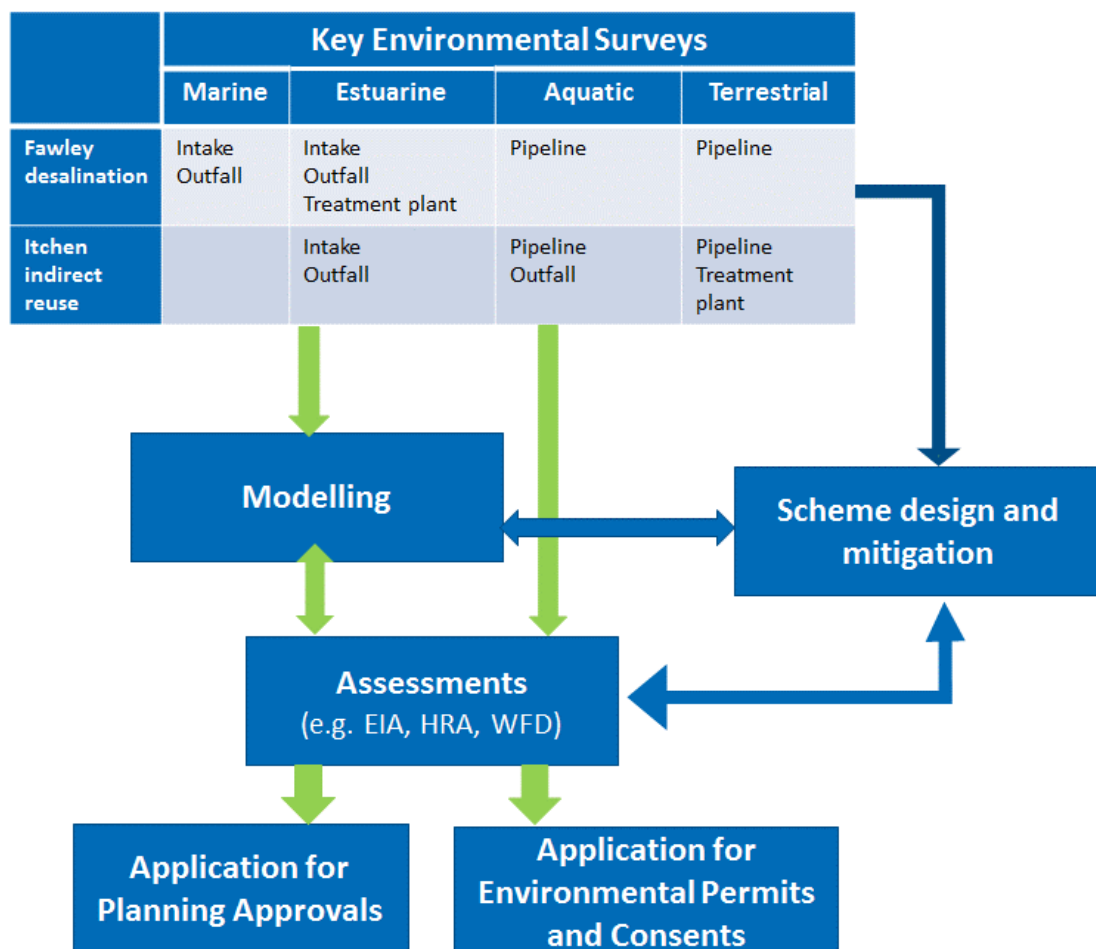
The environmental monitoring and modelling will inform a detailed and thorough environmental assessment of each option to determine impacts, both alone and in-combination with other plans and projects (see below for more details on possible in-combination effects). The assessments will also consider any necessary mitigation measures to address identified impacts to reduce the risk to an acceptable level. Southern Water will continue to work in dialogue with the environmental regulators as this work is carried out to enhance the evidence base, agree the environmental standards to be met, and address and reduce the environmental uncertainties as far as possible.

Figure 16 outlines how the environmental surveys, modelling and assessment activities will interact to deliver the required evidence to support planning applications and applications for environmental permits and consents (e.g. European Protected Species (EPS) licences), marine licences, discharge and waste permits, ordinary watercourse consents), as well as inform scheme design and mitigation at an early stage.

The following sub-sections provide more detail on the key risks and uncertainties, and how these are to be addressed through environmental monitoring/surveys, modelling, and assessments.

As indicated in Figure 14 and Figure 15, scoping documents will be prepared providing details of the scope and methods for the proposed monitoring/surveys, modelling and assessments. These will be shared with regulators and key stakeholders for comment to minimise the risk of additional work or modifications at a later stage that could potentially lead to a delay to the delivery programme.

Figure 1316 Overview of environmental surveys, modelling and assessment interactions



Fawley desalination scheme: monitoring, modelling and mitigation measures to address key environmental risks and uncertainties

Table 10 shows the key environmental risks and uncertainties relating to the Fawley desalination scheme and the environmental monitoring / surveys and modelling that are planned to address these risks and uncertainties and the key mitigation measures likely to be required.

These risks and uncertainties will be a key focus of the survey / monitoring, modelling and assessment effort to inform scheme design. However, the whole suite of Environmental Impact Assessment and environmental permitting issues will also be considered as part of the investigations, including but not limited to the following additional topics: transport (including marine); recreation (including boating/yachting); air quality; noise and vibration; lighting; waste and contaminated land.

Until the final capacity of the scheme is confirmed, Southern Water will continue to assume that the Fawley desalination scheme will need to be constructed up to a capacity of 100MI/d. The scope of the survey/monitoring, modelling, assessment and mitigation development will therefore consider different capacities up to the maximum 100MI/d size (50, 75 and 100MI/d variants).

Key surveys and monitoring

The proposed surveys and monitoring will focus on each of the components of the option, including construction and operational aspects: treatment plant; intake/outfall assets to/from the coastline to the treatment plant; pipeline route. The environmental features most at risk from the scheme will be prioritised in terms of survey/monitoring work necessary to inform scheme design, notably marine, estuarine and terrestrial ecology (particularly designated species and habitats), landscape and visual amenity, maritime transport and recreation. The key monitoring and modelling requirements to address the key risks and uncertainties are set out in Table 10, with further details on the environmental surveys provided in Table 11, but this is not intended to be an exhaustive list of all the environmental investigations that we will need to carry out.

The survey details provided in Table 11 have been derived using best available desk study information and will need to be informed and refined by:

- Specific desk based study, including review of local biodiversity record centre data and other available data (e.g. Webs data for breeding and over-wintering birds)
- Targeted site walkover surveys and/or similar reconnaissance surveys of the coastal environment
- Preliminary ecological appraisals
- Preliminary environmental appraisal for non-ecological features

Additional features may be identified as needing survey following these activities to ensure all topic specific surveys required to inform statutory environmental assessment processes are identified and programmed for delivery.

Key modelling investigations

Findings from the key modelling activities set out in Table 10 will inform the environmental assessments and, in turn, inform the technology, design and siting of the intake and discharge structures, and any mitigation measures. This is likely to be an iterative modelling process as the design is optimised to minimise adverse effects and the final mitigation measures can be incorporated into the project-level HRA Appropriate Assessment, Environmental Statement of the EIA and other regulatory environmental assessments.

Mitigation measures

As part of the environmental investigations, Southern Water will specifically consider whether any identified adverse effects can be avoided by modifications to the scheme design or operating philosophy. By carrying out the environmental assessments early in the planning process (see Figure 13, Figure 14 and Figure 15 earlier), the findings will iterate with modifications to the scheme design to minimise adverse effects through design measures wherever feasible. Where residual adverse effects cannot be avoided, the monitoring, modelling and environmental assessments will inform the development of mitigation measures to be discussed with regulators and relevant stakeholders at an early stage: these will also iterate with changes to the scheme design so that they are integrated into the final scheme design to be submitted with the planning approval and environmental permitting applications. Table 10 sets out the likely key mitigation measures that will be required to address the key risks presented by the scheme construction and/or operation. The plan-level HRA Appropriate Assessment of the scheme in the WRMP19 provides further details on the mitigation measures to avoid effects on European sites and Southern Water will continue to discuss the development of these measures with Natural England as the scheme design is further developed.

Southern Water will aim to agree the mitigation measures with relevant statutory bodies prior to submission of the planning and permitting applications. Draft Construction Environmental Management Plans, Operational Mitigation and Monitoring Plans and Site Waste Management Plans will also be produced to accompany these applications.

In addition to developing any required mitigation measures, Southern Water will work with regulators and planning authorities to identify the opportunities for environmental enhancement to secure biodiversity net gain objectives.

Table 10 Fawley desalination scheme: key monitoring, modelling and mitigation measures to address the key environmental risks and uncertainties

Risk/Uncertainty	Environmental Monitoring	Environmental Modelling	Mitigation Measures
<p>Location of the site for the desalination treatment plant.</p> <p>The WRMP19 site is within the New Forest National Park, and in close proximity to the Solent Maritime Special Area of Conservation (SAC) and Solent and Southampton Water Special Protection Area (SPA) and Ramsar site (and underlying SSSIs).</p>	<p>Habitat surveys, including protected and designated species.</p> <p>Breeding and wintering bird surveys of potentially affected areas to determine use of habitats by qualifying species close to areas likely to be affected by construction.</p> <p>Landscape, visual amenity and recreation appraisal of the desalination plant site in relation to the New Forest National Park.</p>	<p>Estuarine flood risk modelling</p>	<p>Mitigation measures will be required during construction to avoid adverse effects on the National Park, European sites and underlying SSSIs. These will particularly include measures to avoid adverse effects on designated bird species (such as noise and visual disturbance abatement) as informed by the bird surveys.</p> <p>Protected species mitigation measures will be informed by the habitat surveys.</p> <p>The agreed construction mitigation measures will be incorporated into the Construction Environmental Management Plan (CEMP).</p> <p>Landscape and visual amenity to be protected with screening during construction and sensitive landscaping of the operational site.</p> <p>Flood protection measures may be required to protect the site from future climate change impacts on estuarine flood risk.</p>
<p>Abstraction and discharge facilities:</p> <p>Partially located within the proposed Solent and Dorset Coast SPA, with construction sites in proximity to the Solent Maritime SAC and Solent</p>	<p>Sampling and mapping of marine habitats and fauna (including designated and protected habitats and species) at the locations for the abstraction intake and discharge outfall (including along the construction corridor for the</p>	<p>Modelling of the abstraction intake and discharge outfall structures to understand:</p> <ul style="list-style-type: none"> ▪ how they may interfere with, or be impacted by, coastal processes (such as currents and long-shore drift) 	<p>Modelling of the outfall and abstraction intake will be iterative with the engineering design to deliver an optimum design that minimises environmental impact. Mitigation measures may include 'soft engineering' to prevent</p>

Risk/Uncertainty	Environmental Monitoring	Environmental Modelling	Mitigation Measures
<p>and Southampton Water SPA and Ramsar site.</p>	<p>proposed 500m extension to the existing outfall, and/or other locations that may also be considered for the discharge structure), to determine if highly sensitive ecological features could be affected.</p> <p>Breeding and wintering bird surveys of potentially affected areas to determine use of habitats by qualifying species close to areas likely to be affected by construction and/or operational activities.</p> <p>Landscape, visual amenity and recreation appraisals in relation to the Solent and shoreline.</p>	<ul style="list-style-type: none"> ▪ whether their positioning might lead to increased localised erosion and/or sediment deposition in the vicinity of the structures. ▪ how the above potential changes to coastal processes may impact on marine habitats and fauna 	<p>localised erosion or sedimentation risks.</p> <p>Mitigation measures will be required to avoid adverse effects on European sites and underlying SSSIs. These will particularly include measures to avoid adverse effects on designated bird species (such as noise and visual disturbance abatement) during construction as informed by the bird surveys. Marine surveys and modelling will inform the development of mitigation measures necessary to protect habitats and species that may be affected by residual impacts on coastal processes.</p> <p>The agreed construction mitigation measures will be incorporated into the Construction Environmental Management Plan (CEMP).</p> <p>Landscape and visual amenity to be protected with screening during construction and sensitive landscaping of the operational site. Recreational mitigation to be determined from survey findings and assessment of potential effects.</p>
<p>Extent of the dispersion plume from the concentrated brine waste stream:</p> <p>Discharge (with treatment prior to discharge as necessary to protect the marine environment) into the</p>	<p>Sampling programme for salinity levels and other relevant water quality parameters within the spatial extent of the modelled dispersion plume, and to inform more detailed modelling of the dispersion plume.</p>	<p>Monitoring will inform detailed brine and chemical discharge dispersion modelling for the Solent. The model will be used to understand how the ambient salinity levels and marine water quality within the area of dispersion would be affected by either use of the existing disused Fawley</p>	<p>The monitoring and modelling will help determine the nature of any treatment required of the waste stream prior to discharge. This will also depend on the precise treatment process to be adopted and the nature of the waste stream</p>

Risk/Uncertainty	Environmental Monitoring	Environmental Modelling	Mitigation Measures
<p>proposed Solent and Dorset Coast SPA.</p> <p>There is a risk (depending on final location of outfall) for the plume to extend to part of the Solent Maritime SAC and Solent and Southampton Water SPA and Ramsar site.</p>	<p>Sampling of marine habitats and fauna within the waste stream dispersion plume: the sampling area will iterate with the more detailed plume dispersion modelling.</p>	<p>power station outfall (with 500m extension) or – if required- alternative new outfall structure.</p>	<p>it will produce. Dialogue with regulators on discharge permitting conditions will also inform the required treatment of the waste stream (chemical composition and temperature).</p> <p>Modelling will be iterative with the engineering design to deliver an optimum design of the outfall location, its orientation and dispersion methods to minimise impact on the marine environment and avoid adverse effects on European sites.</p>
<p>Pipeline routing: the pipeline to the Test Surface Water Supply Works to be installed within or in close proximity to the New Forest SAC, SPA, Ramsar site.</p> <p>There is uncertainty as to where the pipeline could be installed.</p>	<p>Mapping of habitats within the current electricity pylon wayleave of the New Forest SAC, SPA and Ramsar, in particular to check for any water-dependent habitat that could be adversely affected by changes to drainage, as well as checking for any habitats or species sensitive to air quality risks (notably nitrogen deposition) during construction.</p> <p>Surface water and groundwater surveys at sensitive locations along the pipeline route</p>	<p>Surface and groundwater flow modelling (informed by site-specific survey) will be required for sensitive locations along the pipeline route, notably within the New Forest SAC, SPA and Ramsar site, to assess whether the pipeline will alter the functionality of any water-dependent habitats by creating preferential drainage away from the features which cannot be adequately mitigated.</p>	<p>Modelling will be iterative with the scheme design to ensure no adverse effects on European sites - if issues are identified, the pipeline routing will be further optimised to avoid any adverse effects.</p> <p>Develop appropriate design and construction techniques where risk of adverse effects on drainage may impact wetland habitat, by re-routing wherever feasible and sensitive design to mitigate adverse effects where this is not feasible.</p>

Risk/Uncertainty	Environmental Monitoring	Environmental Modelling	Mitigation Measures
<p>The majority of the pipeline connections will be required in the New Forest National Park.</p>	<p>Baseline air quality surveys, focusing on nitrogen deposition.</p> <p>Landscape, visual amenity and recreation appraisal of the pipeline connections.</p>	<p>Nitrogen deposition is affecting the condition of some of the New Forest SAC habitats and therefore modelling work, informed by baseline air quality surveys, will be required to determine if the pipeline construction activities may present a risk of adverse effects.</p>	<p>Develop appropriate mitigation measures to avoid adverse effects on air quality during construction (such as dust suppression measures) that will be incorporated into the Construction Environmental Management Plan (CEMP).</p> <p>Landscape and visual amenity to be protected with screening during construction and sensitive reinstatement of ground cover and vegetation with biodiversity net gain principles applied. Recreational mitigation to be determined from survey findings and assessment of potential effects.</p>
<p>Risk of spread of INNS associated with construction activities and possible changes to marine environment</p>	<p>Surveys and mapping to assess presence of any marine and terrestrial INNS.</p>	<p>Marine modelling (above) may be used to help assess the potential risks of spreading marine INNS.</p>	<p>Mitigation measures will be informed by the INNS surveys, marine modelling and INNS risk assessments, and will be designed in accordance with the latest INNS regulatory guidance and input from INNS specialists.</p>
<p>Effects on archaeological and heritage assets from construction and (for marine assets) operational activities</p>	<p>Baseline surveys of archaeology and heritage assets terrestrial and maritime within an agreed zone of influence of each of the scheme components and within the modelled dispersion plume area.</p>	<p>The marine modelling and groundwater/surface water modelling (above) may help to assess potential risks to marine or water-dependent archaeological and heritage assets.</p>	<p>Mitigation measures will be determined in dialogue with Historic England and other relevant stakeholders dependent on the findings of the baseline surveys and impact assessment work.</p>

Table 11 Key environmental surveys to inform scheme design and planning and environmental permit applications*

	Physical Environment					Marine and Estuarine Environment					Freshwater Environment					Terrestrial Environment					Air, Heritage, Landscape & Recreation											
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24								
Fawley Desalination Option																																
Plant	✓	✓	✓	✗	✗	✗	✗	✗	✗	✗	✓	✗	✗	✗	✗	✗	✗	✗	✗	✗	✓	✓	✓	✓	✗	✗	✗	✗	✓	✓	✓	✓
Intake/outfall	✗	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✓	✓	✓	✓
Pipelines/tunnels	✓	✓	✓	✗	✗	✗	✗	✗	✗	✗	✗	✗	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✗	✓	✓	✓
Itchen Indirect Water Reuse Options																																
Pipeline	✓	✓	✓	✗	✗	✗	✗	✗	✗	✗	✓	✗	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✗	✓	✓	✓
Abstraction/discharge	✓	✓	✓	✗	✗	✗	✗	✗	✗	✗	✗	✓	✓	✓	✓	✓	✗	✗	✗	✗	✓	✓	✗	✗	✗	✗	✗	✗	✗	✓	✗	✗
Effluent redirection	✗	✓	✗	✓	✗	✗	✗	✓	✓	✗	✓	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗
Treatment plant	✗	✓	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✓	✓	✗	✓	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✓	✗	

*please note that this table is not intended as an exhaustive list but identifies the key survey and monitoring requirements

Key: ✓ = survey / monitoring is required
 ✗ = survey / monitoring is NOT/UNLIKELY to be required

Itchen Indirect Water Reuse Options

As with the Fawley desalination option, Southern Water acknowledges that there are a range of environmental uncertainties and risks associated with the Itchen indirect water reuse options. For this reason Southern Water are setting out early environmental monitoring, modelling and assessment actions to improve understanding of the risks and to examine how these can be avoided or mitigated to acceptable levels. By taking this early action in parallel to the work for the Fawley desalination scheme, the aim is to make better informed decisions as to which option is the best solution to delivering reliable and sustainable water supplies within the s20 agreement timescales. Critical to assessing the deliverability of the Itchen indirect water resource options will be the decision from Defra, the Environment Agency and Natural England regarding whether the application of the revised Common Standards Monitoring Guidance (rCSMG) is to be implemented in this case.

Whilst the long-distance pipelines required for some of the options impact different areas, the common key environmental risk regarding all of these options is the discharge of water into the River Itchen SAC near the tidal limit and subsequent re-abstraction before the tidal limit. In particular, the River Itchen rCSMG targets for water quality and flow (in the short reach between abstraction and discharge) might be affected by these options. These issues require further dialogue with Natural England and the Environment Agency in particular and will also need to draw on the planned rCSMG WINEP investigations that Southern Water will be carrying out in partnership with Portsmouth Water in relation to the lower River Itchen.

Table 12 shows the key environmental risks and uncertainties relating to the Itchen indirect water reuse options and the environmental monitoring/surveys and modelling that Southern Water plan to carry out to address these risks and uncertainties and the key mitigation measures likely to be required.

These risks and uncertainties will be a key focus of the survey/monitoring, modelling and assessment effort to inform scheme design. However, the whole suite of Environmental Impact Assessment and environmental permitting issues will also be considered as part of the investigations, including but not limited to the following additional topics: transport, recreation; air quality; noise and vibration; lighting; waste and contaminated land.

The scope of the survey/monitoring, modelling, assessment and mitigation development will consider different capacities of the options until such time as a decision is reached on the capacity required.

Key surveys and monitoring

The proposed surveys and monitoring will focus on each of the components of the option, including construction and operational aspects: treatment activities at the wastewater treatment works (WwTWs) and effects of reduced treated effluent discharge to the estuarine or marine environment; pipeline route; discharge to the River Itchen and subsequent re-abstraction. The environmental features most at risk from the scheme will be prioritised in terms of survey/monitoring work necessary to inform scheme design, notably terrestrial and aquatic ecology (particularly designated species and habitats). The key monitoring and modelling requirements to address the key risks and uncertainties are set out in Table 12 (with further details on the environmental surveys provided in Table 11), but this is not intended to be an exhaustive list of all the environmental investigations that will need to be carried out. Southern Water will also draw on monitoring of the lower River Itchen that is already being contracted as part of the s20 agreement monitoring programme. Additional features may be identified as needing survey following these activities to ensure all topic specific surveys required to inform statutory environmental assessment processes are identified and programmed for delivery.

Key modelling investigations

Findings from the key modelling activities set out in Table 12 will inform the environmental assessments and, in turn, inform the technology and design of the treatment and discharge arrangements for the reuse options, and development of necessary mitigation measures. This is likely to be an iterative modelling process as the design is optimised to minimise adverse effects.

Mitigation measures

As part of the environmental investigations, Southern Water will specifically consider whether any identified adverse effects can be avoided by modifications to the scheme design or operating philosophy. By carrying out the environmental assessments early in the planning process (see Figure 13, Figure 14 and Figure 15 earlier), the findings will iterate with modifications to the scheme design to minimise adverse effects through design measures wherever feasible. Where residual adverse effects cannot be avoided, the monitoring, modelling and environmental assessments will inform the development of mitigation measures to be discussed with regulators and relevant stakeholders at an early stage: these will also iterate with changes to the scheme design so that they are integrated into the final scheme design in the event that the Itchen indirect water reuse options are to be developed and submitted for planning approval and environmental permitting applications. Table 12 sets out the likely key mitigation measures that will be required to address the key risks presented by the scheme construction and/or operation. The plan-level HRA Appropriate Assessment of the scheme in the WRMP19 provides further details on the mitigation measures to avoid effects on European sites and we will continue to discuss the development of these measures with Natural England as the scheme design is further developed. Where appropriate, these may dovetail with proposed mitigation measures in the Lower Itchen being progressed as part of the s20 agreement in respect of the Lower Itchen sources Drought Order to increase environmental resilience to abstraction during drought conditions.

In addition to developing any required mitigation measures, we will work with regulators and planning authorities to identify the opportunities for environmental enhancement to secure biodiversity net gain objectives.

Table 12 Itchen indirect water reuse options: key monitoring, modelling and mitigation measures to address the key environmental risks and uncertainties

Risk/Uncertainty	Environmental Monitoring	Environmental Modelling	Mitigation Measures
<p>Additional treatment facilities and diversion of final effluent at two of the potential Wastewater Treatment Works (WwTWs) – risk of construction and operational effects on European sites.</p>	<p>Habitat surveys, including protected and designated species:</p> <ul style="list-style-type: none"> ▪ part of the Chichester and Langstone Harbours SPA and Ramsar site within the zone of influence of construction activities at Portsmouth Harbour WwTW ▪ part of the Solent Maritime SAC and Solent and Southampton Water SPA and Ramsar site within the zone of influence of construction activities at Woolston WwTW. <p>Breeding and wintering bird surveys of potentially affected areas to determine use of habitats by qualifying species close to areas likely to be affected by construction and changes to treated effluent discharges to the marine or estuarine environment, as applicable (Portsmouth Harbour and Woolston WwTWs only).</p>	<p>Modelling of the effects of reduced treated effluent discharge on nutrient and salinity levels in the following European sites to confirm no adverse effects on designated features or species:</p> <ul style="list-style-type: none"> ▪ part of the Chichester and Langstone Harbours SPA and Ramsar site (Portsmouth Harbour WwTW) ▪ part of the Solent Maritime SAC and Solent and Southampton Water SPA and Ramsar site (Woolston WwTW) 	<p>Mitigation measures will be required during construction to avoid adverse effects on the designated bird species (such as noise and visual disturbance abatement) as informed by the bird surveys.</p> <p>Modelling of the effects on nutrient and salinity levels is not expected to lead to any adverse effects on European sites but if modelling indicates a potential risk this will be discussed further with Natural England and Environment Agency.</p> <p>Protected species mitigation measures during construction will be informed by the habitat surveys.</p> <p>The agreed construction mitigation measures will be incorporated into the Construction Environmental Management Plan (CEMP).</p>
<p>Discharge of highly treated effluent to the lower River Itchen may have adverse effects on the River Itchen SAC (including in respect of rCSMG standards) and to the Itchen Estuary</p>	<p>Water quality, flow monitoring and habitat and species surveys of the lower River Itchen to the tidal limit (including migratory fish).</p> <p>Water quality and habitat and species surveys of the River Itchen Estuary (including migratory fish).</p>	<p>WINEP rCSMG water quality and flow modelling and investigations for the River Itchen SAC to inform the assessment of the impact of the Itchen indirect potable water reuse options.</p> <p>The WINEP modelling approach will be further developed to carry out option-specific modelling will be required to assess the effects on rCSMG standards.</p>	<p>The surveys and modelling will help inform any specific requirements for the scheme design, in particular the specific water treatment requirements of the final effluent such that the discharge will meet the rCSMG water quality targets. These measures will be incorporated into the scheme design to meet the</p>

Risk/Uncertainty	Environmental Monitoring	Environmental Modelling	Mitigation Measures
	<p>Habitat mapping, including protected species surveys, and river channel surveys in the lower reach of the River Itchen in the area of the proposed discharge facilities. There may also be a need for a similar survey for a new abstraction facility, although existing abstraction assets may be used (subject to further study).</p>	<p>We will work closely with the Environment Agency and Natural England to ensure the approach adopted for the WINEP investigations can support the assessment of the reuse options as far as possible.</p> <p>Modelling of the impacts on water quality on the River Itchen estuary to assess the potential for any adverse environmental effects, including compliance with WFD transitional water body objectives, and in particular, any risk to migratory fish species.</p>	<p>requirements of the Habitats Regulations. Surveys and modelling will inform the need for any mitigation measures to comply with freshwater WFD objectives, in particular in respect of migratory fish not covered under the Habitats Regulations.</p> <p>Habitat surveys and the water quality and flow modelling will inform the precise siting of the discharge (and if required, abstraction) facilities to avoid adverse effects on SAC features and minimise other environmental effects. The design will need to incorporate mitigation measures to avoid any entrainment of fish and avoid local scouring/erosion of the river channel.</p>
<p>Pipeline routing: risk of adverse effects on designated habitats and species from construction of long distance pipelines, in particular with some lengths of pipeline in close proximity to a number of designated sites: Portsdown SSSI; Botley Wood and Everett's and Mushes Copses SSSI; Solent and Southampton Water SAC, SPA and Ramsar site; River Itchen SAC.</p>	<p>Mapping of habitats (including designated and protected species) through walkover surveys of the pipeline routes.</p> <p>Walkover survey to include evaluation of options for reducing where feasible the number of crossings under/across the River Itchen SAC, such as utilising any existing crossing points of the lower River Itchen.</p>	<p>Surface and groundwater flow modelling (informed by site-specific survey) will be required for sensitive locations along the pipeline route to examine the impacts of the proposed pipeline crossings on the River Itchen SAC and wetland SSSIs. The modelling will assess whether the pipeline will alter the functionality of any water-dependent habitats by creating preferential drainage away from the features which cannot be adequately mitigated.</p>	<p>Modelling will be iterative with the scheme design to ensure no adverse effects on European sites - if issues are identified, the pipeline routing will be further optimised to avoid any adverse effects.</p> <p>Develop appropriate pipeline design and construction techniques where risk of adverse effects on drainage may impact wetland habitat, by re-routing wherever feasible (such as using existing lower River Itchen</p>

Risk/Uncertainty	Environmental Monitoring	Environmental Modelling	Mitigation Measures
Construction of the section of pipeline to the Lower Itchen Water Supply Works is located in proximity to the South Downs National Park.	<p>Surface water and groundwater surveys at sensitive locations along the pipeline route (notably designated wetland sites adjacent to the route and the River Itchen SAC crossings).</p> <p>Landscape, visual amenity and recreation appraisal of the pipeline connections.</p>	None	<p>crossing points), and adopting sensitive design to mitigate adverse effects where this is not feasible.</p> <p>Landscape and visual amenity to be protected with screening during construction and sensitive reinstatement of ground cover and vegetation with biodiversity net gain principles applied. Recreational mitigation to be determined from survey findings and assessment of potential effects.</p>
Risk of spread of INNS associated with construction and operation.	<p>Surveys and mapping to assess presence of any aquatic and terrestrial INNS.</p> <p>Sampling of wastewater treatment works final effluent for presence of any INNS larvae.</p>	Water quality modelling (above) may be used to help assess the potential risks of spreading aquatic INNS.	Mitigation measures will be informed by the INNS surveys, marine modelling and INNS risk assessments, and will be designed in accordance with the latest INNS regulatory guidance and input from INNS specialists.
Effects on archaeological and heritage assets from construction activities.	Baseline surveys of archaeology and heritage assets within an agreed zone of influence of each of the scheme components.	Groundwater/surface water modelling (above) may help to assess potential risks to any water-dependent archaeological and heritage assets.	Mitigation measures will be determined in dialogue with Historic England and other relevant stakeholders dependent on the findings of the baseline surveys and impact assessment work.

8.5.4 Environmental Assessments

Environmental assessments of each option are required to be submitted in support of applications for planning approvals (including any Development Consent Order application) and environmental permit/consent applications. These will draw on the surveys/monitoring and modelling activities, as well as published data and other relevant available evidence.

The assessments required for each of the schemes are broadly similar, although the Fawley desalination scheme has a greater number of marine issues that would need to be considered in consultation with the Marine Management Organisation, Natural England and other relevant marine stakeholders. A wide range of environmental assessments will be required, including (but not limited to):

- Environmental Impact Assessment (EIA)
- Project-level HRA
- Project-level WFD assessments
- SSSI assessments
- Flood Risk Assessments (FRA)
- INNS risk assessments
- Marine Policy Assessment against the South Marine Plan
- Transport assessments (including air quality impacts)
- Energy Statements
- Sustainability Statements

The assessments will be carried out in accordance with regulatory requirements and best practice national guidance. Southern Water will consult on the scope of these assessments. Specific assessment methods (for example, the eDNA tool for Great Crested Newts or the WHPT and LIFE scores for macroinvertebrates) will also be set out in the scoping documents. In this way, the aim is to agree the assessment approach and specific methods in advance of carrying out the work to avoid the risk of delay to the programme at a later stage in the planning process.

Cumulative, in-combination effects assessment

The assessments will consider cumulative environmental effects with other projects, including with other WRMP19 projects such as the Portsmouth Water Havant Thicket bulk supply scheme. Cumulative effects with other Southern Water projects will also be considered, committed projects with existing planning permission (or permission being actively sought), with projects set out in land use plans (notably Local Plans), and with developments set out in other strategic plans, such as Shoreline Management Plans.

The SEA, HRA and WFD assessment of the WRMP19 set out the potential for cumulative, in-combination effects with the Fawley desalination scheme and the Itchen indirect water reuse options.

There may be cumulative effects with the Bournemouth Water import option and the pipeline from Fawley desalination scheme if these were to be constructed concurrently and/or if part of the pipeline routes overlap. These will be investigated as both scheme designs are progressed further. There is also a potential for cumulative effects with the Test Estuary industrial direct water reuse scheme should this scheme be required to be constructed at the same time as an alternative option to one of the smaller supply schemes in our preferred plan. Cumulative effects with any developments at the Fawley power station site (Fawley Waterside development) and other local development projects will also be considered.

In relation to the Itchen indirect potable reuse options, there are several key concerns in respect of cumulative, in-combination effects identified in the WRMP19 environmental assessments and that Southern Water will be investigating in greater detail as part of the early environmental investigations, working closely with Portsmouth Water where relevant:

- Delivery of the Havant Thicket reservoir scheme pipeline: in particular, the same pipeline route for crossing of the River Itchen SAC is currently assumed for both options
- Cumulative effects on the River Itchen SAC as a whole due to the potential for multiple river crossings by proposed new pipelines for various other WRMP19 schemes
- Cumulative effects on the South Downs National Park from multiple water company new pipeline schemes at the landscape scale where pipelines are to be constructed either within or in proximity to the National Park, requiring a cross-water company assessment of the landscape effects of these proposed pipelines
- Cumulative effects during construction near to European sites for designated birds due to other infrastructure developments around Solent and Southampton Water SPA and Ramsar site and the Chichester and Langstone Harbours SPA and Ramsar site

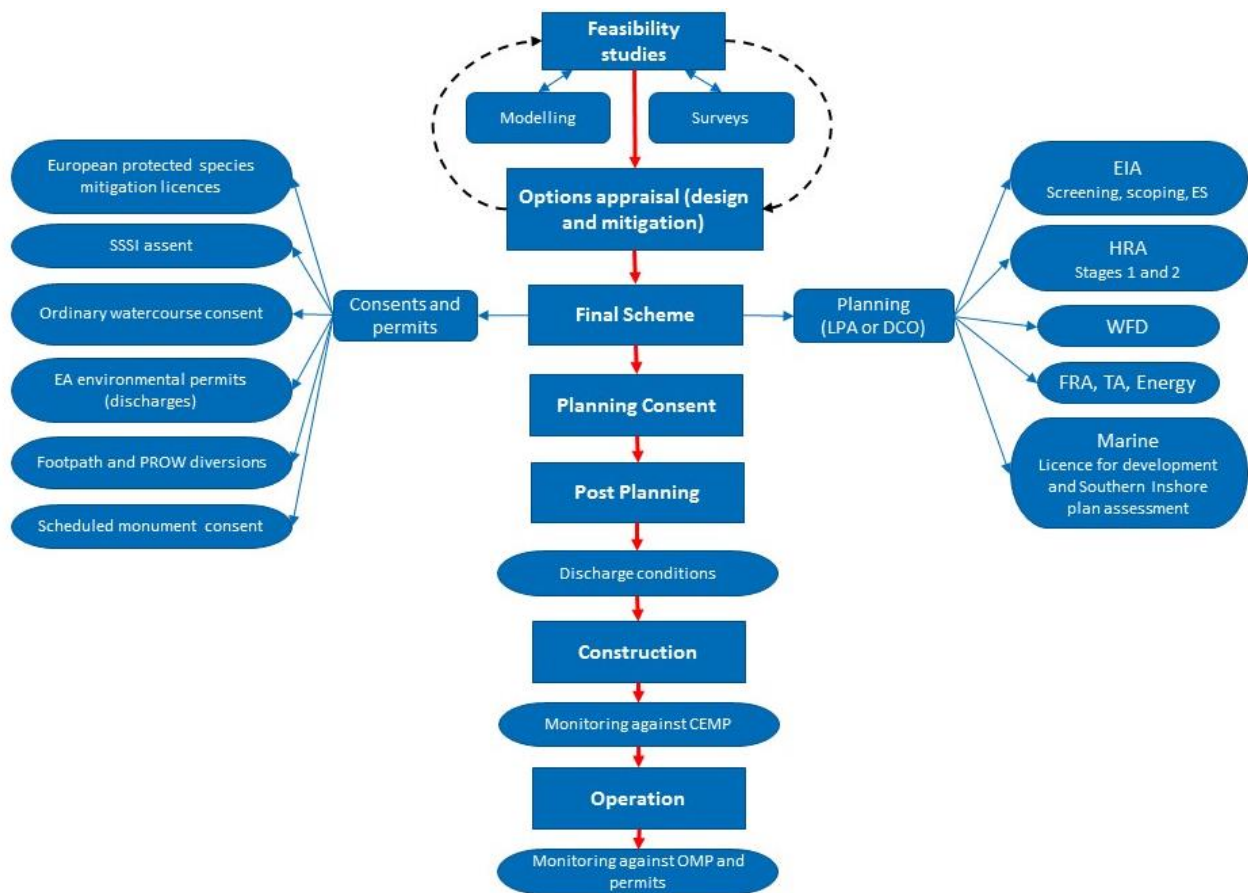
Portsmouth Water and Southern Water are committed to meeting on a regular basis to discuss ongoing investigations in relation to the delivery of water supply schemes in order to keep each other informed of emerging risks to each company's respective water resources strategies, including potential for cumulative environmental effects. This bilateral liaison will be in addition to discussions at a regional scale through the WRSE group of companies, which will consider the wider risks of cumulative landscape effects of multiple new pipelines.

In carrying out the early environmental investigations, Southern Water will work with the planning authorities, Natural England and Environment Agency to identify all other projects and proposals that may lead to cumulative, in-combination effects and ensure these are all considered as part of the environmental assessment of the Fawley desalination and the Itchen indirect water reuse schemes.

8.5.5 Planning and Permitting Activities

Figure 17 provides an overview of the planning and permitting requirements likely to be needed.

Figure 17 Overview of Planning and Permitting Requirements



Alongside the planning process, various permits/consents will be required to support the delivery of the selected scheme or schemes. Southern Water will develop the necessary evidence and assessments to support the application for planning approval and environmental permits/consents for each of the options so that once a final decision on the selected scheme or schemes is reached, there will be no delay in proceeding to make the statutory applications.

The permits/consents required will depend on the selected scheme or schemes, but will include:

- Marine licences for development (where relevant)
- Assent for works within a Site of Special Scientific Interest
- European protected species mitigation licences
- Ordinary watercourse consents for works in, on or near an ordinary water course
- Environmental permits for discharges to the aquatic environment and for waste arisings
- Public rights of way (PRoW) diversions

SSSI assent, marine licences and protected species survey licences may also be required for the survey work to be undertaken, along with land access agreements where necessary.

Post-Planning Approval

A number of the permits/consents identified above will not be authorised until planning permission has been granted, for example Protected Species mitigation licences,

and therefore sufficient time has been allowed in the delivery programme (see Figure 13 earlier) to undertake habitat creation and species translocation or other similar activities. Given the different components of each scheme option and different construction durations, this work can be phased over a period of time in line with the construction programme: it will not all need to be carried out immediately following the start of the overall construction programme planned for May 2023.

Southern Water's delivery programme (see Figure 13 earlier) also allows time to discharge any relevant planning conditions ahead of the commencement of construction work: again, these can be phased according to the construction programme. Planning conditions could include, for example, finalising the Construction Environmental Management Plan with contractor input, finalising landscaping and planting schemes, achievement of relevant Protected Species mitigation licences, a confirmed scheme of investigation and timetable for cultural heritage mitigation measures, and land contamination remediation measures.

Monitoring during construction and once the scheme is operational (see Figure 13 earlier) will be crucial in confirming that the scheme is not impacting the environment. This is likely to include continuation of pre-application monitoring for the selected scheme or schemes where there is a risk of adverse effects and/or to monitor implementation of the success of defined mitigation measures (both during construction and during subsequent operation). The Construction Environmental Management Plan and any environmental permit/consent conditions will provide the formal mechanisms for monitoring during the construction phase, with thresholds and feedback mechanisms set to ensure any breaches can be addressed promptly. An Operational Mitigation and Monitoring Plan (OMP) may be used to secure longer term monitoring once the scheme is operational, and again identify thresholds, feedback mechanisms and additional mitigation should a breach be identified. There will also be regulatory monitoring set out in environmental permit/consent conditions. An Operational Mitigation and Monitoring Plan could also be used to secure a programme of longer-term maintenance for any habitat created to ensure it meets its full potential (e.g. removal of INNS, replacement of failed tree standards).

8.5.6 Regulatory and stakeholder consultation

Southern Water is committed to working closely with regulators, local planning authorities and interested stakeholders in delivery of the Fawley desalination scheme and/or the alternative Itchen indirect water reuse options, including the additional environmental activities set out above.

Southern Water recognises that to deliver the scheme or schemes there are multiple regulators and stakeholders that need to be engaged with (see below). Southern Water will continue to draw on previous experience of managing multi-regulator and multi-stakeholder inputs to large capital projects on the land/marine interface, for example for the development of the large Brighton (Peacehaven) wastewater treatment works and sewerage improvements.

Southern Water has made progress in developing the necessary dialogue with many stakeholders already, building on existing relationships in many cases. As set out earlier, since the revised draft WRMP19 was submitted in September 2018, Southern Water has continued to consult with the regulators and stakeholders. In particular:

- We have liaised closely with the Environment Agency to understand and address any concerns they may have relating to our WRMP. In particular, we met with the Environment Agency in November 2018 to discuss progress with outstanding issues and commitments made in the Statement of Response. We held another meeting on

29 March 2019 to discuss and clarify the requirements for responding to the further information request from Defra

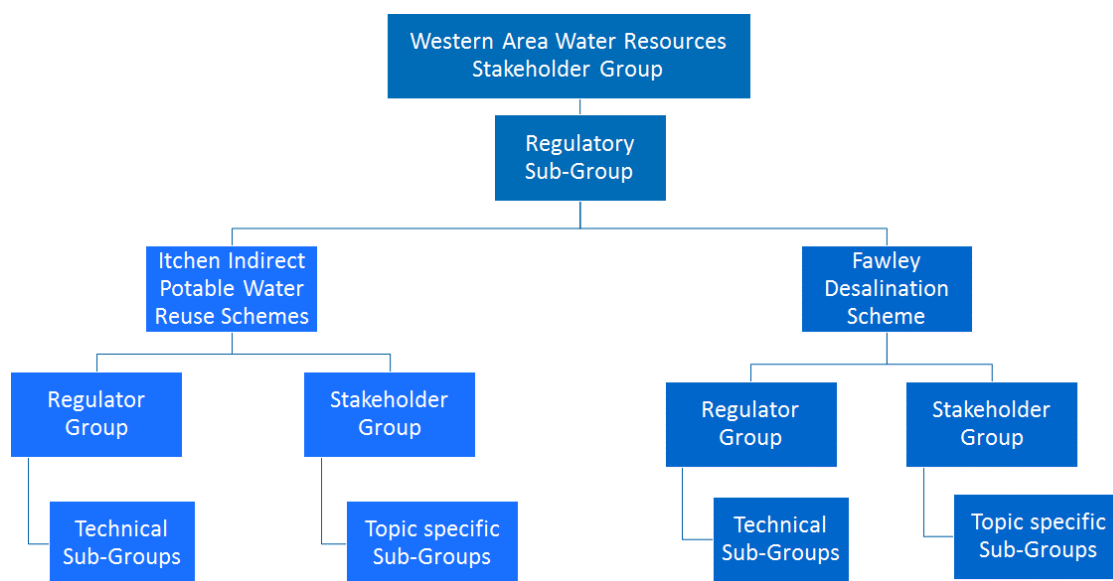
- We met the Environment Agency, Ofwat and Defra on 11 April 2019 to discuss the WRMP and its deliverability, particularly in relation to the Western area strategy. This was followed by another meeting with the Environment Agency on 15 May 2019 to further clarify some of the points
- Following Ofwat's publication of the IAP on 31 January 2019, we submitted further information to Ofwat as requested on its IAP on 1 April and 3 May 2019
- We have continued to keep key stakeholders in our Western area informed of the progress with the WRMP. This includes our investigations and technical work on WRMP schemes, and the work we are carrying out in partnership with the Environment Agency, Natural England and other stakeholders to deliver the commitments in the s20 agreement. This has been communicated through briefings to all of the key stakeholders through the Western Area Water Resources Stakeholder Group in January and May 2019
- We have taken account of Natural England's feedback on the schemes we have proposed in our WRMP and have discussed key points with technical staff

As part of Southern Water's commitment to collaborative working arrangements, the Western Area Water Resources Stakeholder Group, comprising both regulatory and non-regulatory representatives, meets on a regular basis. Table 13 details the membership of this Stakeholder Group. Figure 18 shows how our Western Area Water Resources Stakeholder Group forms the highest level consultation group in our overall engagement approach to regulatory and stakeholder consultation in respect of all water resources management issues in Hampshire and the Isle of Wight. This group will continue to be the strategic vehicle for engagement on the delivery of the Fawley desalination scheme and the alternative Itchen indirect water reuse options.

Table 13 Membership of the Western Area Water Resources Stakeholder Group

Western Area Water Resources Stakeholder Group Membership		
Environment Agency	Salmon and Trout Conservation	CPRE Hampshire
Natural England	Hampshire and Isle of Wight Wildlife Trust	RSPB
Consumer Council for Water	Wessex Chalk Stream and Rivers Trust	World Wildlife Fund
South Downs National Park Authority	Test and Itchen Association	Landowners
New Forest National Park Authority	Countryside Landowners Association	Fisheries
	Angling Trust	Portsmouth Water
	Hampshire Ornithological Society	

Figure 18 Overview of regulatory and stakeholder engagement approach for Fawley desalination scheme and the Itchen indirect alternative water reuse options



Below the strategic consultation group, Figure 18 shows that there is a regulatory strategic sub-group that provides a focus on regulatory matters. Additionally, Southern Water are in the process of establishing scheme-specific stakeholder and regulatory groups for each strategic scheme to enable dialogue on all aspects of the environmental and planning issues for each scheme. It is likely that there will also be a need for regulatory and stakeholder technical or topic-specific sub-groups (see Figure 18) for each scheme to enable greater focus on the details, for example on archaeology or marine environmental modelling. These sub-groups would meet as and when required according to the issues to be discussed and key milestones, including regulatory and planning submission dates. Southern Water currently consider it is appropriate to have one set of regulatory and stakeholder groups for all of the Itchen indirect water reuse options (i.e. Portsmouth Harbour, Fareham, Woolston and Portswood options) due to the overlap of many of the key environmental and planning issues.

Table 14 summarises the key regulatory and planning bodies that we expect to engage with as part of the regulatory groups, and Table 15 provides details of the key stakeholders that Southern Water will need to engage with on a regular basis.

Table 14 Key regulatory and planning bodies

Fawley desalination	Environment Agency Marine Management Organisation (MMO) New Forest District Council Winchester City Council Historic England	Natural England New Forest National Park Authority Southampton City Council South Downs National Park Authority
Itchen Indirect Water Reuse Options	Environment Agency Portsmouth City Council Fareham Borough Council Eastleigh Borough Council Historic England	Natural England Southampton City Council South Downs National Park Authority Winchester City Council

Table 15 Key stakeholders

Fawley desalination		Hampshire & Isle of Wight Wildlife Trust New Forest Trust Inshore Fisheries/IFCA RSPB Forestry Commission RNLI MOD Boating/Yacht Clubs Key industrial land owners Key industrial customers English Heritage Local interest groups Local environmental groups	Western Area Water Resources Stakeholder Group members HM Coastguard Hampshire County Council Trinity House Harbour Authorities Ferry Operators Highways England National Grid Electricity distribution Suppliers Gas/fuel pipeline owners Fawley Waterside Ltd Landowners
Itchen Water Options	Indirect Reuse	Portsmouth Water Hampshire & Isle of Wight Wildlife Trust Inshore Fisheries/IFCA RSPB Itchen fisheries owners Itchen angling groups Local environmental groups Network Rail Gas/fuel pipeline owners	Western Area Water Resources Stakeholder Group members Hampshire County Council Highways England Local interest groups Electricity distribution suppliers Harbour Authorities Friends of the South Downs

As well as the formal meetings of these groups, there will be ongoing dialogue with the representatives of regulators and stakeholders as required, including to gather information, seek advice or to consult on specific issues.

In addition to these collaborative consultation groups, Southern Water will continue to engage directly with its key regulators and with Defra on a regular basis on all regulatory aspects of the delivery of these water resource schemes. This includes joint meetings with several regulators and/or Defra as may be required.

Southern Water’s regulatory dialogue with the Environment Agency and Natural England will include local teams, national permitting centres and other national teams/experts, as appropriate. Southern Water will continue to work with relevant experts within the Environment Agency and Natural England to discuss the detailed design of each scheme and the development of required mitigation measures, including through the Natural England Discretionary Advice Service (DAS).

Southern Water is committed to taking the views of the Environment Agency and Natural England, as well as the MMO where applicable, fully into account at all appropriate stages. As identified in the preceding section, during the early environmental activities there will be extensive dialogue with the environmental regulators to agree the options to be developed, the required mitigation measures and how any residual uncertainties and risks will be managed in advance of applications for planning approval and environmental permits/consents. Figure 14 and Figure 15 earlier indicate that Southern Water will be actively engaging with the environmental regulators at regular intervals at each step of the monitoring, modelling and assessment processes.

Southern Water will also continue to engage with our neighbouring water companies through the WRSE as the schemes are progressed. Portsmouth Water and Southern Water are committed to meeting on a regular basis to discuss ongoing investigations and the delivery of schemes in order to keep each other informed of emerging risks to each company’s respective

water resources strategies. This will include working collaboratively to carefully consider the potential cumulative effects of the River Itchen indirect water reuse options with the Havant Thicket reservoir pipeline to the Southampton East WRZ, and where necessary identify appropriate detailed mitigation measures in dialogue with the environmental regulators.

8.5.7 Planning Co-ordination

Southern Water recognises that the Fawley desalination scheme and the Itchen indirect water reuse options will involve multiple planning authorities. In respect of the Fawley desalination scheme, depending on the final capacity of the scheme, it may be that the scheme is co-ordinated by the Planning Inspectorate through the Development Consent Order process as a Nationally Significant Infrastructure Project (under the Planning Act 2008).

If the Fawley desalination scheme is below the NSIP threshold capacity, Southern Water expect the scheme will be subject to the “Coastal Concordat” agreement to co-ordinate the dialogue on planning matters between the Marine Management Organisation (MMO), New Forest District Council, New Forest National Park Authority and Southampton City Council. This will include co-ordination with Natural England and the Environment Agency in respect of coastal development activities.

For the Itchen indirect water reuse options, the Coastal Concordat will not apply as the schemes do not involve coastal development. However, due to the multiple local planning authorities involved with these schemes due to long lengths of pipeline, Southern Water will discuss with the relevant planning authorities the use of voluntary Planning Performance Agreements to facilitate dialogue and agree timescales, actions and resources during the pre-application and application stages, and possibly extending through to the post-application stage.









9. Assessment of the WRMP19 strategies: Central and Eastern areas

9.1 Assessment Context

Through consideration of alternative options and programmes as part of the programme appraisal modelling and decision-making process, a final preferred strategy was developed for each operational area for the WRMP19. Each of the strategies were subject to assessment against the SEA objectives (as well as being subject to HRA and WFD assessment), as described below.

The assessment matrices presented in the following sections inform the commentary on the effects of the final strategies for each operating area identified through the SEA. Note that the assessment tables provided in Appendix D provide a full commentary for all effects of each of the options individually as required by the SEA Directive. Appendix G provides details of the SSSI assessments for each of the supply options included in the strategies. Annex 15 and Annex 16 provide full details of the HRA and WFD assessments, respectively, that have informed the SEA. The key below each matrix gives the SEA topic represented by each numbered objective, and the levels of significance (based on the definitions given in Figure 6 in section 4). The colour coding in the matrices represents a range from significant adverse impact in red through to significant beneficial impacts in dark green as shown in the legend below. The table beneath shows the code number for each SEA topic and objective presented in the assessment matrices.

Legend for interpretation of significance of effect used in each assessment matrix:

Colour	Significance of Effect
	Dark Green Major Beneficial
	Mid Green Moderate Beneficial
	Light Green Minor Beneficial
	Blue Negligible
	Yellow Minor Adverse
	Orange Moderate Adverse
	Red Major Adverse
	None Not Applicable

SEA topics and objectives codes:

Key Environmental and Social Criteria								
Criteria	1. Biodiversity, plants and animals	2.1 Population and human health	2.2 Population and human health	2.3 Population and human health	3.1 Material assets and resource use	3.2 Material assets and resource use	4.1 Water	4.2 Water
Objective Description	To conserve and enhance the variety of plant and animal life, including important sites of nature conservation interest and protected habitats and species, to enhance the local natural resources (including geology, soil, air and water) and avoid the spreading of invasive species.	To protect and enhance health and well-being through raising awareness of the importance and value of the water environment.	To protect and enhance the water environment for other users including sustainable recreation, tourism and mobility, as well as land-based recreational resources.	To promote a sustainable economy with good access to basic services, including a quick to recover, high quality and affordable supply of water.	To reduce, and make more efficient, the household, industrial and commercial consumption of resources, minimise the generation of waste, encourage its re-use and eliminate waste sent to landfill.	To promote and secure the efficient and sustainable use of water to ensure quick to recover water supplies for people and businesses.	To avoid negative impacts on surface and groundwater levels and flows, including when this impacts on habitats.	To protect and enhance surface and groundwater quality and protect and enhance coastal waterbodies.
Criteria	4.3 Water	4.4 Water	5.1 Soil, geology and land use	6.1 Air and Climate	6.2 Air and climate	6.3 Air and climate	7.1 Archaeology and Cultural Heritage	8.1 Landscape and Visual Amenity
Objective Description	To ensure appropriate and sustainable management of water whilst protecting the biological, geochemical and physical processes and components that take place or occur within a biological community of interacting organisms and their physical environment that rely on water resources.	To reduce or manage flood risk.	To protect and enhance the physical features of the surface of the Earth and their relation to its geological structures and the quality and quantity of soils.	To reduce air pollutant emissions.	To reduce energy consumption and greenhouse gas emissions.	To adapt and improve flexibility to the threats of climate change.	To conserve and enhance the historic environment, assets (building, monument, site, place, area or landscape) identified as having a degree of importance, and their settings and protect important sites preserving evidence of past activity.	To protect, enhance the quality of and improve access to landscapes identified as having a degree of importance and unimportant landscapes, urban areas (towns) and the countryside.

9.2 Central area

9.2.1 Overview

Due to the scale of the forecast supply deficit in the Central area, it was not considered feasible to remove any option included in the feasible list from consideration for the final strategy. All options were therefore considered and the SEA findings (along with the HRA and WFD assessments) were actively used in reaching a decision on the WRMP strategy. A number of alternative options and option combinations were explored in developing the preferred strategy as well as a wide range of scenario testing model runs - the SEA, HRA and WFD assessments were used to compare the environmental performance of these alternative combination of options to inform and contribute to the decision-making process which also took into account other factors including cost, resilience and customer preference information. We also took account of the consultation responses on the draft WRMP19. This assessment and decision-making process led to the development of our preferred strategy for the Central Area.

Given the environmental benefits associated with demand management options as set out in the SEA, we have preferentially included in our strategy the early implementation of further measures to reduce demand for water in the Central Area:

- Reduce leakage by a further 15% by 2025 and by 50% by 2050
- Water efficiency activities to help our customers reduce their consumption to an average of 100 litres per head per day by 2040 ('Target 100' programme). This involves an intensive media and engagement campaign as part of an initial phase of the 'Target 100' programme, concentrated throughout the period 2020-2025, but helping to influence customers' water use behaviour over the longer term.
- Metering of more household properties to increase meter penetration from 88% to 92% which will support the achievement of the 'Target 100' programme

We have also included 9 catchment management schemes in our strategy to address nitrate

and/or pesticide water quality issues at some of our water sources, securing existing supplies and in the majority of cases enabling more water to be made available for supply.

Our strategy also includes development of a strategic Littlehampton WwTW Indirect Potable Water Reuse scheme (20MI/d) and a coastal desalination plant at Shoreham Harbour (10MI/d). Additionally, there are a number of small groundwater schemes and an artificial groundwater storage and recovery (ASR) scheme for the Sussex Coast Lower Greensand aquifer. We will also maximise the use of remaining surplus water in winter when river flows are high from our Pulborough surface water source within the conditions of our existing abstraction licence.

The ability to achieve our aim of restricting drought orders/permits to extreme drought conditions only to reduce the risk of adverse environmental effects was examined as part of developing the strategy taking account of the costs, risks, feasibility and environmental effects of the measures required to deliver this objective. Delivery of this objective requires several new resource schemes to be developed first, including the transfer to Midhurst WSW and Petersfield BH rehabilitation scheme and the scheme to bring the West Chiltington supply back into service, along with continuing activity to further reduce leakage and customer consumption through more metering and water efficiency measures. Consequently, until all of these schemes are delivered, drought permits/orders in the Central area would still be required in severe as well as extreme drought conditions in the period up to 2024.

9.2.2 SEA of the preferred strategy

The SEA assessment summary of the WRMP19 strategy for the Central area is presented in Figure 199 below using the same structure as described for the Western Area strategy.

Demand management measures are a core feature of the strategy, reflecting their environmental benefits and include: installation of AMR meters as part of increasing household meter penetration from 88% to 92%; further leakage reduction (15% by 2025 and 50% by 2050); and the 'Target 100' water efficiency activities to reduce average per capita consumption to 100 litres per head per day by 2040. The SEA identified that the effects of these options are mainly beneficial but with some minor temporary adverse effects in respect of materials required for water leak repairs and metering, as well as the risk of temporary traffic disruption and associated carbon and air quality effects of street works for leak repair activities.

The strategy includes nine catchment management options to improve nutrient and pesticide management through improvements to land-use practices. The SEA findings for the catchment management options are very similar and have been grouped together in one row in the table below. The effects of these options are assessed as beneficial in relation to many of the SEA objectives with predominately negligible or no adverse effects, except for minor adverse effects associated with carbon emissions for the extra water treatment necessary for the additional water made available by these schemes. These schemes also provide a beneficial effect in respect of WFD objectives to achieve good ecological status and wider environmental objectives for terrestrial ecosystems.

We have also included an in-stream river restoration works scheme for the River Arun and Western Rother to provide increased environmental resilience to the abstraction of water from the rivers in times of drought. This will complement the Pulborough source options and the Littlehampton WwTW indirect potable reuse scheme included in the strategy. The effects of this option are assessed as beneficial in relation to many of the SEA objectives with only negligible adverse effects.

There are seven supply-side options in our strategy, including a strategic water reuse scheme and desalination scheme which both provide beneficial effects relating to the provision of additional reliable water supplies by reusing treated effluent and seawater, respectively, and thereby increasing resilience to the future effects of climate change. The SEA identified a number of adverse effects for these two schemes:

- The **Littlehampton reuse option** would give rise to a small number of major adverse effects relating to some construction activity within proximity to the South Downs National Park, the significant use of materials for construction and operation, as well as requiring high energy usage with consequent greenhouse gas emissions
Since the draft WRMP19, the pipeline route for this scheme has been reviewed and revised to avoid adverse effects on the nationally rare ecological communities of the Fairmile Bottom SSSI and minimise effects on other nearby sensitive habitats within the South Downs National Park. This review has considered the permanence of impacts from the pipeline, including assessing the risk of loss of irreplaceable habitats (e.g. chalk grassland) which cannot be mitigated for. The pipeline will be installed within the road, or verge, to the north of Fairmile Bottom SSSI, and therefore there will be no direct habitat loss. Air quality impacts will need to be considered and an air quality assessment will be completed once details of the construction programme and methods have been finalised
As identified by the WFD assessment (Annex 16, Appendix B), the discharge of highly treated effluent to the Western Rother would not lead to any material adverse effects.
- Some moderate adverse effects have been identified in relation to the **10MI/d Shoreham desalination plant** including energy use and carbon emissions. The desalination plant would be located adjacent to existing industrial areas with few sensitive receptors in immediate proximity to these sites. As identified by the WFD assessment (see Appendix B of Annex 16 and Appendix G of this report, section 1.8), the discharge of brine waste would not lead to any material adverse effects to water quality or ecology in the marine environment. Near Field dispersion modelling of the brine discharge shows that the hypersaline plume reaches equilibrium (10% above ambient salinity) within 20.53 m from the outfall under worst case scenario. The option will also make use of the existing long-sea outfall from Shoreham power station, and therefore at sufficient distance from the Adur Estuary SSSI. The breakwaters at the mouth of the estuary will also deflect the plume away from the mouth of the estuary

The **Pulborough winter transfer scheme (Stage 2)** and the **Sussex Coast - Lower Greensand ASR schemes** may result in some temporary moderate adverse effects as a consequence of pipeline construction activities, including in proximity to the South Downs National Park. The Pulborough scheme pipeline has been routed to minimise impacts to the South Downs National Park by extending alongside or within the A27 where possible. However, some small sections of pipeline will be required within the South Downs National Park as existing water supply infrastructure are located within the Park and the pipeline needs to connect to these assets. Further route optimisation will be required at the detailed planning stage to minimise impacts to priority habitats including avoiding the lowland calcareous grassland at Slonk Hill and Southwick Hill. Lowland calcareous grassland also extends around Patcham and therefore long-term habitat loss will occur along this section of the pipeline route where existing access tracks cannot be used. Route optimisation will be required at the detailed planning stage to avoid extensive loss of trees. The pipeline avoids the Adur Estuary SSSI.

Once operational, negligible adverse effects are anticipated for both of these schemes, with the exception of moderate adverse effects relating to energy use and carbon emissions

Both these schemes are beneficial for water supply sustainability and resilience, optimising existing water resources, making use of higher river flows in the winter within existing abstraction licence conditions so as to protect groundwater resources for subsequent use in the drier summer months when river flows are much lower in the Western Rother. Subsequently, during the summer, additional groundwater abstraction enabled by varying the existing abstraction licence condition for our Pulborough groundwater source (by not restricting groundwater abstraction when river flows are low) will help secure water supplies to the north Sussex area without adverse effects on the Western Rother.

The **options to rehabilitate the West Chiltington and Petersfield groundwater sources** have limited construction-related requirements and so no adverse construction effects are likely. However, for the West Chiltington option only, the WFD assessment has identified some uncertainty regarding the potential effects to surface waters (River Chilt) and a potential risk to wetland habitats (Hurston Warren SSSI) as a result of the groundwater abstraction. Although historically the source was operated without any known effects on the water environment, further assessment of the hydrogeological connectivity between the groundwater source and these dependant ecosystems is required in order to confirm the magnitude of any potential impact during operation. These investigations will take place as part of the WINEP3 WFD no-deterioration investigations already agreed with the Environment Agency and scheduled for completion by 2022. We will work with the Environment Agency and Natural England over the coming months to agree the precise scope of these investigations, which may include groundwater modelling and/or pump test surveys. These investigations will support the development of any mitigation measures that may be required in the event that WFD status deterioration and/or adverse effects on the GWDTE SSSI site are identified.

Overall, the environmental assessment has concluded that the strategy has predominately minor to moderate adverse effects and negligible to minor beneficial effects. The Littlehampton WwTW water reuse scheme will present some potential major adverse effects, mostly during construction but also in respect of high energy use.

For several of the schemes, we have considered a range of mitigation measures to reduce the assessed effects on the environment and these will be further developed as part of the detailed planning and design of the schemes. We are committed to continuing dialogue with regulators, statutory bodies and interested stakeholders in developing these schemes and as we carry out detailed environmental investigations to inform precise details of any required mitigation measures.

Figure 19 Visual evaluation matrix summary of WRMP preferred programme for the Central area

Option name	Residual Effects Significance	SEA objective																
		Biodiversity, flora and fauna		Population and human health			Material assets and resource use		Water				Soil, geology and land use	Air and Climate			Archaeology and Cultural Heritage	Land-scape and Visual
		1.1	1.2	2.1	2.2	2.3	3.1	3.2	4.1	4.2	4.3	4.4	5.1	6.1	6.2	6.3	7.1	8.1
Littlehampton WTW Indirect Potable Water Reuse (20M/d)	Adverse	Minor adverse	Negligible beneficial or adverse	Moderate adverse	Minor adverse	Negligible beneficial or adverse	Moderate adverse	Negligible beneficial or adverse	Minor adverse	Minor adverse	Negligible beneficial or adverse	Negligible beneficial or adverse	Negligible beneficial or adverse	Moderate adverse	Major adverse	Negligible beneficial or adverse	Moderate adverse	Major adverse
	Beneficial	Negligible beneficial or adverse	Negligible beneficial or adverse	Minor beneficial	Negligible beneficial or adverse	Moderate beneficial	Negligible beneficial or adverse	Moderate beneficial	Negligible beneficial or adverse	Negligible beneficial or adverse	Negligible beneficial or adverse	Negligible beneficial or adverse	Negligible beneficial or adverse	Negligible beneficial or adverse	Negligible beneficial or adverse	Negligible beneficial or adverse	Minor beneficial	Negligible beneficial or adverse
Transfer to Midhurst WSW & Petersfield BH rehabilitation	Adverse	Negligible beneficial or adverse	Negligible beneficial or adverse	Negligible beneficial or adverse	Negligible beneficial or adverse	Negligible beneficial or adverse	Minor adverse	Negligible beneficial or adverse	Minor adverse	Minor adverse	Negligible beneficial or adverse	Negligible beneficial or adverse	Negligible beneficial or adverse	Negligible beneficial or adverse	Moderate adverse	Negligible beneficial or adverse	Negligible beneficial or adverse	Minor adverse
	Beneficial	Negligible beneficial or adverse	Negligible beneficial or adverse	Minor beneficial	Negligible beneficial or adverse	Moderate beneficial	Negligible beneficial or adverse	Negligible beneficial or adverse	Negligible beneficial or adverse	Negligible beneficial or adverse	Negligible beneficial or adverse	Negligible beneficial or adverse	Negligible beneficial or adverse	Negligible beneficial or adverse	Negligible beneficial or adverse	Negligible beneficial or adverse	Negligible beneficial or adverse	Negligible beneficial or adverse
Scheme to bring West Chiltington back into service	Adverse	Minor adverse	Negligible beneficial or adverse	Minor adverse	Negligible beneficial or adverse	Negligible beneficial or adverse	Minor adverse	Negligible beneficial or adverse	Moderate adverse	Moderate adverse	Moderate adverse	Negligible beneficial or adverse	Negligible beneficial or adverse	Negligible beneficial or adverse	Moderate adverse	Negligible beneficial or adverse	Negligible beneficial or adverse	Negligible beneficial or adverse
	Beneficial	Negligible beneficial or adverse	Negligible beneficial or adverse	Minor beneficial	Negligible beneficial or adverse	Moderate beneficial	Negligible beneficial or adverse	Negligible beneficial or adverse	Negligible beneficial or adverse	Negligible beneficial or adverse	Negligible beneficial or adverse	Negligible beneficial or adverse	Negligible beneficial or adverse	Negligible beneficial or adverse	Negligible beneficial or adverse	Negligible beneficial or adverse	Negligible beneficial or adverse	Negligible beneficial or adverse
ASR (Sussex Coast - Lower Greensand)	Adverse	Negligible beneficial or adverse	Negligible beneficial or adverse	Minor adverse	Minor adverse	Negligible beneficial or adverse	Moderate adverse	Negligible beneficial or adverse	Negligible beneficial or adverse	Negligible beneficial or adverse	Negligible beneficial or adverse	Negligible beneficial or adverse	Negligible beneficial or adverse	Minor adverse	Moderate adverse	Negligible beneficial or adverse	Negligible beneficial or adverse	Negligible beneficial or adverse
	Beneficial	Minor beneficial	Minor beneficial	Minor beneficial	Negligible beneficial or adverse	Moderate beneficial	Negligible beneficial or adverse	Negligible beneficial or adverse	Negligible beneficial or adverse	Negligible beneficial or adverse	Negligible beneficial or adverse	Negligible beneficial or adverse	Negligible beneficial or adverse	Negligible beneficial or adverse	Negligible beneficial or adverse	Negligible beneficial or adverse	Minor beneficial	Negligible beneficial or adverse
Winter transfer Stage 2: New main Shoreham/North Shoreham and Brighton A	Adverse	Negligible beneficial or adverse	Negligible beneficial or adverse	Minor adverse	Minor adverse	Negligible beneficial or adverse	Minor adverse	Negligible beneficial or adverse	Negligible beneficial or adverse	Negligible beneficial or adverse	Negligible beneficial or adverse	Negligible beneficial or adverse	Negligible beneficial or adverse	Minor adverse	Moderate adverse	Negligible beneficial or adverse	Moderate adverse	Major adverse
	Beneficial	Negligible beneficial or adverse	Negligible beneficial or adverse	Minor beneficial	Negligible beneficial or adverse	Moderate beneficial	Negligible beneficial or adverse	Moderate beneficial	Negligible beneficial or adverse	Negligible beneficial or adverse	Minor beneficial	Negligible beneficial or adverse	Negligible beneficial or adverse	Negligible beneficial or adverse	Negligible beneficial or adverse	Negligible beneficial or adverse	Minor beneficial	Negligible beneficial or adverse
Coastal Desalination - Shoreham Harbour (10M/d)	Adverse	Negligible beneficial or adverse	Negligible beneficial or adverse	Moderate adverse	Minor adverse	Negligible beneficial or adverse	Moderate adverse	Negligible beneficial or adverse	Negligible beneficial or adverse	Minor adverse	Negligible beneficial or adverse	Negligible beneficial or adverse	Negligible beneficial or adverse	Negligible beneficial or adverse	Moderate adverse	Moderate adverse	Negligible beneficial or adverse	Negligible beneficial or adverse
	Beneficial	Negligible beneficial or adverse	Negligible beneficial or adverse	Minor beneficial	Negligible beneficial or adverse	Moderate beneficial	Negligible beneficial or adverse	Negligible beneficial or adverse	Negligible beneficial or adverse	Negligible beneficial or adverse	Minor beneficial	Negligible beneficial or adverse	Negligible beneficial or adverse	Negligible beneficial or adverse	Negligible beneficial or adverse	Negligible beneficial or adverse	Minor beneficial	Negligible beneficial or adverse
Pulborough groundwater licence variation	Adverse	Negligible beneficial or adverse	Negligible beneficial or adverse	Negligible beneficial or adverse	Negligible beneficial or adverse	Negligible beneficial or adverse	Negligible beneficial or adverse	Negligible beneficial or adverse	Negligible beneficial or adverse	Negligible beneficial or adverse	Negligible beneficial or adverse	Negligible beneficial or adverse	Negligible beneficial or adverse	Negligible beneficial or adverse	Minor adverse	Negligible beneficial or adverse	Negligible beneficial or adverse	Negligible beneficial or adverse
	Beneficial	Negligible beneficial or adverse	Negligible beneficial or adverse	Minor beneficial	Negligible beneficial or adverse	Moderate beneficial	Moderate beneficial	Negligible beneficial or adverse	Negligible beneficial or adverse	Negligible beneficial or adverse	Minor beneficial	Negligible beneficial or adverse	Negligible beneficial or adverse	Negligible beneficial or adverse	Negligible beneficial or adverse	Negligible beneficial or adverse	Minor beneficial	Negligible beneficial or adverse

- Key:
- Major adverse
 - Moderate adverse
 - Minor adverse
 - Negligible beneficial or adverse
 - Minor beneficial
 - Moderate beneficial
 - Major beneficial

9.2.3 SEA of strategic alternative options for Central area

Four strategic alternative options are being considered for the Central area: a larger coastal desalination option at Shoreham (up to 30MI/d), Tidal River Arun Desalination (10MI/d), Brighton WwTW indirect potable reuse (10 MI/d) and the Pulborough Winter Transfer Stage 1 scheme. These options may be required if an option in the preferred programme cannot be delivered in part or in full following more detailed planning and further environmental assessment studies.

These alternative options have been assessed (see Figure 20) and the SEA concluded that:

- The **larger coastal desalination option at Shoreham (up to 30MI/d)** would have moderate adverse effects including energy use and carbon emissions. Being located adjacent to an existing industrial area, there are few sensitive receptors in close proximity. The discharge of brine waste is not considered to lead to any material adverse effects to water quality or ecology in the marine environment. As with the smaller variant, the option will make use of the existing long-sea outfall from Shoreham power station, and therefore at sufficient distance from the Adur Estuary SSSI. The breakwaters at the mouth of the estuary will also deflect the plume away from the mouth of the estuary.
- The **Tidal River Arun Desalination (10MI/d)** requires a pipeline which crosses the River Arun and extends partly through the South Downs National Park. The section within the South Downs National Park cannot be avoided as Perry Hill WSR is located in the National Park, therefore mitigation will be required to minimise landscape impacts. The waste brine discharge will be mixed with effluent from the Littlehampton WwTW and discharge via the existing outfall into the coastal waters to allow for better dispersion. Climping beach SSSI is downstream of the abstraction point on the River Arun, and therefore reduced flows in the river could have adverse effects on the site. Timing of the abstractions to avoid low tide may help to mitigate these impacts but will need to be investigated further if this scheme is to be progressed. The SSSI also has a coastal frontage and therefore dispersion modelling of the brine discharge will be required to ensure no adverse impacts to the SSSI if this scheme is to be progressed.
- Since the draft WRMP19 and representations made by Natural England, the treated water pipeline route for **Brighton WwTW indirect potable reuse option** has been reviewed and completely re-routed to avoid impacting the Lewes Downs SAC, surrounding habitat used by a designated species, irreplaceable priority habitats (chalk grassland and ancient woodland), the visual amenity of the South Downs National Park, plus possible effects on Scheduled Monuments. The revised route also avoids any impacts to the Clayton to Offham Escarpment SSSI.
As a result of this significant change to the pipeline route, the identified environmental effects of the pipeline component of the scheme have substantially reduced although there is still some pipeline construction required further east within the South Downs National Park which we cannot avoid due to the relative locations of the Brighton WwTW and the location of the discharge of treated effluent on the other side of the South Downs. However, the revised scheme will ensure there is only one construction corridor required within the South Downs National Park, thereby minimising impacts. Additionally, there is some uncertainty surrounding the operational effect of increased flows on aquatic ecology in the water body receiving the highly treated effluent from the Brighton WwTW scheme, with the potential risk of WFD status deterioration. If this alternative scheme was required to be developed, further investigations would be required to assess these potential impacts in more detail, and if necessary develop appropriate mitigation measures if a WFD status deterioration risk was confirmed.

As with the Littlehampton WwTW reuse scheme, this Brighton scheme provides beneficial effects relating to the provision of additional reliable water supplies by reusing treated effluent, thereby increasing resilience to the future effects of climate change.

- The **Pulborough Winter Transfer Stage 1 scheme** makes use of existing water resources and involves improving water treatment processes to enable 2 Ml/d to be made available for supply. As such there are negligible effects from construction or operation of this scheme except for some minor adverse effects associated with additional energy and chemical use during operation and the use of materials during the construction phase.

Figure 20 Visual evaluation matrix summary of alternative options for the Central area

Central Area: Option name	Residual effect significance	SEA objective																	
		Biodiversity, flora and fauna		Population and human health			Material assets and resource use		Water				Soil, geology and land use		Air and Climate			Archaeology and Cultural Heritage Land-scape and Visual Amenity	
		1.1	1.2	2.1	2.2	2.3	3.1	3.2	4.1	4.2	4.3	4.4	5.1	6.1	6.2	6.3	7.1	8.1	
Winter transfer Stage 2: turbidity/sludge handling process improvements at Pulborough	Adverse						Minor adverse									Minor adverse		Minor adverse	
	Beneficial			Minor beneficial		Minor beneficial		Moderate beneficial											
Brighton WTW Indirect Potable Reuse scheme	Adverse	Moderate adverse	Minor adverse	Moderate adverse	Minor adverse		Major adverse		Major adverse						Moderate adverse	Major adverse	Moderate adverse	Major adverse	
	Beneficial			Minor beneficial		Minor beneficial		Moderate beneficial			Minor beneficial						Minor beneficial		
Coastal desalination at Shoreham (up to 30MI/d)	Adverse	Minor adverse		Moderate adverse	Minor adverse		Moderate adverse			Minor adverse					Moderate adverse	Moderate adverse			
	Beneficial			Minor beneficial		Minor beneficial				Minor beneficial							Minor beneficial		
Tidal River Arun Desalination	Adverse	Moderate adverse		Moderate adverse	Minor adverse		Moderate adverse		Minor adverse	Minor adverse			Minor adverse	Minor adverse	Moderate adverse			Minor adverse	
	Beneficial			Minor beneficial		Minor beneficial				Minor beneficial						Minor beneficial			

- Key:
- Major adverse
 - Moderate adverse
 - Minor adverse
 - Negligible beneficial or adverse
 - Minor beneficial
 - Moderate beneficial
 - Major beneficial

9.3 Eastern area

9.3.1 Overview

Due to the scale of the forecast supply deficit in the Eastern area, it was not considered feasible to remove any option included in the feasible list from consideration for the final strategy. All options were therefore considered and the SEA findings (along with the HRA and WFD assessments) were actively used in reaching a decision on the WRMP strategy. A number of alternative options and option combinations were explored in developing the preferred strategy as well as a wide range of scenario testing model runs - the SEA, HRA and WFD assessments were used to compare the environmental performance of these alternative combination of options to inform and contribute to the decision-making process which also took into account other factors including cost, resilience and customer preference information. We also took account of the consultation responses on the draft WRMP19. This assessment and decision-making process led to the development of our preferred strategy for the Eastern area.

Given the environmental benefits associated with demand management options as set out in the SEA, we have preferentially included in our strategy the early implementation of further measures to reduce demand for water in the Eastern area:

- Reduce leakage by a further 15% by 2025 and by 50% by 2050
- Water efficiency activities to help our customers reduce their consumption to an average of 100 litres per head per day by 2040 ('Target 100' programme). This involves an intensive media and engagement campaign as part of an initial phase of the 'Target 100' programme, concentrated throughout the period 2020-2025, but helping to influence customers' water use behaviour over the longer term.

We have also included 14 catchment management schemes in our strategy to address nitrate and/or pesticide water quality issues at some of our water sources, securing existing supplies and in the majority of cases enabling more water to be made available for supply.

Our strategy also includes development of a strategic Medway WwTW indirect potable water reuse scheme, an increased import of water from South East Water and improvements to a key water transfer pipeline within the operational area. Some enhancement schemes will also be required to bring some existing licensed water sources back into supply.

Our strategy therefore is to make the maximum use of existing water resources alongside demand management measures to deliver a robust and resilient water supply for customers in the Eastern area without the need for major new water source development.

The ability to achieve our aim of restricting drought orders/permits to extreme drought conditions only to reduce the risk of adverse environmental effects was examined as part of developing the strategy taking account of the costs, risks, feasibility and environmental effects of the measures required to deliver this objective. Delivery of this objective requires several schemes to be delivered first, including the South East Water import and some of the catchment management schemes, along with continuing activity to further reduce leakage and customer consumption through water efficiency measures. Drought permits/orders in the Eastern area would therefore still be required in severe as well as extreme drought conditions in the period up to 2024. After that, the number and frequency of drought permits/orders will be significantly reduced even in extreme drought, with consequent reductions in the environmental impact (in particular by removing the requirement for a River Medway Scheme Drought Permit / Order).

9.3.2 SEA of the preferred strategy

The SEA summary of the WRMP19 strategy for the Eastern area is presented in Figure 21 below.

Demand management measures are a core feature of the strategy, reflecting their environmental benefits and include: further leakage reduction (15% by 2025 and 50% by 2050); and the 'Target' 100 water efficiency activities to reduce average per capita consumption to 100 litres per head per day by 2040. The SEA identified that the effects of these options are mainly beneficial but with some minor temporary adverse effects in respect of materials required for water leak repairs, as well as the risk of temporary traffic disruption and associated carbon and air quality effects of street works for leak repair activities.

The strategy includes fourteen catchment management options to improve nutrient and pesticide management through improvements to land-use practices. The SEA findings for the catchment management options are very similar and have been grouped together in one row in the table below. The effects of these options are assessed as beneficial in relation to many of the SEA objectives with predominately negligible or no adverse effects, except for minor adverse effects associated with carbon emissions for the extra water treatment necessary for the additional water made available by these schemes. These schemes also provide a beneficial effect in respect of WFD objectives to achieve good ecological status and wider environmental objectives for terrestrial ecosystems.

The strategy involves development of six water supply augmentation options. The Medway WwTW indirect potable water reuse scheme provides beneficial effects relating to the provision of additional reliable water supplies by reusing treated effluent, thereby increasing resilience to the future effects of climate change. However, the scheme has the potential for major adverse effects relating to archaeology and cultural heritage due to the pipeline construction work – these construction risks will be addressed further in consultation with Historic England and local heritage asset owners and stakeholders through detailed planning, site surveys and design/routing of the pipeline route. These activities will inform the development of any necessary mitigation measures to protect the heritage features and reduce the effects to acceptable levels. The pipeline has been routed within existing access roads or arable fields to avoid woodland priority habitat. Arboriculture implication assessments will need to be carried out at the detailed planning stage to ensure any use of verges does not impinge the root protection zone. Mitigation will be required during construction to avoid impacts to Holborough and Burham Marshes SSSI (e.g. dust suppression measures, strategy for dewatering) however permanent disruption to surface water drainage will be avoided by constructing in the existing road network and disturbed arable land.

The strategy includes an inter-zonal water transfer (to maximise the full existing transfer capacity from the Faversham area) and a bulk water import from South East Water in the Canterbury area, both of which were assessed as having potential moderate adverse effects to biodiversity, fauna and flora due to construction effects on sites of nature conservation interest, as well as to landscape and visual amenity within the Kent Downs AONB. A short length of pipeline is required for the inter-zonal transfer from the Faversham area of approximately 5km within the Kent Downs AONB. Further route optimisation will be required at the detailed planning stage to minimise landscape impacts of these pipelines by routing through roads and existing access tracks where feasible. The pipelines have already been routed to avoid ancient woodland, and areas of woodland and parkland. These options will be further assessed during detailed design to develop appropriate mitigation measures to reduce

the magnitude of effects to an acceptable level. Minor beneficial effects arise from making optimal use of existing water sources.

The recommissioning of the Meopham greensand groundwater source is assessed as having predominantly negligible adverse effects. Minor adverse effects relate to energy and materials use and associated carbon emissions for water pumping and treatment. Minor beneficial effects arise from making optimal use of existing water sources.

Recommissioning of the West Sandwich and Sandwich groundwater source may have some minor adverse effects on surface water streams and aquatic ecology which will be investigated further as part of the WINEP3 investigations agreed with the Environment Agency over the next few years. This may require some additional abstraction licence control measures to be applied to protect the environment. Otherwise, this scheme has predominantly negligible adverse effects. Minor adverse effects relate to energy and materials use and associated carbon emissions for water pumping and treatment. Minor beneficial effects arise from making optimal use of existing water sources.

In the longer term, there may be a requirement to recommission our Stourmouth water supply source and treatment works for delivery by 2060 depending on the actual supply-demand balance position by this time. This would have negligible to minor adverse effects whilst minor beneficial effects arise from making optimal use of existing water sources.

Overall, the environmental assessment has concluded that the strategy has predominately negligible to minor adverse effects and negligible to minor beneficial effects.

9.3.3 SEA of strategic alternative option for Eastern area

One strategic alternative option is being considered for the Eastern area: the Sittingbourne industrial water reuse scheme. This option may be required if an option in the preferred programme cannot be delivered in part or in full following more detailed planning and further environmental assessment studies.

This alternative option has been assessed (see Figure 22 below) and the SEA concluded that there may be moderate adverse effects during construction after application of mitigation measures due to the proximity to important international wildlife sites, but mitigation would prevent any adverse effects on any European site. As with the Medway reuse scheme, this scheme would, if required to be implemented, lead to some beneficial effects in providing additional reliable water supplies by reusing treated effluent, thereby increasing resilience to the future effects of climate change

Figure 21 Visual evaluation matrix summary of WRMP preferred programme for the Eastern area

Option name	Residual Effects Significance	SEA objective																
		Biodiversity, flora and fauna		Population and human health			Material assets and resource use		Water				Soil, geology and land use	Air and Climate			Archaeology and Cultural Heritage	Land-scape and Visual
		1.1	1.2	2.1	2.2	2.3	3.1	3.2	4.1	4.2	4.3	4.4	5.1	6.1	6.2	6.3	7.1	8.1
Medway WTW Indirect Potable Water Reuse (18 MI/d)	Adverse	Minor adverse	Negligible beneficial or adverse	Moderate adverse	Minor adverse	Negligible beneficial or adverse	Moderate adverse	Negligible beneficial or adverse	Minor adverse	Minor adverse	Negligible beneficial or adverse	Negligible beneficial or adverse	Minor adverse	Moderate adverse	Moderate adverse	Negligible beneficial or adverse	Major adverse	Negligible beneficial or adverse
	Beneficial	Negligible beneficial or adverse	Negligible beneficial or adverse	Minor beneficial	Negligible beneficial or adverse	Moderate beneficial	Negligible beneficial or adverse	Moderate beneficial	Negligible beneficial or adverse	Negligible beneficial or adverse	Minor beneficial	Negligible beneficial or adverse	Negligible beneficial or adverse	Negligible beneficial or adverse	Negligible beneficial or adverse	Negligible beneficial or adverse	Minor beneficial	Negligible beneficial or adverse
Recommission Meopham Greensand groundwater source	Adverse	Negligible beneficial or adverse	Negligible beneficial or adverse	Negligible beneficial or adverse	Negligible beneficial or adverse	Negligible beneficial or adverse	Minor adverse	Negligible beneficial or adverse	Negligible beneficial or adverse	Negligible beneficial or adverse	Negligible beneficial or adverse	Negligible beneficial or adverse	Negligible beneficial or adverse	Negligible beneficial or adverse	Minor adverse	Negligible beneficial or adverse	Negligible beneficial or adverse	Minor adverse
	Beneficial	Negligible beneficial or adverse	Negligible beneficial or adverse	Minor beneficial	Negligible beneficial or adverse	Moderate beneficial	Negligible beneficial or adverse	Negligible beneficial or adverse	Negligible beneficial or adverse	Negligible beneficial or adverse	Negligible beneficial or adverse	Negligible beneficial or adverse	Negligible beneficial or adverse	Negligible beneficial or adverse	Negligible beneficial or adverse	Negligible beneficial or adverse	Negligible beneficial or adverse	Negligible beneficial or adverse
Utilise full existing transfer capacity (from Faversham4)	Adverse	Minor adverse	Minor adverse	Minor adverse	Negligible beneficial or adverse	Negligible beneficial or adverse	Minor adverse	Negligible beneficial or adverse	Negligible beneficial or adverse	Negligible beneficial or adverse	Negligible beneficial or adverse	Negligible beneficial or adverse	Negligible beneficial or adverse	Minor adverse	Moderate adverse	Negligible beneficial or adverse	Negligible beneficial or adverse	Minor adverse
	Beneficial	Negligible beneficial or adverse	Negligible beneficial or adverse	Minor beneficial	Negligible beneficial or adverse	Moderate beneficial	Negligible beneficial or adverse	Negligible beneficial or adverse	Negligible beneficial or adverse	Minor beneficial	Negligible beneficial or adverse	Negligible beneficial or adverse	Negligible beneficial or adverse	Negligible beneficial or adverse	Negligible beneficial or adverse	Negligible beneficial or adverse	Minor beneficial	Negligible beneficial or adverse
Stourmouth WSW (10MI/d with 20MI covered storage)	Adverse	Minor adverse	Negligible beneficial or adverse	Minor adverse	Moderate adverse	Negligible beneficial or adverse	Moderate adverse	Negligible beneficial or adverse	Minor adverse	Minor adverse	Negligible beneficial or adverse	Negligible beneficial or adverse	Negligible beneficial or adverse	Negligible beneficial or adverse	Minor adverse	Moderate adverse	Minor adverse	Minor adverse
	Beneficial	Negligible beneficial or adverse	Negligible beneficial or adverse	Minor beneficial	Negligible beneficial or adverse	Moderate beneficial	Negligible beneficial or adverse	Negligible beneficial or adverse	Negligible beneficial or adverse	Negligible beneficial or adverse	Negligible beneficial or adverse	Negligible beneficial or adverse	Negligible beneficial or adverse	Negligible beneficial or adverse	Negligible beneficial or adverse	Negligible beneficial or adverse	Negligible beneficial or adverse	Negligible beneficial or adverse
SEW bulk supply near Canterbury	Adverse	Negligible beneficial or adverse	Negligible beneficial or adverse	Minor adverse	Minor adverse	Negligible beneficial or adverse	Minor adverse	Negligible beneficial or adverse	Negligible beneficial or adverse	Negligible beneficial or adverse	Negligible beneficial or adverse	Negligible beneficial or adverse	Negligible beneficial or adverse	Minor adverse	Minor adverse	Negligible beneficial or adverse	Minor adverse	Minor adverse
	Beneficial	Negligible beneficial or adverse	Negligible beneficial or adverse	Minor beneficial	Negligible beneficial or adverse	Moderate beneficial	Negligible beneficial or adverse	Negligible beneficial or adverse	Negligible beneficial or adverse	Minor beneficial	Negligible beneficial or adverse	Negligible beneficial or adverse	Negligible beneficial or adverse	Negligible beneficial or adverse	Negligible beneficial or adverse	Negligible beneficial or adverse	Minor beneficial	Minor adverse
West Sandwich & Sandwich WSW licence variation	Adverse	Negligible beneficial or adverse	Negligible beneficial or adverse	Negligible beneficial or adverse	Negligible beneficial or adverse	Negligible beneficial or adverse	Minor adverse	Negligible beneficial or adverse	Negligible beneficial or adverse	Negligible beneficial or adverse	Negligible beneficial or adverse	Negligible beneficial or adverse	Negligible beneficial or adverse	Negligible beneficial or adverse	Negligible beneficial or adverse	Negligible beneficial or adverse	Minor adverse	Negligible beneficial or adverse
	Beneficial	Negligible beneficial or adverse	Negligible beneficial or adverse	Minor beneficial	Negligible beneficial or adverse	Moderate beneficial	Negligible beneficial or adverse	Negligible beneficial or adverse	Negligible beneficial or adverse	Negligible beneficial or adverse	Negligible beneficial or adverse	Negligible beneficial or adverse	Negligible beneficial or adverse	Negligible beneficial or adverse	Negligible beneficial or adverse	Negligible beneficial or adverse	Negligible beneficial or adverse	Negligible beneficial or adverse

Key:

- Major adverse
- Moderate adverse
- Minor adverse
- Negligible beneficial or adverse
- Minor beneficial
- Moderate beneficial
- Major beneficial

Figure 22 Visual evaluation matrix summary of the strategic alternative option for the Eastern area

Option name	Residual Effects Significance	SEA objective																
		Biodiversity, flora and fauna		Population and human health			Material assets and resource use		Water				Soil, geology and land use	Air and Climate			Archaeology and Cultural Heritage	Land-scape and Visual
		1.1	1.2	2.1	2.2	2.3	3.1	3.2	4.1	4.2	4.3	4.4	5.1	6.1	6.2	6.3	7.1	8.1
Sittingbourne Industrial Water Reuse	Adverse	Major adverse	Minor adverse	Major adverse	Minor adverse	Negligible beneficial or adverse	Major adverse	Negligible beneficial or adverse	Negligible beneficial or adverse	Negligible beneficial or adverse	Negligible beneficial or adverse	Negligible beneficial or adverse	Negligible beneficial or adverse	Minor adverse	Major adverse	Negligible beneficial or adverse	Negligible beneficial or adverse	Minor adverse
	Beneficial	Negligible beneficial or adverse	Negligible beneficial or adverse	Moderate beneficial	Negligible beneficial or adverse	Moderate beneficial	Negligible beneficial or adverse	Negligible beneficial or adverse	Negligible beneficial or adverse	Negligible beneficial or adverse	Negligible beneficial or adverse	Negligible beneficial or adverse	Negligible beneficial or adverse	Negligible beneficial or adverse	Negligible beneficial or adverse	Negligible beneficial or adverse	Moderate beneficial	Negligible beneficial or adverse

- Key:
- Major adverse
 - Moderate adverse
 - Minor adverse
 - Negligible beneficial or adverse
 - Minor beneficial
 - Moderate beneficial
 - Major beneficial

9.4 Delivering on national environmental policy objectives

Net environmental gain has been included as a policy principle in the Government's 25 year plan to improve the environment (published in January 2018). References to achieving net gains across the three overarching objectives for sustainable development (economic, social and environmental) along with achieving net gain in biodiversity are also set out in the updated National Planning Policy Framework (NPPF) published in July 2018 (and were previously included in the 2012 NPPF). The National Infrastructure Commission (NIC) report on water infrastructure (published in April 2018) also emphasises the economic and social benefits of improving water supply resilience.

The SEA incorporates these key policy principles within the various topic area objectives against which we have assessed each option, strategy and the WRMP19 as a whole. We have therefore had regard to these national planning objectives in developing the WRMP19.

We are committed to delivering the principles set out the NPPF as we develop each supply scheme included in our WRMP19, working in dialogue with regulators, planners and stakeholders as we progress to the detailed design stage and detailed consideration of any required environmental mitigation measures.

As we plan to implement the WRMP, we will continue our work to embed the principles of achieving net gain across the three overarching objectives for sustainable development (economic, social and environmental) in line with the government's 25 Year Plan and the NPPF. Whilst they have not been quantified in monetary terms using natural and social capital methods, in qualitative terms net economic, social and environmental gains are likely to arise from delivery of our WRMP19 due to:

- Overall reduction in demand for water due to further leakage control and demand management measures, leading to an overall reduction in the amounts we need to abstract from the water environment
- A greater reduction in abstraction from **freshwater** resources as we deliver more innovative new sources of water: sea water desalination plants at Fawley and Shoreham; direct industrial water reuse in Hampshire (and possibly in Kent); indirect potable water reuse schemes in the Medway area, on the Sussex coast and on the Isle of Wight
- Reducing abstraction from water sources where existing abstraction levels present environmental risks in dry weather / drought conditions
- Substantially reducing the need for drought permits and drought orders from the mid-2020s in all but extreme drought conditions, reducing the frequency of adverse environmental effects associated with these measures
- Major programme of catchment management schemes and several river restoration measures to improve the quality of catchment land and in-stream habitats, enhancing the environmental resilience of our water sources and associated water bodies
- Further developing inter-company water transfers to maximise use of existing water resources and developing strategic new water sources without adverse effects on the environment. These additional inter-connections will also provide enhanced supply resilience, with social and economic benefits beyond meeting forecast supply deficits.
- Improving water supply resilience for household and non-household customers by reducing the frequency of water use restrictions and significantly reducing the risk of emergency drought orders, delivering economic and social benefits

9.5 Effects of the WRMP19 on ecosystem services

Although not part of the SEA process, the government's Natural Environment White Paper (Defra, 2011) encourages the consideration of ecosystem services, i.e. the benefits (goods and services) that people get from the environment. As shown in the option and programme assessments, and as discussed with regulators and stakeholders during development of the WRMP19, the SEA has considered effects on ecosystem services. Individual schemes in the WRMP have not been subject to ecosystems services assessment directly. However, an exercise was undertaken to map ecosystems services on to the SEA objectives arrived at through the SEA scoping process. We have mapped the SEA topics for the SEA of this plan against the various ecosystem services in line with the Environment Agency's November 2016 guidance on environmental valuation. Ecosystems services were grouped under four broad categories:

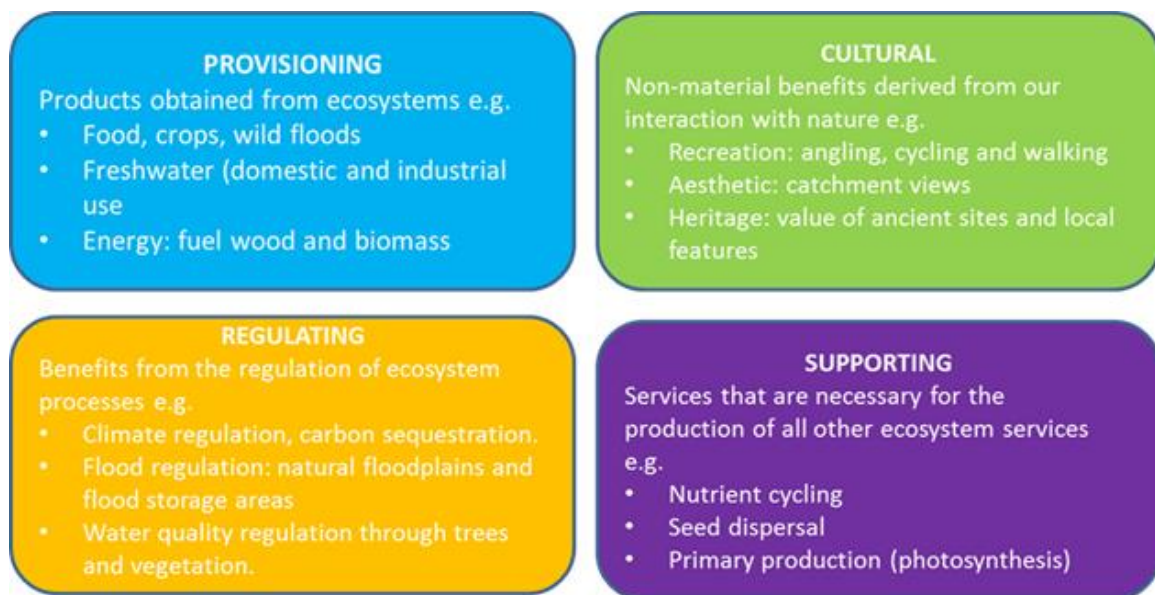


Table 16 provides an outline overview of how the final WRMP could affect the provision of ecosystems services. This illustrated that the SEA objectives considered all of the ecosystems services likely to be affected by schemes under consideration for the WRMP.

As an ecosystems services assessment approach is different to SEA, it was not proposed to incorporate an ecosystem services review of the effects as part of the SEA, which is a statutory process with specific government guidance to follow. However, for the options included in the WRMP19 strategy, a summary assessment table is provided below to indicate how each option may influence relevant ecosystem services (either positive or negative influence) to reinforce the findings from the SEA. The ticks in the boxes indicate where information in the SEA assessment matrices in Appendix D can be linked to specific ecosystem service categories.

This qualitative mapping can be built on for future planning aligned to the water industry's increasing adoption of ecosystems services and natural capital accounting for strategic planning and decision-making, including innovative approaches within Southern Water as part of its strategic Integrated Water Cycle Management programme.

Table 16 SEA to Ecosystem Services Mapping

Topic	Ecosystem Services																														
	Provisioning Services						Regulating services							Cultural services						Supporting services											
	Fresh Water	Food	Fibre and Fuel	Genetic Resources	Biochemicals, natural medicines	Ornamental Resources	Water for non-consumptive use	Air quality regulation	Climate regulation	Water regulation	Natural hazard regulation	Pest regulation	Disease regulation	Erosion regulation	Water purification and waste treatment	Pollination	Noise and light regulation	Cultural heritage	Recreation and tourism	Aesthetic Value	Intellectual & scientific, education value	Inspiration of art, folklore etc.	Social relations	Spiritual and religious value	Existence Value	Soil formation	Primary production	Nutrient cycling	Water recycling	Photosynthesis	Provision of habitat
Biodiversity, flora and fauna		✓		✓									✓	✓	✓	✓								✓		✓				✓	✓
Population and human health		✓	✓		✓	✓				✓	✓	✓	✓			✓		✓			✓	✓	✓	✓							
Material assets and resource use		✓																✓													
Water	✓									✓				✓																	
Soil, geology and land use													✓												✓		✓				
Air and climate							✓	✓																							
Archaeology and Cultural Heritage																	✓							✓							
Landscape and Visual Amenity																	✓		✓		✓			✓							

10. Cumulative effects assessment

10.1 Introduction

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

10.2 Cumulative effects of demand management options

Table 17 describes the potential cumulative impacts between the demand management options.

Table 17 Cumulative impacts between demand management options

Cumulative beneficial effects	Cumulative beneficial effects have been identified for all demand management options in relation to these measures acting in combination to increase the overall demand savings, thereby contributing to sustainable abstraction. The cumulative benefits will help reduce stress on the water environment and the water settings of heritage and landscape features, as well as reducing energy use for water pumping and treatment.
Cumulative adverse effects	Limited potential for cumulative temporary adverse effects, these relate to demand management options that require water leak repairs and metering in terms of the risk of temporary traffic disruption and associated carbon, as well as the associated air quality effects works in urban areas.

10.3 Cumulative effects of supply options

Potential interactions, and therefore cumulative effects, between each water supply option included in the WRMP19 strategies (and strategic alternatives) have been identified and are presented in Figure 23. The interactions are categorised by the potential for cumulative effects to arise due to construction and/or operation. The assessment of these potential cumulative effects are summarised in Table .

The assessments have also been informed by the HRA and WFD assessments. The potential for cumulative effects regarding European designated sites was investigated as part of the HRA which, following Appropriate Assessment in some cases, concluded that there would be no cumulative likely significant effects due to the WRMP19 schemes being implemented.

Similar to demand management options, multiple catchment management options (not included in the tables below) are considered to result in the potential for cumulative moderate beneficial effects associated with land management improvements and reduced application of fertiliser or pesticides on surface waters in the region, benefiting both terrestrial and aquatic biodiversity. No cumulative adverse effects are identified for these schemes and as such they are not included in the cumulative effects figure or tables below.

Identified cumulative effects of the different water supply options in the WRMP19 strategies are summarised below with further details provided in Table 18 to 21.

Cumulative effects of the Western area strategy have been identified in relation to:

- Beneficial effects of the proposed catchment management and river restoration schemes with other measures in the South East River Basin District River Basin Management Plan, as well as other catchment improvement activities
- Beneficial effects for all the demand management options in relation to these measures acting in combination to increase the overall demand savings, thereby contributing to sustainable abstraction
- Potential construction related cumulative effects due to the proximity and overlap of likely construction periods between the Hampshire grid system options (2026 and 2027) and the Southampton Link Main pipeline (2024-2027). The potential effects are limited to temporary effects to the local population and are considered low risk
- Potential adverse effects on Southampton Water from abstraction for the Test Estuary WwTW industrial water reuse scheme (if required) and the Fawley desalination scheme or Itchen indirect potable reuse schemes. These potential cumulative adverse effects are considered of being no greater than minor magnitude given the volume of water in the tidal prism of Southampton Water relative to the volumes of water being abstracted or effluent diverted
- Potential minor risk of cumulative effects with respect to three options that would be partly constructed within or in proximity to the New Forest National Park (Test Estuary WwTW industrial reuse (if required); Fawley desalination; and Bournemouth Water import). Careful planning, design and mitigation will be needed in relation to the pipeline construction activities to minimise impacts to habitats, heritage features and landscape features that provide the basis for the National Park designation
- Potential cumulative effects with wider infrastructure and housing development activities around Fawley and in the area to the south-west of Southampton between the edge of the New Forest and Southampton Water. Careful co-ordination will be required to plan the WRMP schemes to minimise risks of cumulative temporary adverse construction effects with these other developments over the near-term (2020 to 2027)

Cumulative effects of the Central area strategy have been identified in relation to:

- Beneficial effects of the proposed catchment management schemes with other measures in the relevant River Basin Management Plans as well as other catchment improvement activities
- Potential cumulative effects to the Sussex Coastal WFD water body due to the concurrent operation of the coastal desalination plants at Shoreham were assessed as negligible
- Potential cumulative effects to the Lower Greensand Arun and Western Streams WFD water body due to the operation of the Petersfield and West Chiltington groundwater sources were assessed as negligible
- Four water supply options in the preferred programme would be located within or adjacent to the South Downs National Park: Pulborough winter transfer scheme Stage 2; Littlehampton water reuse scheme; Rehabilitate Petersfield boreholes; Sussex coastal ASR scheme; and two strategic alternatives if developed; Brighton WwTW Indirect Potable Reuse and Tidal River Arun Desalination. Much of the development will take place at existing Southern Water operational sites and the risk of cumulative effects in respect of construction activities is considered low. Careful planning, design and mitigation will be needed in relation to the pipeline construction

elements required for some of these options to minimise impacts to habitats, heritage features and landscape features that provide the basis for the National Park designation. Close consultation will be necessary with the South Downs National Park Planning Authority, Natural England and other interested stakeholders

- Cumulative major effects on energy use and carbon emissions during operation of several energy-intensive schemes (notably the desalination and water reuse schemes)

Cumulative effects of the Eastern area strategy have been identified in relation to:

- Beneficial effects of the proposed catchment management schemes with other measures in the River Basin Management Plans as well as other catchment improvement activities
- Pipeline and related construction works some distance apart within the Kent Downs AONB relating to the South East Water import in the Canterbury area and the Faversham Main options. Careful planning, design and mitigation will be needed in relation to the pipeline construction to minimise impacts to habitats, heritage features and landscape features that provide the basis for the AONB designation but overall the cumulative effects are considered minor
- The draft final WRMP19 for Affinity Water has removed the groundwater source options which would have involved increased abstraction from the East Kent Chalk - Stour WFD groundwater body, potentially giving rise to cumulative effects with Southern Water's West Sandwich and Sandwich groundwater scheme. No impact pathways have been identified for the Lye Oak and Tappington South groundwater options which have been retained in Affinity Water's draft final WRMP19, and therefore no cumulative effects are considered likely.

Table 18 Cumulative effects assessment of supply options related to construction

Receptor	Option and Development Dates	Assessment of potential for cumulative effects
Local population (Population and human health)	Hampshire grid (reversible link HSE-HW) Hampshire grid (reversible link HW-HA) Southampton Link Main	<p>Identifying sources: These options have sections of proposed pipeline that are (necessarily) in close proximity as they allow connectivity to the same Southern Water supply assets. They are identified in the WRMP19 as likely to be constructed during a similar period (2026-2027).</p> <p>Potential environmental change and predicted response to change: Construction related cumulative effects are considered limited in scale as the location of where the pipeline sections come in close proximity with each other covers a small area. The options involve the construction of transfer pipelines which would be buried. The construction of these pipelines during a similar timeframe has the potential for short to medium-term temporary cumulative effects in the local area that relate to traffic disruption, noise, disturbance, nuisance effects, disruption to public rights of way and recreation. Disruption would be limited in duration and intensity as construction activity moves from one section of pipeline to another. There is an area identified as ancient woodland near the River Itchen that might be at increased risk due to cumulative effects. There are other sensitive receptors in proximity (River Itchen SAC and SSSI, South Downs National Park and two registered Parks and Gardens). However, constructing pipeline sections in proximity to these sites is unlikely to result in cumulative adverse effects to population and human health.</p> <p>Uncertainty, mitigation and monitoring: The potential for cumulative effects should be reviewed from a strategic planning perspective. Sensitive receptors (e.g. local residents) may consider constructing elements of all three schemes that are in proximity at the same time more preferable than multiple periods of disruption. Enhanced construction related mitigation such as detailed routing, traffic planning and management and limitation of works within peak periods or times will minimise the potential cumulative effects identified towards the local population.</p> <p>Overall rating of cumulative effects: Overall, given the nature of the potential cumulative effects (pipeline construction), there is a low risk of cumulative effects regarding the SEA topic Population and human health.</p>

Table 19 Cumulative effects assessment of supply options (by WFD water body) related to hydrological/hydrogeological connectivity

WFD Water body	Option	Assessment of Potential for Cumulative Effects
Southampton Water	Test Estuary WwTW industrial reuse (if required) Fawley Desalination 75MI/d	<p>Identifying sources: Test Estuary WwTW industrial reuse involves the re-direction of effluent from Southampton Water to industrial premises near to the proposed discharge point of the Fawley Desalination scheme (near the mouth of Southampton Water).</p> <p>Potential environmental change and predicted response to change: As identified by the WFD assessment, the Test Estuary WwTW industrial reuse has a low risk of adverse impacts to flows in Southampton Water, as a consequence of effluent being re-directed for industrial water use. The reduction in flow occurs into a narrow stretch part of the Test Estuary, while there is the potential for local impacts on invertebrates and fish this is not anticipated to extend beyond this and not extend towards the mouth of Southampton Water in proximity of the Fawley desalination brine discharge. The results of far field salinity modelling of the Fawley desalination brine discharge indicated that it is highly unlikely that a hypersaline plume originating in The Solent would cause salinity levels within Southampton Water to be elevated to the point where WFD ecological status was impacted.</p> <p>Uncertainty, mitigation and monitoring: None identified</p> <p>Overall rating of cumulative effects: Negligible risk of having cumulative adverse effects on Southampton Water transitional water body.</p>
Western Rother	Pulborough Groundwater Licence Variation Littlehampton Water Reuse Scheme	<p>Identifying sources: The Pulborough Groundwater Licence Variation targets the removal of the MRF condition on the groundwater source (and de-coupling from the surface water licence) in order to increase abstraction. The Littlehampton Water Re-use Scheme targets a 20 MI/d effluent transfer to the Western Rother, to be re-abstracted further downstream within the same waterbody.</p> <p>Potential environmental change and predicted response to change: As identified by the WFD assessment, the Pulborough Groundwater Licence Variation has been assessed as provisionally compliant, pending further assessment to confirm that the increased groundwater abstraction will not lead to WFD deterioration for the Western Rother, as a consequence of flow regime alterations. The Littlehampton Water Reuse Scheme has also been assessed as</p>

WFD Water body	Option	Assessment of Potential for Cumulative Effects
		<p>compliant, since the effluent will be highly treated and not expected to have detrimental impacts on the river's water quality or flow regime.</p> <p>Uncertainty, mitigation and monitoring: None identified</p> <p>Overall rating of cumulative effects: Negligible risk of cumulative adverse effects on the Southampton Water WFD transitional water body.</p>

Table 10 Cumulative effects assessment of supply options related to European designated sites

High Value Receptor	Option	Assessment of Potential for Cumulative Effects
<p>The New Forest SAC</p> <p>New Forest SPA and Ramsar</p>	<p>Bournemouth Water bulk supply</p> <p>Test Estuary WwTW Industrial Reuse (if required)</p> <p>Fawley desalination (modular) 100MI/d (strategic alternative)</p>	<p>Identifying sources: These options all require pipelines in or in close proximity to The New Forest SAC and New Forest SPA and Ramsar, and therefore have the potential to give rise to in-combination effects on the qualifying features.</p> <p>Potential environmental change and predicted response to change: Route optimisation of the Bournemouth Water bulk supply will ensure sufficient distance between the pipeline construction corridor and White parish Common SSSI (a component of The New Forest SAC) thereby avoiding adverse effects. All three schemes, if required, are needed by 2027.</p> <p>It is currently uncertain as to whether the Fawley desalination option will be required as this is a strategic alternative, and not currently in the preferred programme. It is also uncertain as to whether a 100MI/d option requires the pipeline. However, assuming it did, the same pipeline route would be used for this option and the Test Estuary Industrial Reuse option, thereby avoiding impacts to multiple areas of The New Forest SAC. Consideration will be given to installing the pipelines at the same time, in the same easement, to avoid repeat construction works in the designated site. This, with the option specific mitigation, will avoid adverse impacts.</p> <p>Uncertainty, mitigation and monitoring: Further detailed design and assessment to understand if Fawley desalination (modular) 100MI/d will be required in the preferred programme. Detailed route optimisation for Bournemouth Water bulk supply to avoid impacts to designated site. Implementation of option specific mitigation as detailed in Stage 2 Appropriate Assessments (Annex 15).</p> <p>Overall rating of cumulative effects: Overall, with appropriate mitigation employed there is a low risk of cumulative adverse effects regarding the SEA topic Biodiversity, flora and fauna.</p>

High Value Receptor	Option	Assessment of Potential for Cumulative Effects
<p>Solent Maritime SAC</p> <p>Solent and Southampton Water SPA and Ramsar</p>	<p>Bournemouth Water bulk supply</p> <p>Fawley desalination 75MI/d (modular) (preferred programme) or 100MI/d (modular) (strategic alternative)</p> <p>Southampton Link Main</p> <p>Test Estuary Industrial Reuse (if required)</p> <p>Itchen Indirect Potable Reuse Options (Portsmouth Harbour and Fareham WwTW indirect potable reuse, or Woolston and Portswood WwTW indirect potable reuse) (if required)</p>	<p>Identifying sources: These options all require construction in close proximity to Solent Maritime SAC and Solent and Southampton Water SPA and Ramsar, and therefore have the potential to give rise to in-combination effects on the qualifying features. Four of the options (Test Estuary Industrial Reuse, Fawley and the two Itchen Indirect Potable Reuse options) could result in operational impacts from changes in effluent amounts entering the estuary and brine discharge in coastal waters close to the site.</p> <p>Potential environmental change and predicted response to change: The construction activities relating to three options (Bournemouth Water bulk supply, Fawley and Southampton Link Main) will not result in direct impacts on the designated habitats of the European site. There is however a possible risk of damage to offsite habitat that provides a functional linkage to the SAC. Indirect impact associated with run-off from construction sites and dust could affect some of the habitats associated with the SAC and therefore mitigation measures will be required to ensure the habitats are not adversely affected.</p> <p>The operation of the Fawley desalination, or one of the Itchen Indirect Potable Reuse and Test Estuary industrial reuse options (if required) could also result in impact on the SAC either through changes in hydrological regime due to the cumulative effect of a decrease in treated effluent inputs and the discharge of brine. However, there is a spatial separation, and the large buffering capacity of Southampton Water and the Solent between the localised area of potential impact from the Test Estuary (to River Itchen confluence) and very minor increase in salinity as a result of the Fawley desalination scheme (downstream of Hamble Estuary). The existing effluent from the Portsmouth Harbour WwTW was redirected as part of a multi-million pound environmental improvement programme, and now discharges through an existing 5.7km sea outfall from Eastney Pumping station, into the main channel. A reduction in effluent resulting from the operation of the reuse scheme is therefore unlikely to be perceptible. The effluent from the Woolston WwTW is discharged through the existing outfall into the main channel of the River Itchen, approximately 300m offshore. A reduction in effluent</p>

High Value Receptor	Option	Assessment of Potential for Cumulative Effects
		<p>discharge could result in localised changes to the benthic community. Further in-combination assessment will be required depending on the final selection of schemes for the Western area.</p> <p>Uncertainty, mitigation and monitoring: The final selection of schemes in the Western area is uncertain, therefore further in-combination assessment will be required once the final scheme selection and detailed design is available (investigations for all schemes will be progressing simultaneously as require delivery by 2027 (see section 8.5). Detailed mitigation is discussed in the Stage 2 Appropriate Assessments (Annex 15) to avoid adverse impacts.</p> <p>Overall rating of cumulative effects: Overall, with appropriate mitigation employed there is a low risk of cumulative adverse effects regarding the SEA topic Biodiversity, flora and fauna.</p>
River Itchen SAC	<p>Additional import from Portsmouth Water (Havant Thicket reservoir development)</p> <p>Itchen Indirect Potable Reuse Options (Portsmouth Harbour WwTW and Fareham WwTW or Woolston and Portswood WwTW (strategic alternatives)</p>	<p>Identifying sources: These options require the pipeline to cross under the River Itchen, and therefore have the potential to give rise to in-combination effects on the qualifying features.</p> <p>Potential environmental change and predicted response to change: The construction activities relating to these options would require multiple crossings under the River Itchen SAC and construction in close proximity which could give rise to in-combination effects on the qualifying features such as Atlantic salmon and southern damselfly.</p> <p>Further detailed studies are required to confirm construction methods and programme, however both are likely to be required for operation in the same AMP period and therefore both could be constructed at the same time, in the same easement, thereby reducing multiple disturbances of the SAC.</p> <p>Uncertainty, mitigation and monitoring: Detailed mitigation is discussed in the Stage 2 Appropriate Assessments (Annex 15) to avoid adverse impacts.</p>

High Value Receptor	Option	Assessment of Potential for Cumulative Effects
		<p>Overall rating of cumulative effects: Overall, with appropriate mitigation employed there is a low risk of cumulative adverse effects regarding the SEA topic Biodiversity, flora and fauna.</p>

Table 21 Cumulative effects assessment of supply options related to landscape scale receptors

High Value Receptor	Option	Assessment of Potential for Cumulative Effects
South Downs National Park	Pulborough winter transfer scheme Stage 1 Littlehampton WwTW Indirect Potable Reuse Scheme Pulborough winter transfer scheme Stage 2 Pulborough groundwater licence variation Transfer to Midhurst WSW & Rehabilitate Petersfield source ASR Scheme Lower Greensand (SW WRZ) Brighton WwTW Indirect Potable Reuse (if required) Tidal River Arun Desalination (if required)	<p>Identifying sources: These options are all located within (or close proximity to) South Downs National Park and therefore have the potential to affect the character, distinctiveness, access and enjoyment of the designated area. None of the options are identified as resulting in potential operational hydrological cumulative effects.</p> <p>Potential environmental change and predicted response to change: Several of the schemes involve construction and development at existing Southern Water sites and therefore are unlikely to result in adverse cumulative effects over the long term (Rehabilitate Petersfield source; and ASR Scheme Lower Greensand). The remaining schemes (or parts of) that lie in the South Downs National Park (Littlehampton WwTW Indirect Potable Reuse Scheme; Pulborough winter transfer scheme Stage 2; Brighton WwTW Indirect Potable Reuse (if required) and Tidal River Arun Desalination (if required)) mainly relate to the construction of transfer pipelines which will be constructed adjacent to roads where possible, are considerable distance from each other (>5km) and will be buried after construction. Where pipeline construction does not follow existing roads, the reinstatement of land use and recovery of habitats and landscape following the pipeline construction may extend to 5 years or more. Therefore, the potential cumulative effects to the National Park are considered medium to long-term, but temporary provided that appropriate mitigation measures are put in place during construction to avoid sensitive habitats where loss of the habitat and/or effects on groundwater flow to these habitats would lead to permanent damage. There are only small parts of schemes that would result in permanent above ground infrastructure within the National Park (e.g. the proposed discharge to the River Ouse for the Littlehampton Indirect Potable Water Reuse Scheme). Considering this the potential cumulative effects could be termed ‘nibbling’ (incremental effects resulting in gradual loss of natural areas) and are considered small scale.</p> <p>Uncertainty, mitigation and monitoring: Further surveys and detailed route alignments to find the optimum route minimising environmental impacts.</p> <p>Overall rating of cumulative effects: Overall, with appropriate mitigation employed there is a low risk of cumulative adverse effects regarding the SEA topic Landscape and visual amenity.</p>

High Value Receptor	Option	Assessment of Potential for Cumulative Effects
New Forest National Park	Fawley Desalination Bournemouth Water import Test Estuary WwTW industrial reuse (if required)	<p>Identifying sources: These schemes involve pipeline construction close to (Bournemouth Water Import) or marginally within the New Forest National Park and therefore have the potential to affect the character, distinctiveness, access and enjoyment of the designated area.</p> <p>Potential environmental change and predicted response to change: No operational hydrological related cumulative effects on the National Park are anticipated. The Fawley desalination and Test Estuary WwTW industrial reuse schemes new pipelines are in proximity at the eastern boundary of the National Park. Based on the WRMP19 programme they could be constructed at the same time, if the Test Estuary WwTW industrial reuse scheme is required. The portion of the Test Estuary WwTW industrial reuse scheme pipeline located in the New Forest would be constructed adjacent to an existing main A road in an existing wayleave for power lines and therefore long-term effects are considered negligible. The majority of the Fawley Desalination pipeline would be constructed adjacent to roads in the New Forest (or otherwise located in the same wayleave as for the Test Estuary WwTW industrial reuse scheme). Best practice construction methods and mitigation will be in place to prevent any long-term impact on the National Park.</p> <p>Uncertainty, mitigation and monitoring: Sections of the Test Estuary WwTW Industrial Reuse scheme and the Fawley Desalination pipelines may share the same route adjacent to a main A road in an existing wayleave. Any potential to make use of this spatial synergy to minimise future effects should be investigated.</p> <p>Overall rating of cumulative effects: Negligible risk of having cumulative adverse effects regarding the SEA landscape and visual amenity topic.</p>
Kent Downs AONB	South East Water bulk supply near Canterbury Utilise full existing transfer capacity (from Faversham)	<p>Identifying sources: These options are both located within (or partly within) the Kent Downs AONB and therefore have the potential to affect the character, distinctiveness, access and enjoyment of the designated area. However, the options relate to water transfers and no operational hydrological related cumulative effects on the AONB are anticipated.</p> <p>Potential environmental change and predicted response to change: The two schemes are 17km apart and therefore effects only relate to cumulative effects to the AONB receptor, no cumulative effects are considered likely to any other receptors. The</p>

High Value Receptor	Option	Assessment of Potential for Cumulative Effects
		<p>Faversham scheme would consist of the construction of a 5.3km pipeline, two pumping stations and installation of various new asset component at the existing Southern Water WSW. The South East Water bulk supply near Canterbury scheme will involve the construction of a new 6.6km pipeline and a new 2Ml/d pumping station. The pipelines will be buried and other elements of the schemes, apart from two pumping stations, will all be located within existing water company sites and are not considered to result in adverse cumulative effects to the AONB. The reinstatement of land use and recovery of habitats and landscape following the pipeline construction may extend to 5 years or more. Therefore, the potential cumulative effects to the AONB are considered medium to long-term but temporary. Information regarding the AONB reports of it being under pressure from demographic change more than most other designated landscapes and states that utilities infrastructure, while critical to the functioning of society, can detract from landscape characteristics and qualities. However, as the transfer pipelines will be buried and cumulative effects temporary in nature, the potential incremental cumulative effects on the AONB would be limited.</p> <p>Uncertainty, mitigation and monitoring: Further surveys and detailed route alignments to find the optimum route minimising environmental impacts. This will also minimise the potential cumulative effects to the AONB. Potential for enhancements such as contributing to wildlife corridors or recreation amenity could result in positive cumulative effects to the AONB but these are not definite.</p> <p>Overall rating of cumulative effects: Overall there is a low risk of cumulative adverse effects regarding the SEA topic landscape and visual amenity. They would likely be medium to long-term, temporary and minor.</p>

10.4 Cumulative effects with other relevant plans, programmes and projects

10.4.1 Other water company WRMPs

All of the neighbouring water companies to Southern Water are also preparing revised draft and final 2019 WRMPs. The plans of the neighbouring companies all include demand management components. Improved water efficiency and leakage reduction across the South East of England will likely provide beneficial cumulative effects in terms of reduced water abstraction (or at least reduced growth in water abstraction) with associated benefits for the water environment, as well as lower energy use and carbon emissions from reduced pumping and treatment (or reduced growth of these activities). These measures will also reduce the scale of required new water resources across the South East.

The assessment made use of outputs of a WRSE project. The WRSE group includes six South East water companies (Affinity Water, Portsmouth Water, South East Water, Southern Water, SES Water and Thames Water). The purpose of the project was to input to the development of long term best value plans for securing water supplies in the south east. Since 2016, the WRSE has been working to improve the approach to undertaking cumulative effects assessment for WRMP options developed by neighbouring water companies in the South East of England.

Updated information sharing facilitated through WRSE as part of the development of revised draft WRMP19s during mid-August 2018 has enabled cumulative effects assessment between the water supply options being considered for revised draft WRMP19s by the six water companies that form WRSE. Cumulative effects identified by the updated mid-August 2018 collaborative study, and revised further to reflect the position at November 2019, that may relate to the Southern Water options included in the WRMP19 are discussed in turn below:

- Southern Water's Stourmouth WSW (10MI/d) scheme, South East Water's Broad Oak Reservoir pumped refill abstraction and Affinity Water's Dover Docks Reservoir - Broomfield Banks Effluent Reuse scheme in the Stour catchment
The WFD cumulative effects assessment (Annex 16) has concluded that no greater than minor adverse effects on the Stour estuary would arise from concurrent operation of these schemes. The abstractions for Southern Water and South East Water will be constrained by MRF conditions to protect flow to the Stour estuary, whilst the Affinity Water scheme involves indirect effluent reuse which will reduce freshwater input to the estuary but the scale of this reduction is small relative to the combined freshwater inputs to the estuary. There is no risk of WFD status deterioration
Cumulative construction risks are unlikely as the Stourmouth WSW scheme is not planned to be required until 2060 whereas the Broad Oak Reservoir scheme is likely to be developed much earlier. The Dover Docks scheme is spatially distant from the other two schemes so cumulative construction risks are unlikely to arise
Operational effects on other (non-water) receptors are considered to be negligible.
- Southern Water's scheme to recommission the Meopham Greensand groundwater source and Thames Water's Southfleet/Greenhithe licence disaggregation scheme both involve abstraction from the North Kent Medway Chalk
The WFD cumulative effects assessment (Annex 16) has concluded that concurrent operation of these two schemes are not expected to lead to a deterioration of WFD status to the chalk groundwater body given the volumes of abstraction involved within existing licence limits

No cumulative construction effects are likely as the schemes involve minor works at existing water source assets. Operational effects on other (non-water) receptors are considered to be negligible

- Southern Water's Hampshire Grid and Newbury WSW asset enhancement in the North Wessex Downs AONB along with South East Water's scheme to address septic tanks/cess pit discharges to Woodgarston will not have any cumulative adverse construction or operational effects given the small-scale nature of the South East Water scheme
- Southern Water's South East Water bulk supply near Canterbury scheme, the scheme to maximise the Faversham main and to recommission Meopham Greensand groundwater source are all in proximity to the Kent Downs AONB and may have cumulative effects with several of the groundwater schemes in the proposed Affinity Water draft final WRMP19 in the same area

There is potential for minor temporary cumulative adverse effects on visual amenity if any of the Southern Water schemes were constructed at the same time as one or more of the Affinity Water schemes. No operational effects on visual amenity or other receptors is anticipated.

As part of the further development and detailed design of the WRMP19 preferred programmes, we will discuss identified potential cumulative landscape effects with other water companies through the WRSE group and propose the development of a combined Protected Landscape Mitigation Strategy that can be discussed with Natural England and relevant Protected Landscape Officers in South East England.

10.4.2 Cumulative effects with water company Drought Plans

Southern Water Drought Plan 2019

The WRMP19 include the need for drought contingency measures set out in the Drought Plan 2019 and which may lead to cumulative effects:

- **Medway water reuse scheme** - no potential major adverse cumulative effects on the Medway estuary are anticipated between the reuse scheme and the Drought Plan measure for a Sheerness emergency desalination plant. Once the water reuse scheme is in place the risk of requiring the emergency desalination plant is very low (only in an extreme drought). Concurrent operation of these two schemes is therefore very unlikely but given the relative locations of the assets, there is not likely to be any cumulative adverse effects on the Medway Estuary MCZ or Medway Estuary and Marshes Special Protection Area (as confirmed in the Drought Plan HRA Appropriate Assessment)
From 2024, the River Medway Scheme Drought Order should no longer be required even in extreme drought and therefore cumulative effects with the Medway water reuse scheme will not arise
- **River restoration options for River Test and River Itchen** - potential for cumulative beneficial effects with the Test Surface Water and Lower Itchen sources Drought Permits/Orders by helping improve the environmental resilience of the rivers to abstraction at times of low river flows
- **Sandown WwTW indirect potable water reuse scheme** – this scheme is mutually exclusive with the Sandown desalination scheme and with the Drought Plan 2019 scheme for a Sandown emergency desalination plant as they would occupy the same land area. Consequently no in-combination effects would arise between these schemes

Assessment of the potential for in-combination impacts of this plan with drought management measures listed in neighbouring water companies' drought plans has also been undertaken.

The information used to carry out these assessments is considered to be the most up to date information available at the time of writing (November 2019).

There are no cumulative effects identified between the WRMP19 and the supply-side Drought Plan options (including Drought Orders and Permits) of the neighbouring water companies:

- Affinity Water
- South West Water (Bournemouth Water)
- Thames Water
- Wessex Water
- Cholderton and District Water Company
- SES Water
- South East Water
- Portsmouth Water

10.4.3 Other plans and projects

River Basin Management Plans (RBMP) (Thames River Basin District and South East River Basin District Plans)

Assessment of the potential for cumulative effects with these River Basin Management Plans (RBMPs) has been undertaken. The information used to carry out these assessments is considered to be the most up to date information available at the time of writing, but the assessments should be reviewed at the time of future scheme implementation to ensure that no changes to the River Basin Management Plans have been made in the intervening period, and that the assessment, therefore, remains valid.

Both the Thames and South East RBMPs describe the planned steps to implement the measures required to achieve the environmental objectives of the WFD. They provide the framework for protecting and enhancing the water environment. The SEAs (Environment Agency, 2016a,b) of the RBMPs determined that the plan was likely to have significant positive effects on the environment, particularly in respect of biodiversity, water, population and human health and that any local negative effects would expect to be mitigated during implementation. No adverse cumulative effects between the Thames or South East RBMPs and our WRMP19 are anticipated. The demand management, catchment management and river restoration options in the WRMP19 may have cumulative beneficial effects in supporting some of the RBMP objectives and RBMP measures in the relevant river catchments benefitting from the WRMP19 schemes.

Shoreline Management Plans

Shoreline Management Plans provide a policy context for shoreline/coastal zone management and development. The following Shoreline Management Plans are available within the public domain and were considered for in-combination impacts:

- SMP 9 The Medway Estuary and Swale
- SMP10 Isle of Grain to South Foreland.
- SMP 11 Beachy Head to South Foreland
- SMP 12 Beachy Head to Selsey Bill (South Downs)
- SMP 13 Hurst Spit to Selsey Bill (North Solent)
- SMP 14 Isle of Wight
- SMP 15 Durlston Head to Hurst Spit (Poole and Christchurch Bays)

The assessments for any potential in-combination impacts between these plans and the measures contained in our WRMP19 were considered with regards to spatial proximity and/or hydrological and/or hydrographical connectivity. No in-combination likely significant effects were identified in respect of the policies set out in the plans.

With the exception of one plan, none of the specific measures within the plans were assessed as having any likely cumulative effects with options in our WRMP19. Measures put forward in the Isle of Wight Shoreline Management Plan included the proposed creation of a 30.9ha compensatory habitat of coastal grazing marsh for the Solent and Southampton Water Ramsar site. Such a measure would not be adversely affected by any of the options considered in the WRMP19 that affect the Solent and Southampton Water Ramsar site.

The latest version of the relevant Shoreline Management Plans will be consulted as schemes affecting the coastal zone are brought forward for detailed design and planning in dialogue with the Environment Agency, local planning authority and/or other relevant statutory bodies and stakeholders.

Canal and River Trust Water Resources Strategy 2015–2020

The Canal and River Trust Water Resources Strategy (Canal and Rivers Trust, 2015) sets out the vision for how it intends to manage water resources across its network through to 2050. It contains the Trust's planned actions over the next five years relating to the canal network. The Kennet and Avon Canal hydrological unit partially overlaps with Southern Water's drought plan area. However, the main actions for the strategy are to undertake a range of modelling scenarios for the hydrological units in order of preference. Specific restoration projects or other canal developments are not detailed, however Strategic Action 4 states that appropriate water resource assessments will be undertaken aiming for "no net impact on long term water resource levels of service." No adverse cumulative effects between the Canal and River Trust Water Resources Strategy and the options included in our WRMP19 have been identified.

At the time of writing, the Canal and River Trust had not published its drought plans in the public domain.

Cumulative effects with identified relevant strategic level projects

There are a number of infrastructure priorities identified in regional and local planning documents in addition to national programmes. These include the improvement of existing infrastructure by extension, redevelopment or increasing existing capacity. With regard to other projects that may result in a cumulative effect with the company's WRMP19, those considered to be **relevant at the strategic level** comprise large scale high profile infrastructure schemes and particularly those that may affect water flows or groundwater levels in the same catchments as those affected by the WRMP. These projects comprise:

- Lower Tidal Arun flood risk management scheme – The scheme was formally approved in March 2014 by the Environment Agency and is outlined to manage flood risk in the Arun Valley, from Pallingham Weir to Littlehampton. The scheme consists of a range of measures and recommends maintaining and enhancing many existing flood defences and providing some new ones in strategic locations. The new defences however do rely on funding, so it is anticipated that construction will be staggered. In the more rural areas, it is recommended to work with natural processes and increase landowner involvement in decisions. Consultation is in the early stages and the work is expected to be carried out by developing a strategic approach, over the next 100 years⁴. Depending on the exact location of flood defence works there is the potential for construction related cumulative effects if they are implemented at similar time frames to the company's Littlehampton WwTW indirect potable water reuse scheme and Tidal River Arun Desalination scheme (if required)

⁴Environment Agency, 2012a, Lower Tidal River Arun Strategy Environmental Report Final Draft – for external consultation, accessed at https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/307894/Lower_Tidal_River_Arun_final_strategy_report.pdf

- Leigh flood storage area – The Leigh Barrier is an existing flood storage area to protect properties and 300 business in the town of Tonbridge in Kent (River Medway)⁵. The Leigh Barrier is due to be upgraded to increase its storage capacity by a further 30%. This was originally programmed for 2035; however, it is anticipated to be completed sooner, should appropriate funding be secured. The scheme is more than 20km from our nearest WRMP19 scheme (Medway WwTW indirect potable water reuse scheme). It is considered unlikely that construction or operation of Leigh flood storage area would lead to cumulative effects with the Southern Water’s WRMP19
- National Infrastructure projects listed for the South East⁶ includes a scoping request to apply to the Secretary of State for an Order granting development consent to decommission an existing gas fired Combined Heat and Power plant and build, commission and operate a new gas-fired Combined Heat and Power (CHP) plant to supply steam and power near Sittingbourne. Therefore there is the potential for cumulative construction effects with the WRMP19 option Sittingbourne industrial reuse scheme (if this strategic alternative option is required to be implemented) should the timing of the construction coincide

Other projects listed on the National Infrastructure projects listed for the South East⁶ are considered too distant from the WRMP19 options and the respective zones of hydrological influence to result in any cumulative effects

Cumulative effects with identified relevant regional and local level projects

A number of potential development projects have been identified for consideration in the cumulative effects assessment. These are listed below with potential interactions with our plan:

- Fawley Power Station redevelopment scheme:
 - Fawley desalination scheme
- Potential for further port development at Marchwood Military Port / Dibden Bay (Port of Southampton):
 - Test Estuary WwTW industrial water reuse scheme
 - Fawley desalination scheme
 - Bournemouth Water import
- Planned residential allocations in emerging New Forest District Local Plan:
 - Test Estuary WwTW industrial water reuse
- Potential residential development on a former aerodrome site (as set out in the Local Plan)
 - Littlehampton WwTW indirect potable reuse scheme
- Arundel bypass: Highways England is currently consulting on its preferred route (as announced in May 2018):
 - Littlehampton water reuse scheme

None of the above developments are anticipated to result in any cumulative effects regarding the operation of the WRMP19 schemes. Cumulative construction effects would only arise if the timing of the infrastructure required by the WRMP option was to coincide. It is anticipated that these temporary cumulative effects, for example nuisance effects to local population or adverse effects to the enjoyment of nearby landscape designations (e.g. New Forest and South Downs National Park), could be effectively mitigated through appropriate scheduling of all the construction required so as to avoid any concurrent works.

There is a small risk that simultaneous implementation of our WRMP19 leakage reduction programme could lead to cumulative adverse effects with respect to other national or regional

⁵ Environment Agency, 2012b, Leigh flood storage area policy paper, accessed at <https://www.gov.uk/government/publications/leigh-flood-storage-area/leigh-flood-storage-area>
<https://www.gov.uk/government/publications/leigh-flood-storage-area/leigh-flood-storage-area>

⁶ National Infrastructure Planning: South East, accessed at <https://infrastructure.planninginspectorate.gov.uk/projects/south-east/>

infrastructure schemes involving partial or full road closures. However, any such cumulative effects would be minor, as most of the demand management activities would be localised and small in scale, and could be effectively mitigated through careful project management and best practice construction methods, as well as co-ordination of major street works with relevant highways authorities.

11. Summary of HRA, WFD and other Designated Sites Assessments

11.1 HRA

The HRA of the WRMP19 (see Annex 15) has concluded that the plan is compliant with the Habitats Directive, with no adverse effects on European sites anticipated with the application of appropriate mitigation measures. The findings of the HRA have informed the development of this SEA.

The HRA Stage 1 screening assessment concluded that four of the options included within the WRMP19 required Appropriate Assessment, together with four of the strategic alternative options. These Appropriate Assessments concluded that, with the proposed mitigation measures in place for each scheme, there would be no adverse effects on the integrity of any European site. As these schemes are taken forward for further detailed design, the finer details of the required mitigation measures will need to be developed in dialogue with Natural England and the site operators/owners and secured during the project-stage HRA when a detailed design and construction method statement will be developed. If the mitigation measures described in the assessments are implemented as currently suggested, then it can be reasonably concluded that the WRMP19 will not have an adverse effect on the integrity of any European site.

Further information is provided in the accompanying HRA Report (Annex 15).

11.2 WFD

The WFD assessment has indicated that, with two exceptions, the schemes included in the WRMP19 strategies are compliant with WFD requirements. The assessment indicated uncertainty as to the magnitude of effects on WFD water bodies for two of the options included in the WRMP19 strategies, and therefore a risk of deterioration in status of the water body:

- The West Chiltington groundwater abstraction option assessment indicated that, adopting a precautionary approach, a potential for impacts on one WFD river water body and a groundwater dependent terrestrial ecosystem (GWDTE). The historic operation of the boreholes did not result in any concerns about adverse effects on the SSSI or the River Chilt and for this reason, although there is insufficient objective evidence currently available, we believe the option will be compliant once the proposed investigations are completed to provide that evidence.
Further assessment of the hydrogeological connectivity between the groundwater source and these dependant ecosystems is proposed to confirm the magnitude of any potential impact during operation. These investigations will take place as part of the Water Industry National Environment Programme (WINEP) WFD no-deterioration investigations already agreed with the Environment Agency and scheduled for completion by 2022. We will work with the Environment Agency and Natural England over the coming months to agree the precise scope of these investigations, which may include groundwater modelling and/or pump test surveys.
- These investigations will support the development of any mitigation measures that may be required in the event that WFD status deterioration and/or adverse effects on the GWDTE SSSI site are identified. Mitigation measures could involve some additional volumetric and/or groundwater level constraints on the existing abstraction licence to protect surface water features or possibly some in-stream (River Chilt) or wetland (GWDTE) restoration measures to enhance the resilience of these water bodies to any identified effects of groundwater abstraction.

- Sandown WwTW Indirect Potable Reuse option assessment indicated a potential for impacts on the flow regime of one WFD river water body. Further assessment is necessary in order to ascertain the magnitude of impacts on ecological receptors, as a consequence of flow regime alterations during the operation of the scheme.

We will work with the Environment Agency and Natural England over the coming months to agree the specific scope of investigations and/or surveys to assess the risks in more detail, in particular in respect of the effect of changes to the low flow regime and water quality from increased flow augmentation of the River Eastern Yar. These investigations will be completed by 2021 at latest and will inform the development of any required mitigation measures – these could include operational controls to reduce the volume of discharge relative to actual river flow and possibly treatment processes to manage the temperature of the effluent relative to the ambient river water temperature if required.

South West Water has advised that for the Bournemouth Water bulk supply transfer option it will be carrying out a WFD risk of status deterioration study as has already been discussed as part of the West Country Water Resources Group with the Environment Agency. We will liaise with South West Water on their investigations which will need to be completed by 2020 at latest. These investigations will inform the development of any mitigation measures associated with the increased abstraction (within existing licence limits).

For the two schemes identified as uncertain in respect to WFD compliance, our plan includes strategic alternative schemes that could be developed should the investigations summarised above conclude there would be a risk of WFD status deterioration. For the West Chiltington source, if the volume of abstraction needed to be reduced from this source as part of any mitigation measures, the alternative option would be to develop another stage of our Pulborough winter transfer scheme. For the Sandown WwTW Indirect Potable Reuse option, the alternative would be the Sandown desalination scheme.

The WFD compliance assessment has been applied to all of the strategic alternative options included in the WRMP19. The assessment of these alternative options concluded that:

- The Brighton WwTW Indirect Potable Reuse scheme (10MI/d) presents a potential risk of WFD deterioration to one WFD river water body, linked to increases in the flow regime and potentially water temperature and the associated potential impacts on macroinvertebrates and macrophytes within a short reach of the water body. If this alternative scheme was required to be developed, further investigations would be required to assess these potential impacts in more detail, and if necessary develop appropriate mitigation measures if a WFD status deterioration risk was confirmed. Mitigation measures could include operational controls to reduce the volume of discharge relative to actual river flow and possibly treatment processes to manage the temperature of the effluent relative to the ambient river water temperature if required.
- The Itchen Indirect Potable Reuse schemes (combined Portsmouth Harbour and Fareham WwTWs indirect potable reuse scheme (90MI/d) or Woolston and Portswood WwTW indirect potable reuse scheme (20.5MI/d) present a potential risk of WFD deterioration to one WFD river water body, linked to increases in the flow regime and potentially water temperature and the associated potential impacts on fish, macroinvertebrates and macrophytes within a short reach of the water body (depending on the final location of the discharge outfall as part of the detailed design). If either of these alternative schemes was required to be developed, further investigations would be needed to assess these potential impacts in more detail, and if necessary develop appropriate mitigation measures if a WFD status deterioration risk was confirmed. Mitigation measures could include operational controls to reduce the volume of discharge relative to actual river flow and possibly treatment processes to manage the temperature of the effluent relative to the ambient river water temperature if required.

- The remaining strategic alternative options have been assessed as WFD compliant.

The findings of the WFD assessment have informed the development of this SEA.

Further information is provided in the accompanying WFD Assessment Report (Annex 16).

11.3 Marine Conservation Zones

The Marine and Coastal Access Act 2009 allows for the creation of Marine Conservation Zones (MCZs). MCZs protect a range of nationally important marine wildlife, habitats, geology and geomorphology, and can be designated anywhere in territorial and offshore waters.

The MCZ assessment reviewed potential effects on the following MCZ's within 10km of the preferred programme and strategic alternatives⁷:

- Poole Rocks
- Southborne Rough
- Yarmouth to Cowes
- Bembridge
- Beachy Head West
- Kingmere
- Thanet Coast
- The Swale Estuary
- Medway Estuary

All options were assessed for potential effects on the designated species and habitats during construction and operation and concluded that negligible effects were expected, with the exception of the Medway WwTW Indirect Potable Water Reuse on the Medway Estuary MCZ.

Potential construction impacts on the Medway MCZ habitats and species are considered negligible, however operational impacts are considered minor.

The scheme involves the transfer of 18Ml/d of treated effluent from Medway WwTW to the Medway offline water storage reservoir for onward supply to the water treatment works. The scheme will decrease water available in the River Medway, which may lead to a change in flow regime and impacts on water quality and aquatic biota. The transfer of effluent will result in a reduction in flow of the River Medway (10.5% at Q95 flows). Possible adverse effects on the upper Medway Estuary are potentially immediate, local salinity effects but no significant water quality impacts in the Medway MCZ.

Of the qualifying features of the Medway Estuary MCZ, only the broad scale marine habitat of sub-tidal mud, and the polychaete species Tentacled lagoon worm (*A. romijni*) are considered sensitive to impact as a result of a reduction in freshwater influx to the Medway Estuary. As such, only these two features have been scoped into the assessment.

Those environmental attributes, integral to the conservation objectives of this species, which are considered sensitive to hydrological impact from reduced freshwater influx are; population size; biological connectivity; physico-chemical properties; water quality - dissolved oxygen; water quality – nutrients and extent and spatial distribution of supporting habitat.

⁷ Natural England, 2017, Tips and advice on how to assess potential impacts of water company statutory plans on the marine environment – Focussing on Marine Conservation Zones (MCZ).

The Medway estuary contains extensive areas of subtidal mud; it is found throughout the whole Medway estuary from the mouth through to the upper stretches at Rochester and Strood. This habitat can be further divided into biotope complexes and biotopes. The biotope complex, which has been mapped in the upper Medway Estuary (upstream of Gashouse Point, Rochester), is Sublittoral Mud in Variable Salinity” (SS.SMu.SMuVS).

The scheme would only operate intermittently during prolonged periods of dry weather and for most of the time there would be no adverse effects on the Medway Estuary. During operation, there would be a reduction in treated sewage effluent discharge from Aylesford WwTW to the Medway Estuary, which equates to 10.5% of freshwater flows. This is classed as a negligible hydrological impact and is not expected to lead to a significant decrease in wetted width or depth. The intertidal and subtidal mudflats along the Medway estuary as a whole as well as those located within the Medway Estuary Marine Conservation Zone have a low sensitivity to changes in water levels and any increase in exposure during the operation of the scheme is expected to be within that experienced as part of the normal tidal range. The mudflat habitat designated as part of the Medway Estuary and Marshes European sites (SPA and Ramsar) are not expected to be impacted since they are situated much further downstream in areas which are tidally dominated and would not be affected by a relatively small reduction in freshwater flow input at the Medway WwTW. In conclusion, the implementation of the option during prolonged dry periods is not expected to lead to any material erosion loss and sediment movement, except possibly at a localised level in the immediate reaches downstream of the WwTW in the uppermost reaches of the estuary under low flow conditions combined with low tide.

The tentacled lagoon-worm *A. romijni* has been recorded in subtidal habitats in the upper stretches of the estuary in the vicinity of Rochester and Strood, specifically around Sun Pier and Chatham Ness - alongside a brackish lagoon on Common Marsh, at Cuxton, (above Mean High Water). Confidence in the presence and extent of this species is low. The tentacled lagoon-worm (*A. romijni*) is considered tolerant of a wide range of salinities, from below 5 to a salinity as high as 48, therefore any increase in salinity due to the decrease in freshwater input is will result in negligible adverse effects to this species. A reduction in mud dominated substrate distribution is considered unlikely as a result of reduced freshwater influx to the estuary. The target DO and DIN concentration for the sub-tidal mud habitat is unlikely to be significantly impacted by the reduced freshwater influx to the estuary. Tidal bed stress and light are the main mechanisms controlling macroalgal growth in the Medway Estuary rather than nutrients, with *Enteromorpha* spp. and *Ulva* spp. favouring areas of low tidal energy (such as the upper creek)⁸.

Further investigations to confirm these conclusions are recommended as the scheme operational details are developed, but it is considered that the assessment effects identified above are not of a scale that would preclude development of the scheme or require any mitigation measures.

⁸ Gilliland P. M. and Sanderson W. G., 2000, “Re-evaluation of marine benthic species of nature conservation importance: a new perspective on certain ‘lagoonal specialists’ with particular emphasis on *Alkmaria romijni* Horst (Polychaeta: *Ampharetidae*)”. *Aquatic Conservation: Marine and Freshwater Ecosystems*, 10, 1-12

12. Mitigation and monitoring

12.1 Overview

Key stages of the SEA process include Task B5: Mitigating adverse effects and Task B6: Proposing measures to monitor the environmental effects of implementing a plan or programme, as well as Stage E: Monitoring the significant effects of the plan or programme on the environment.

12.2 Mitigation

The sections below describe how Task B5: Mitigating adverse effects tasks have been or will be addressed, as applicable and the appropriate mitigation measures are implemented for any adverse effects identified.

Mitigation may be defined as a measure to limit the effect of an identified significant impact or, where possible, to avoid the adverse impact altogether. Consideration of mitigation measures has been an integral part of the SEA process and has informed development of the WRMP19. The SEA appraisals set out this Report (and its appendices) have been based on the assessment of residual impacts, i.e. those impacts likely to remain after the implementation of identified mitigation measures. Certain assumptions have been made regarding mitigation measures in carrying out the assessments, notably:

- Where suitable mitigation measures have been identified, these have been taken into account, such that the resultant residual impact has been determined in this SEA
- In line with recommendations made in the UKWIR SEA Guidance (UKWIR 2012), the SEA appraisals have assumed the implementation of reasonable mitigation measures such as operation of water sources in line with regulatory requirements and the use of good construction practice, including measures such as:
 - Invasive species on site are to be identified and removed in advance of construction;
 - HGV routing, cap on movements, appropriate working hours
 - Screening around the perimeter of works at the start of construction (creation of landscaping/planting for large scale construction)
 - Footpath diversions established regarding construction work including pipelines
 - Resources for construction of the scheme would be sourced locally where possible
 - Minimising removal of spoil from construction sites
 - Runoff from the construction sites would be attenuated and the quality managed according to best construction practices
 - Appropriate pipeline laying techniques regarding river crossings
 - Flood risk management during construction (temporary flood defence and siting of spoil and contaminants away from areas at risk of flooding)
 - Siting of temporary and permanent works to minimise impacts on setting of heritage and landscape features
 - Archaeological watching briefs during excavation
 - Noise abatement barriers where required
 - Dust control measures: dampening dust emissions from groundworks and vehicle washing

The mitigation measures described above and the additional mitigation measures summarised further below (and set out in more detail in Appendix G for SSSIs, in Annex 15 for European sites and in Annex 16 for WFD water bodies) would, in some cases, be implemented through Environmental Impact Assessment and planning process. In this way, effective mitigation plans can be developed to minimise many of the residual adverse effects currently identified in the SEA appraisals.

12.3 Mitigation and enhancement of significant effects

The need for additional mitigation measures has been identified for many of the options included in the WRMP19. However, in some cases some uncertainty remains around effects on and these will be subject to further investigation, potentially leading to additional mitigation. This includes the West Chiltington scheme and the Sandown WwTW indirect potable water reuse scheme. The SEA and WRMP19 have identified that alternative schemes are available and could be selected if the WFD compliance cannot be secured through mitigation (including operational control measures). Where HRA screening identified Likely Significant Effects from any schemes, HRA Appropriate Assessment was undertaken, which has highlighted the need for specific mitigation measures as summarised below and detailed in Annex 15.

Adverse effects identified concerning air quality and carbon emissions are less spatially specific. Air quality effects may be mitigated through improved transport logistics, and routing to avoid sensitive areas such as AQMAs. Opportunities to generate energy from renewable sources are already being taken by the company and further energy recovery and renewable energy options will be positively explored as part of the development of the detailed design of schemes included in the plan, particularly the more operationally energy-intensive schemes.

12.3.1 Western area

The need for additional mitigation measures for the preferred programme has been identified in the Western area in relation to the Bournemouth and Portsmouth Water bulk supply options, desalination at Fawley, the Southampton Link Main, the Hampshire Grid options and the Sandown WwTW Indirect Potable Water Reuse scheme.

Effects on biodiversity, fauna and flora

Sandown indirect potable water reuse scheme

The preferred programme for the Western area includes the indirect potable water reuse option at Sandown. This requires small sections of new pipeline to be routed through the Isle of Wight AONB to connect to existing Southern Water supply infrastructure within the AONB. However, the route has been revised to extend along the perimeter of the urban area of Sandown before extending north thereby avoiding previous potential impacts to Alvington Marshes SSSI. The connection from the discharge will still require crossings of the River Medina and Lukely Brook; however if at all possible these will utilise road crossings over the rivers.

Approximately 0.5km of coastal and floodplain grazing marsh will be temporarily lost during construction, and 0.3km of deciduous woodland. Further optimisation of the pipeline route will be undertaken at the planning stage to determine if these habitats can be avoided, or lengths within the minimised further. If not, a suitable mitigation and compensation package will need to be developed, and opportunities for biodiversity enhancements will need to be explored.

Fawley desalination scheme

As discussed in section 8.1.2, we have set out at a strategic level in both the HRA Appropriate Assessment (Annex 15 Appendix B) and the WFD Assessment (Annex 16 Appendix B) the mitigation measures required to protect the marine ecology and environment in respect of the Fawley desalination scheme, both during construction and operation. These will need to be developed in greater detail and informed by site specific environmental investigations as part of the next stage of detailed planning and design which in turn will inform the EIA and other statutory permitting processes. The approach to these investigations was set out in section 8.5 and will need to cover the range of potential risks outlined earlier in section 6.3.3 and those set out in the HRA and WFD assessments in respect of the pipeline routes.

We will work closely with Natural England and the Environment Agency to develop the detailed surveys to inform the detailed design of mitigation measures through the proposed Steering Work and scheme-specific Working Groups referenced earlier in section 8.5. We have already revised the strategic outline design to reduce the risks of adverse effects (see section 8.1.2) and have considered mitigation measures including:

- Best practice pollution control measures during construction of the outfall and abstraction pipelines to protect sensitive habitats at the landward side of the construction activities
- Noise, vibration and dust suppression measures to protect designated bird species during construction of the intake and outfall
- Optimising the precise location of the outfall pipe and design/configuration of the dispersers to maximise mixing of the brine discharge – this will require further dispersion modelling to be carried out to inform the design
- If required, consider operational control rules to optimise the dispersion of brine discharges if adverse effects are not addressed by the design of the outfall infrastructure

Bournemouth Water Import

South West Water has advised that for the Bournemouth Water import option it will be carrying out a WFD risk of status deterioration study as has already been discussed as part of the West Country Water Resources Group with the Environment Agency. We will liaise with South West Water on their investigations which will need to be completed by 2020 at latest. These investigations will inform the development of any mitigation measures associated with the increased abstraction (within existing licence limits).

Effects on archaeology and cultural heritage

A number of scheduled monuments and designated archaeological and cultural heritage assets are identified within the Western area, with a reasonable risk of damaging undiscovered archaeological remains. A watching brief, surveys and investigation would minimise risk of harm to unknown assets and known monuments.

Effects on landscape and visual amenity

Many of the strategic schemes in the Western area preferred programme will involve construction within, or in close proximity to, designated landscapes (South Downs National Park, New Forest National Park and the Isle of Wight AONB). Effects on landscape and visual amenity would be mitigated as far as possible by amendment of pipeline routes for avoidance of key landscape features such as veteran trees and hedgerows, returning the visual and physical integrity of the landscape as closely as possible to its previous condition. Where options would result in the development of permanent features, these should be designed to blend with the existing landscape as far as possible with the careful selection of construction materials, although it is noted that the development of permanent, above ground features outside of our existing operational sites is relatively low. Full consultation will be required with the National Park Planning Authorities, AONB committee and Natural England to further discuss mitigation measures.

12.3.2 Central area

The need for additional mitigation measures for the preferred programme has been identified in the Central area in relation to the West Chilington groundwater scheme, Pulborough winter transfer scheme Stage 2 and the Littlehampton WwTW Indirect Potable Water Reuse scheme.

Effects on water quality and resources, particularly in terms of WFD status

The West Chilington groundwater abstraction option assessment indicated a potential for impacts on a surface water body and a groundwater dependent terrestrial ecosystem (GWDTE). The historic operation of the boreholes did not result in any concerns about adverse effects on the SSSI or the

River Chilt, but further assessment of the hydrogeological connectivity between the groundwater source and these dependant ecosystems is required in order to confirm the magnitude of any potential impact during operation. These investigations will take place as part of the WINEP3 WFD no-deterioration investigations already agreed with the Environment Agency and scheduled for completion by 2022. We will work with the Environment Agency and Natural England over the coming months to agree the precise scope of these investigations, which may include groundwater modelling and/or pump test surveys. These investigations will support the development of any mitigation measures that may be required in the event that WFD status deterioration and/or adverse effects on the GWDTE SSSI site are identified.

Effects on biodiversity, fauna and flora

Several options in the Central area will require investigation in to the potential need for additional mitigation due to construction-related adverse effects.

Pulborough winter transfer scheme Stage 2

The Pulborough winter transfer scheme Stage 2 pipeline has been rerouted since the draft WRMP19 to avoid crossing the Adur Estuary SSSI, but construction works will be required approximately 400m to the east. Given the small scale of construction works required for the pipeline installation air quality impacts are considered unlikely, however best practice construction methods and use of hoarding will be used where necessary.

The pipeline has been routed to minimise impacts to the South Downs National Park (SDNP) by extending alongside or within the main road where possible. Sections of pipeline will be required within the SDNP as existing Southern Water infrastructure are located within it. Further route optimisation will be required at the detailed planning stage to minimise impacts to priority habitats including avoiding the lowland calcareous grassland at Slonk Hill and Southwick Hill. Lowland calcareous grassland also extends around Patcham and therefore long-term habitat loss will occur along this section of the pipeline route where existing access tracks can't be used. Habitats alongside the main road include semi-improved grassland and deciduous woodland, with a large area of deciduous woodland along Greenridge, close to Patcham Recreation Ground. Route optimisation will be required at the detailed planning stage to avoid extensive loss of trees.

Littlehampton WwTW Indirect Potable Water Reuse

Only one pipeline route is now proposed for the Littlehampton WwTW Indirect Potable Water Reuse option, extending further to the west and away from the River Arun. Therefore, there will be no crossings required on the River Arun.

The route will be almost entirely within the South Downs National Park from Slindon to Fittleworth as the proposed discharge to the River Rother is close to the existing Fittleworth WSW, directly north of Ford. Minimising impacts will involve further route optimisation to avoid sensitive habitats and utilise existing infrastructure where possible (e.g. alongside the A29 and B2138). Impacts will be temporary during the construction phase, although recovery of habitats is likely to be short-medium term when considering the typical regrowth period for grassland and herb communities (~2 years) and shrub and hedge communities (~2-8 years). Recovery of the habitats will be aided by minimising the working width where possible, and only topsoil stripping the trench, use of ground protection mats across the construction footprint, and separating the topsoil and subsoil layers to ensure the existing root balls and seedbank is retained and replaced in the right sequence to maximise potential for habitat recovery. Re-seeding may also be required and species mixes would need to be agreed with the relevant stakeholders at the detailed planning stage.

The pipeline route has also been reviewed in relation to Fairmile Bottom SSSI and areas of ancient woodland close to a main road. Commitment is made to avoid both the designation and these areas of irreplaceable priority habitat. The pipeline will be installed within the road, or verge, to the north of

Fairmile Bottom SSSI. Air quality impacts, including dust from the break-up of the road and the potential for increased loading due to plant movements and stationary (NOx) will need to be considered. An air quality assessment will be completed once details of the plant, construction programme and construction methods have been finalised the Air Pollution Information System data, and onsite monitoring where necessary, and the methodology contained in the Design Manual for Roads and Bridges (DMRB) Air Quality "Appendix F".

Effects on archaeology and cultural heritage

For the revised Pulborough winter transfer Stage 2 option there are two Scheduled Monuments close to the proposed pipeline. . Pipeline rerouting or specific mitigation measures may be required to avoid adverse effects. Considering the length of the pipeline, there is a risk of unknown assets being at risk from the excavation. A watching brief, surveys and investigation would minimise risk of harm to unknown assets.

There are several areas with archaeological importance within 2km of the Littlehampton WwTW Indirect Potable Water Reuse option pipelines. Detailed routing could avoid designated archaeological and cultural heritage assets such as the Scheduled Monument 'Madehurst Wood Earthworks'. However due to the length of the proposed pipeline (~19km) and its location in largely undeveloped rural areas there remains a risk of damaging undiscovered archaeological remains. A watching brief, surveys and investigation would minimise risk of harm to unknown assets.

Effects on landscape and visual amenity

Most of the options in the Central area will involve construction within, or in close proximity to, the South Downs National Park. Effects on landscape and visual amenity would be mitigated by amendment of pipeline routes to avoid key landscape features such as veteran trees and hedge rows, as well as returning the visual and physical integrity of the landscape as closely as possible to its previous condition post-construction. Schemes that will result in permanent development within the National Park, and outside of our existing sites, is limited both in terms of number of options and extend to just the revised Pulborough winter transfer Stage 2 option scheme and the Littlehampton WwTW Indirect Potable Water Reuse option

Pulborough winter transfer Stage 2 option

For the revised Pulborough winter transfer Stage 2 option, the entire pipeline will be laid within, but on the edge of, the South Downs National Park. Potential impacts will mainly occur during the construction phase as each pipe segment is constructed (for example adverse effects on visual amenity due to the excavation works, temporary lighting and the presence of a workforce with associated transport (HGVs)). Impacts could be mitigated to some extent through detailed routing of the pipeline and construction best practices. It is noted that the majority of the route will follow the A27, therefore the sensitivity rating is considered Medium (rather than High). Where there is vegetation loss, it may take a number of years for vegetation to fully recover from residual effects of the construction phase, however, the effects are temporary.

Littlehampton WwTW Indirect Potable Water Reuse option

The Littlehampton WwTW Indirect Potable Water Reuse option includes large sections (12-15km) of the proposed transfer pipeline which would be sited in the South Downs National Park. Potential impacts of the pipeline will be during the construction phase and include excavation works, temporary lighting and the presence of a workforce with associated transport (HGVs). Impacts could be mitigated through detailed routing of the pipeline and construction best practices. Construction works may be visible to sensitive receptors, for example, where it passes in the vicinity of public rights of way. Mitigation measures (such as avoidance of landscape features and screening) will lessen these temporary adverse effects.

12.3.3 Eastern area

Effects on biodiversity, fauna and flora

Similar to the other operating areas, there are several options in the Eastern area preferred programme that will require investigation in to potential need for additional mitigation (beyond that considered standard best practice) as a result of construction related effects. The proposed pipeline for the South East Water to Canterbury scheme intersect with designated sites and will run close to areas identified as Ancient Woodland. This will require careful detailed design and pipeline routing mitigation measures to protect these features.

Further assessment of the potential localised effects on mudflat habitat in the Medway Estuary MCZ will be required to confirm if any adverse effects may arise and to inform any required mitigation in relation to the Medway WwTW indirect potable water reuse scheme.

Effects on archaeology and cultural heritage

The major adverse effects regarding the Medway WwTW indirect potable water reuse scheme relates to fact that the outline scheme for the pipeline route passes through a Scheduled Monument (Romano-British villa, Anglo-Saxon cemetery and associated remains). Further investigation and liaison with Historic England and the site owner would be required, as well as appropriate mitigation measures such as amendment of pipeline routes.

Effects on landscape and visual amenity

The South East Water to Canterbury import scheme would involve some pipeline construction within the Kent Downs AONB. The potential for medium to long term adverse effects to visual amenity following pipeline construction would be mitigated by amendment of pipeline routes to avoid key landscape features, such as veteran trees and hedgerows, as well as returning the visual and physical integrity of the landscape as closely as possible to its previous condition. The only permanent development within the AONB, outside of our existing sites, relates to two new booster pumping stations associated with the existing Faversham main that is within the AONB. Full consultation will be required with the AONB committee and Natural England to further discuss the detailed mitigation measures as part of the detailed design of these schemes.

12.4 Monitoring

Monitoring is required to track the environmental effects to show whether they are as predicted, to help identify any adverse impacts and trigger deployment of mitigation measures. The SEA Regulations require the responsible authority to:

'monitor the significant environmental effects of the implementation of each plan or programme with the purpose of identifying unforeseen adverse effects at an early stage and being able to undertake appropriate remedial action.'

The natural, built and human receptors potentially impacted by the development and operation of the options included in the WRMP19 strategies and possible indicators of effects have been set out in Table 22. These proposed indicators would form the core component of a monitoring programme to assess whether the identified effects in the SEA are occurring as anticipated, or whether it is giving rise to greater or lesser effects (adverse or beneficial). In turn, the monitoring may identify changes to the mitigation measures necessary to minimise adverse effects and/or modifications to scheme design or operation to further augment beneficial effects.

For biodiversity, flora and fauna, as supply schemes move into the detailed design stage, a range of surveys will be required for HRA, WFD and other environmental regulatory requirements. For example, Protected Species surveys will be carried out to confirm the presence or absence of Protected Species. Where Protected Species are identified, we will follow Natural England's

Standing Advice for Protected Species and consult further with Natural England to discuss how the scheme design and operation can be optimised to avoid adverse effects on the relevant species.

Table 22 SEA monitoring indicators for WRMP19

Impacted receptor	Monitoring indicators
Water resources, water quality, biodiversity	Proportion of surface waters and groundwater waterbodies at 'Good' WFD status Specific species and habitats surveys Condition of European Sites and SSSIs according to Natural England condition assessments Progress against the Southern Water biodiversity action plan
Climate factors	Net greenhouse gas emissions per MI (million litres) of treated water (kg CO ₂ equivalent emissions per MI) reported annually by Southern Water
Transport	Transport fleet fuel consumption, emissions and mileage, as monitored routinely by Southern Water
Nuisance / community	Scheme level community disruption due to construction works / during operation (where applicable) would be monitored through an Environmental Management Plan agreed as part of the planning permission process Complaints logged with Southern Water and Local Authority Environmental Health Officers or equivalent Responses gauged through customer satisfaction surveys and reported in Southern Water's annual performance processes
Air quality	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 Changes in air quality as monitored by the Defra Automatic Urban and Rural Network, including using this data to establish the baseline conditions
Landscape and visual amenity	Baseline, construction phase and operational phase Landscape and Visual Impact Assessments or equivalent assessment techniques of sensitive landscapes and visual amenity identified in the SEA (and subsequent planning application submissions) as being at a major or moderate adverse effect. Assessments to be carried out in consultation with appropriate bodies, such as the National Park Planning Authorities, relevant AONB committees and Natural England. These surveys will aid planning and evaluation of the success of proposed mitigation measures to reduce adverse effects on landscape and visual amenity.
Cultural heritage	Condition of buried archaeology would be monitored during construction works as part of a watching brief and associate response measures as set out in the Environmental Management Plan agreed as part of the planning permission process Consultation with Historic England, heritage asset owners and other relevant stakeholders to ensure adverse impacts are minimised and opportunities sought for heritage discovery and/or maintenance. Reference to Historic England's monitoring of heritage assets such as Listed Buildings and Scheduled Monuments, Registered Battlefields, Registered Parks and Gardens, in particular the 'Heritage at risk' register.

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

scale and duration of such scheme-specific monitoring activities proportionate to the assessed environmental risks.

13. Quality assurance

The Office of the Deputy Prime Minister (ODPM) Guidance on SEA contains a quality assurance checklist to help ensure that the requirements of the SEA Directive are met. The checklist is reproduced in Appendix E, demonstrating how this Environmental Report meets the requirements.

14. Conclusions

Through application of the SEA process (and associated HRA and WFD assessments) from the very outset, we have actively considered environmental and social effects throughout the development of the WRMP19 and consulted regularly with regulators, stakeholders and customers to seek their views on the emerging findings from the effects assessment. The SEA process complies with the regulatory requirements and national best practice guidance. The assessments have been based on a broad range of objective environmental and social criteria, developed through public consultation, to ensure all options were considered on a consistent basis, in line with the meeting the requirements of the SEA Directive and the SEA Regulations.

By integrating environmental and social assessment into the development of the WRMP19, a long-term sustainable water resource plan has been produced that

- Maintains water supply reliability and resilience for Southern Water's customers without unacceptable adverse effects on the environment or local communities
- Ensures the use of Drought Orders and Drought Permits to temporarily modify abstraction licence conditions is restricted to only extreme drought conditions in the longer term (beyond the 2020s)

As well as protecting the environment, the WRMP19 provides opportunities for environmental enhancement through various measures, in particular:

- Reducing water abstraction from a number of existing water sources where there is a risk of adverse effects on the water environment
- Actively pursuing further measures to reduce leakage from the water supply system and customer properties, reducing water abstraction from the environment
- Extending water metering to more customers and helping customers reduce their demand for water to achieve Southern Water's long-term target of reducing water consumption to an average of 100 litres per person per day
- Implementing catchment management measures that will enhance catchment land quality and water quality in local rivers and groundwater
- Catchment and in-river restoration measures for the lower River Test and lower River Itchen to increase the environmental resilience of these two rivers to the effects of abstraction, particularly at times of low river flow

15. References

- Canal and River Trust, 2015, “Putting the water into waterways: Water Resources Strategy 2015-2020”.
- Defra, 2011, “The Natural Choice”, Natural Environment White Paper.
- Environment Agency , 2012a, Lower Tidal River Arun Strategy Environmental Report Final Draft – for external consultation, accessed at [https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/307894/Lower Tidal River Arun final strategy report.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/307894/Lower_Tidal_River_Arun_final_strategy_report.pdf)
- Environment Agency, 2012b, Leigh flood storage area policy paper, accessed at <https://www.gov.uk/government/publications/leigh-flood-storage-area/leigh-flood-storage-area>
- Environment Agency and Natural Resources Wales, 2018, “Water Resources Planning Guideline: Interim Update”. July 2018.
- Environment Agency, 2016a, “The River basin management plan for the Thames River Basin District Strategic Environmental Assessment”, Statement of Particulars Updated December 2015 [online] Available at: <https://www.gov.uk/government/collections/river-basin-management-plans-2015>
- Environment Agency, 2016b, “The River basin management plan for the South East River Basin District Strategic Environmental Assessment”, Statement of Particulars Updated December 2015, [online] Available at: <https://www.gov.uk/government/collections/river-basin-management-plans-2015>
- Gilliland P. M. and Sanderson W. G., 2000, “Re-evaluation of marine benthic species of nature conservation importance: a new perspective on certain ‘lagoonal specialists’ with particular emphasis on Alkmaria romijni Horst (Polychaeta: Ampharetidae)”. Aquatic Conservation: Marine and Freshwater Ecosystems, 10, 1-12.
- HM Government, 2018, A Green Future: Our 25 Year Plan to Improve the Environment
- Lior N, 2017, Sustainability as the quantitative norm for water desalination impacts. Desalination Volume 401, 2 January 2017, Pages 99-111
- Ministry of Housing, Communities and Local Government (MHCLG), 2018, Revised National Planning Policy Framework 2018
- National Infrastructure Commission (2018). Preparing for a drier future: England’s water infrastructure needs
- National Infrastructure Planning: South East, accessed at <https://infrastructure.planninginspectorate.gov.uk/projects/south-east/>
- Natural England, 2017, “Tips and advice on how to assess potential impacts of water company statutory plans on the marine environment – Focussing on Marine Conservation Zones (MCZ)”.
- Office of the Deputy Prime Minister, 2005, “A Practical Guide to the Strategic Environmental Assessment Directive”.
- Southern Water, 2019, “Drought Plan 2019 Strategic Environmental Assessment Environmental Report”.
- UKWIR, 2012, “Strategic Environmental Assessment and Habitats Regulations Assessment of Water Resources Management Plans and Drought Plans”, UKWIR Project 12/WR/02/A.

Water Resources Management Plan 2019 Annex 14: SEA Main Report Appendix A: Consultee responses to the scoping report and amendments made as a consequence

December, 2019

Version 1



from
**Southern
Water** 

Statement of Response

Southern Water issued its Strategic Environmental Assessment (SEA) Scoping Report for its draft Water Resources Management Plan 2019 for public consultation from 28th April 2017 to 2nd June 2017.

Comments on the SEA Scoping Report were received from the following organisations:

- Natural England
- Environment Agency
- Historic England
- Howard Taylor, Upstream Dry Fly
- Sussex Wildlife Trust
- The Test & Itchen Association Ltd
- Wessex Chalk Stream Rivers Trust
- Forestry Commission England
- Hampshire and Isle of Wight Wildlife Trust
- Longdown Management Limited
- Amanda Barker-Mill
- C. H. Layman

These comments are set out in Table 1 together with Southern Water's response as to how it intends to take account of them in developing the SEA of the Draft Water Resources Management Plan.

Table 1 Draft Water Resources Management Plan: SEA Scoping Report – responses to comments received

Ref	Consultee	Comment	How comments have been addressed in the Draft Water Resources Management Plan Environmental Report
1	Natural England	<p>Plans programmes or policies</p> <p>I recommend you add the following to your list of plans programmes or policies: National.</p> <ul style="list-style-type: none"> - Defra strategy for the environment creating a great place for living. - The national conservation strategy conservation-21 - The 5-point plan to salmon conservation in the UK <p>National Nature Reserve Management Plans (though you may not be able to, or need to, list all of these, please just reference them as a source of information for assessment of any relevant options).</p>	<p>These policies, plans and programmes have been included in the SEA Environmental Report and considered in the assessment of potential effects of the WRMP.</p>
2	Natural England	<p>Designated sites</p> <p>Natural England has not fully reviewed the long list of sites in Appendix B – which appears comprehensive at first look. Natural England will send you a note separately on any recent additions or amendments to the list should any be required. Note that figures B1, B2 and B3 showing designated sites and national conservation and landscape features were missing from the appendices received by Natural England.</p> <p>Appendix B should be amended to include a map of the current condition of the SSSIs. A summary of the overarching condition of SSSIs in the supply area (in broad terms e.g. percentage in favourable condition) should be provided in Section 4.2.1. This will provide a helpful baseline for designated sites which will help with the SEA of the dWRMP.</p>	<p>The condition of SSSIs are considered where relevant in the individual option assessments.</p>
3		Marine Conservation Zones	

Ref	Consultee	Comment	How comments have been addressed in the Draft Water Resources Management Plan Environmental Report
	Natural England	Appendix B should be revised to include a list of all Marine Conservation Zones within the assessment boundary coastal water bodies.	The appendix has been updated to reflect this comment.
4	Natural England	<p>Biodiversity</p> <p>Many of the key threats and changes are captured including climate change and invasive none native species. The high population and development pressure in the Southern Water Supply area however is not referenced as a pressure in the baseline of the biodiversity. The high levels of anthropogenic pressure are of significant relevance to both the need for water and the baseline condition of the environment and therefore its ability to withstand additional pressures of climate change, new water resources and future growth.</p>	<p>The biodiversity key threats have been updated to reflect this comment.</p> <p>New key message added: The need to recognise the potential issues relating to high population and development pressures in the water supply area which are likely to impact on the need for water and related condition of the environment, and subsequently its ability to withstand additional pressures of climate change, new water resources and future growth.</p>
5	Natural England	<p>Landscape</p> <p>Natural England welcomes the use of NCA and LCA appraisals in the baseline review.</p>	Noted and thank you for your comment.
6	Natural England	Natural England welcomes the document structure which is clear transparent and has a good use of plain English.	Noted and thank you for your comment.
7	Natural England	The map showing the geographical scope of the report shows the core study area and includes an extended northern boundary to encompass the spatial scope of options being considered (reflecting the potential for bulk supply import options). It may be that the impacts of the source waters from cross regional transfers will extend well beyond the northern border shown. Though the impacts of such cross regional transfers should be assessed in the donor company plan, reference to impacts from the source of the water and relevant environmental receptors should be referenced	Reference to impacts from the source of the water for bulk transfers and relevant environmental receptors has been identified in the individual option assessments. The full environmental assessments will be carried out by the donor companies of bulk transfers.

Ref	Consultee	Comment	How comments have been addressed in the Draft Water Resources Management Plan Environmental Report
		<p>in the cumulative and in combination assessments for Southern Waters' SEA.</p> <p>Relevant coastal water bodies are also illustrated but the map shows an open boundary to the SEA. Natural England have assumed that the coastal water bodies and biodiversity within them are within the study boundary.</p>	The transitional and coastal water bodies and biodiversity within them are included within the SEA boundary
8	Natural England	The summary table 3.1 and appendices appears to be very thorough and lists the majority of plans and programmes relevant to this SEA. References to Site Improvement Plans, green infrastructure plans and Natural England's standing advice are particularly welcome. References to National Park and AONB management plans are also welcome.	Noted and thank you for your comment.
9	Natural England	Please see annex 1 and annex 2 for our detailed comments on sources of helpful environmental data. Please forward Natural England a copy of the figures as these were missing from the copy of the consultation documents received by Natural England.	The figures will be forwarded to NE.
10	Natural England	Natural England strongly recommends that the local records centres and the local catchment groups are approached for information on priority habitats and species.	<p>Priority species (and habitats) were discussed at a strategic level in the Scoping Report and were considered as part of the SEA.</p> <p>More detailed assessment will be required as detailed design of schemes included in the plan included within the plan are progressed.</p>
11	Natural England	The proposed approach is clear and simple, and links to the SEA objectives are clear in table 5.2. What is less clear is how the very good SEA key questions in table 5.1 will be linked to the assessment matrices described in section 5.2. Clarification of this point would be helpful. I note that the SEA matrices will only show the residual (post mitigation) impacts in the assessment matrices.	<p>Protected species (and habitats) were discussed at a strategic level in the Scoping Report and were considered as part of the SEA.</p> <p>MCZs have been considered where appropriate as part of Objective 1.1 in the SEA.</p>

Ref	Consultee	Comment	How comments have been addressed in the Draft Water Resources Management Plan Environmental Report
		Natural England welcomes the habitats regulations assessment using conservation objectives for the relevant Natura 2000 sites. Natural England strongly recommends that individual assessments of options, that are likely to impact priority habitats or species, are included in addition to those impacting national and international sites. Note that reference to assessment of Marine Conservation Zones has not been made.	
12	Natural England	The landscapes and habitats in Southern Waters supply area include very high proportions of high value landscapes and habitats. Standard construction mitigation methodologies do not always work to remove impacts on such habitats. It is essential that the assessment methodology and mitigation assumptions can be teased apart to ensure that all assumptions are appropriate to the environmental receptors. It may not be necessary to amend the final matrices table if sufficient information on each options assessment is available. Other companies are producing individual options reports for key options so the likely efficacy of proposed mitigation can be clearly assessed. Natural England welcomes the proposals to assess any options on or likely to affect a SSSI against the sites favourable condition tables.	The SEA Environmental Report has made it clear what mitigation measures have been assumed for the schemes and which have therefore informed the assessment of each option post- mitigation.
13	Natural England	Designated sites The SEA Environmental Report should assess the potential for the proposal to affect nationally and internationally important designated sites, including Special Areas of Conservation (SACs), Special Protection Areas (SPAs), Ramsar sites, Sites of Special Scientific Interest (SSSIs) and Marine Conservation Zones (MCZ). SSSI citations, site conservation objectives, favourable condition tables (FCT) and condition assessments can be viewed online on the Designated Sites View database. Conservation advice on marine protected areas and guidance on how to use this advice can be found on the gov.uk website. In addition, Natural England	Comment noted and confirm that if the SEA (and associated Habitats Regulations Assessment) identifies potential adverse effects on designated sites these were explored further in the specific environmental assessment of options.

Ref	Consultee	Comment	How comments have been addressed in the Draft Water Resources Management Plan Environmental Report
		advises reference to Natural England's SSSI Impact Risk Zones (IRZs) GIS tool/dataset. The SSSI IRZ dataset can be downloaded from the data.gov.uk website as an ESRI ArcMap Shapefile and used in combination with other spatial data in the users GIS. It is also available to view on Magic. Further information about accessing this dataset can be found at data.gov.uk.	
14	Natural England	Habitats Regulations Assessment (HRA) European sites (e.g. designated SACs and SPAs) fall within the scope of the Conservation of Habitats and Species Regulations 2010 (as amended). In addition paragraph 118 of the National Planning Policy Framework (NPPF) requires that potential SPAs, possible SACs, listed or proposed Ramsar sites, and any site identified as being necessary to compensate for adverse impacts on classified, potential or possible SPAs, SACs and Ramsar sites be treated in the same way as classified sites. Under Regulation 61 of the Conservation of Habitats and Species Regulations 2010 (as amended) an appropriate assessment needs to be undertaken in respect of any plan or project which is (a) likely to have a significant effect on a European site (either alone or in combination with other plans or projects) and (b) not directly connected with or necessary to the management of the site. Should a likely significant effect on a European/Internationally designated site be identified or be uncertain, the competent authority (in this case Southern Water) will need to prepare an Appropriate Assessment (AA), in addition to consideration of impacts through the SEA process.	Noted.
15	Natural England	Regionally and locally important sites Southern Water will need to consider impacts of the dWRMP19 options on local wildlife and geological sites. Local Sites are identified by the local wildlife trust, geo-conservation group or a local forum established for the	Local Nature Reserves (LNRs) have been included in the Environmental baseline section and were considered as part of the SEA.

Ref	Consultee	Comment	How comments have been addressed in the Draft Water Resources Management Plan Environmental Report
16	Natural England	<p>purposes of identifying and selecting local sites. They are of county importance for wildlife or geo-diversity.</p> <p>Protected Species</p> <p>Protected Species are those protected by the Wildlife and Countryside Act 1981 (as amended) and by the Conservation of Habitats and Species Regulations 2010 (as amended). Southern Water will need to consider the impacts of the Water Resource Management Plan options on protected species (including, for example, great crested newts, reptiles, birds, water voles, badgers and bats). Natural England does not hold comprehensive information regarding the locations of species protected by law, but advises on the procedures and legislation relevant to such species. Records of protected species should be sought from appropriate local biological record centres, nature conservation organisations, groups and individuals; and consideration should be given to the wider context of the site for example in terms of habitat linkages and protected species populations in the wider area, to assist in the impact assessment. Consideration should be given to whether sites have been used as receptor sites for protected species from other developments. The conservation of species protected by law is explained in Part IV and Annex A of Government Circular 06/2005 Biodiversity and Geological Conservation: Statutory Obligations and their Impact Within the Planning System. If a potential risk to protected species is identified for any water resource plan option, then the area likely to be affected by the water resource option should be thoroughly surveyed by competent ecologists at appropriate times of year for relevant species and the survey results, impact assessments and appropriate accompanying mitigation strategies included as part of any option species environmental report. Note that impacts on protected species are a material consideration for planning authorities, and failure to</p>	<p>Protected species (and habitats) were discussed at a strategic level in the Scoping Report and have been considered as part of the SEA. More detailed assessment will be required as detailed design of schemes included in the plan included within the plan are progressed.</p>

Ref	Consultee	Comment	How comments have been addressed in the Draft Water Resources Management Plan Environmental Report
		consider them at the strategic WRMP stage may result in subsequent delay or in most serious cases, refusal of permissions at the implementation stage. In order to provide this information there may be a requirement for a survey at a particular time of year. Surveys should always be carried out in optimal survey time periods and to current guidance by suitably qualified and where necessary, licensed, consultants. Natural England has adopted Standing Advice for protected species which includes links to guidance on survey and mitigation.	
17	Natural England	Rights of way, access land, coastal access and National Trails The SEA Environmental Report should consider potential impacts of the WRMP options on access land, public open land, rights of way and coastal access routes. Consideration should also be given to the potential impacts on National Trails (e.g. The South Downs Way, The England Coastal Path – South East, The North Downs Way and Thames Path). The National Trails website www.nationaltrail.co.uk provides information including contact details for the National Trail Officer. Appropriate mitigation measures should be incorporated for any adverse impacts. We also recommend reference to the relevant Right of Way Improvement Plans (ROWIP) to identify public rights of way that should be maintained or enhanced.	Public rights of way including National Trails are addressed in the SEA objectives and key questions in SEA Objectives and Assessment approach. Reference is made to ROWIPs in the Plans Policies and Programmes Review. Where an option may affect recreational assets and public rights of way, these were identified and assessed.
18	Natural England	Landscape and visual impacts Natural England welcomes reference is made to National Character Areas (NCAs) throughout the SEA scoping document. Information on Landscape Character Assessment is also available on our website. The SEA should include sufficient baseline information to make meaningful and strategic decisions about the use of the strategic options elected for the dWRMP19. For many options, it may be straightforward to screen out any potential landscape and	Potential effects of the WRMP options on landscape and visual amenity were considered in the SEA under the landscape and visual amenity topic objectives, as set out in the Scoping Report. This includes potential impacts on AONBs, National Parks and National Character Areas.

Ref	Consultee	Comment	How comments have been addressed in the Draft Water Resources Management Plan Environmental Report
		<p>visual impacts. The SEA should explain where any gaps in baseline information are, and how the water company will fill these gaps in sufficient time.</p> <p>We encourage the use of Landscape Character Assessment (LCA), based on the good practice guidelines produced jointly by the Landscape Institute and Institute of Environmental Assessment in 2013. Natural England supports the publication Guidelines for Landscape and Visual Impact Assessment, produced by the Landscape Institute and the Institute of Environmental Assessment and Management in 2013 (3rd edition). The methodology set out is almost universally used for landscape and visual impact assessment.</p>	
19	Natural England	<p>Air quality</p> <p>Information on air pollution impacts and the sensitivity of different habitats/designated sites can be found on the Air Pollution Information System (http://www.apis.ac.uk/). Further information on air pollution modelling and assessment can be found on the Environment Agency website.</p>	<p>Reference to APIS is included in the environmental baseline. Potential effects on air quality was reported against the SEA air and climate topic objectives, as well as the human health topic objective relating to air quality, as appropriate.</p>
20	Natural England	<p>Cumulative and in-combination assessment</p> <p>Natural England would like to highlight the importance of including other water companies' water resource and drought plan options in this assessment, including any bulk water transfers which are being considered. It may be helpful to take account of the work of Water Resources South East on cumulative and in combination assessment if Southern Water has not already done so. Natural England welcomes the intention in the SEA scope to identify, describe and evaluate the effects that are likely to result from the proposed options in combination with any other large or locally-significant projects and activities that are being, have been or will be carried out so far as is reasonably practicable.</p>	<p>The approach to carrying out the cumulative effects assessment is described in Section 6 of the SEA Scoping Report. The approach includes consideration of cumulative impacts with the latest available Water Resource Management Plans and Drought Plans of other water companies.</p> <p>The cumulative assessment also considered other relevant plans and projects, particularly large-scale projects or plans reflecting the strategic level of assessment for SEA.</p>

Ref	Consultee	Comment	How comments have been addressed in the Draft Water Resources Management Plan Environmental Report
		<p>The following types of projects should be included in such an assessment (subject to available information):</p> <ul style="list-style-type: none"> a. existing completed projects; b. approved but uncompleted projects; c. ongoing activities; d. plans or projects for which an application has been made and which are under consideration by the consenting authorities; and e. plans and projects which are reasonably foreseeable, i.e. projects for which an application has not yet been submitted, but which are likely to progress before completion of the water resources management plan period and for which sufficient information is available to assess the likelihood of cumulative and in combination effects. 	
21	Natural England	<p>Baseline Review Priority habitats and species</p> <p>The baseline list of priority habitats and species is weakest part of the scoping report. The list of priority habitat and species is short and would be better described as an “illustrative” list restricted to some of the freshwater dependant habitats and species found in the supply area. The Scoping report does recognise the list is not exhaustive but additional caveats should be added and the assessment of options must consider impacts on all priority habitats and species potentially impacted by an option not just this illustrative list. Several S41 species (e.g. fen raft spider, sharp-leaved pondweed, and cutgrass) have strongholds in Southern Waters supply area. Species such as Little whirlpool ram’s horn snail (<i>Anisus vorticulus</i>) have more than 2/3rd of their UK population in Southern Waters supply area. Other S41 species which are also protected species that feature widely across the</p>	<p>The list has now been described as illustrative. Protected species (and habitats) were discussed at a strategic level in the Scoping Report and were considered as part of the SEA.</p> <p>More detailed assessment will be required as detailed design of schemes included in the plan included within the plan are progressed.</p>

Ref	Consultee	Comment	How comments have been addressed in the Draft Water Resources Management Plan Environmental Report
		supply area include great crested newts. There is no mention of protected species in the environmental baseline. This study area is particularly rich in protected species associated with the high density of ancient woodland and mosaic habitats such as great crested newts, a range of bat species and dormice. Notably absent are marine habitats and species and terrestrial habitats and species. Construction activities as well as changes to freshwater flows to estuaries could potential impact these habitats and species. Large developments could potentially have opportunities for enhancement of terrestrial priority habitats and species (for example reconnection of a gap in a hedgerow during construction of a pipeline). For the final plan the list of S41 habitats and species to be considered should be improved to better reflect the species most relevant to the supply area.	
22	Environment Agency	<p>The current state of the environment has been provided in Section 4 using a variety of sources and assesses the future baseline under a separate heading for each topic. The key sustainability issues relating to the WRMP have also been clearly set out. It would have been good to understand how the baseline characteristics differ from those in the 2015 SEA.</p> <p>Recommended change: Set out changes between the 2015 baseline</p>	The baseline has been set out based on the most up to date information available at the time of assessment (2017). Where possible, future trends have been described.
23	Environment Agency	The methodology section is clear and well laid out. It would've been useful to reference the previous 2015 report methodology where appropriate. Matrices are well used and explanations given to how effects are to be assessed. The only issue is that there is no explanation given to why certain disciplines have been scoped out. It would also be useful to understand how the duration of an effect will be determined i.e. how many years is long term. This should tie in with the timescales in the temporal scope (section 2.2.2.).	With respect to duration, short-term effects have been defined as those that last for up to six months, medium term effects are those that extend beyond six months to two years whilst long term effects are assessed as those that continue for greater than two years.

Ref	Consultee	Comment	How comments have been addressed in the Draft Water Resources Management Plan Environmental Report
		Provide an explanation for why disciplines have been scoped out.	None of the SEA topics were scoped out at the scoping stage, and therefore objectives were developed relating to each of the topic.
24	Environment Agency	<p>The spatial scope extends beyond the boundaries of the Southern Waters WRZs to include bulk supply import options from other suppliers. It would have been useful to state whether similar boundaries had been used in previous WRMP SEA?</p> <p>The assessment of cumulative effects should include transboundary effects with other suppliers.</p> <p>Consider providing a clearer definition of the spatial scope / use consistent terminology.</p>	<p>The transitional and coastal water bodies and biodiversity within them are included within the SEA boundary.</p> <p>The potential for cumulative effects with other Water Company WRMPs were considered.</p>
25	Environment Agency	It seems that the report has scoped in all topics - if not justification should be given to topics scoped out. It doesn't however include the key reasons for scoping in each topic. Was this based on the findings of the 2015 SEA?	All SEA topics were scoped in. Findings of the SEA undertaking in 2015, review of plans, policies and programmes, preparation of the baseline and identification of key messages contributed to the decision to scope all topics in.
26	Environment Agency	<p>The baseline information is sufficient to provide an understanding of the existing environment and its likely evolution within the study area (under separate future baseline headings). It provides a generic picture across the area but does not reference the 2015 SEA report / changes since then. It would've been useful for this section to be more focused on those locations where impacts are likely to occur had an outline of the reasonable alternatives been included in the report. This would facilitate a greater understanding of the spatial distribution of environmental effects, rather than just their performance against the objectives.</p> <p>Consider whether the assessment methodology could be modified to provide greater clarity on the spatial distribution of the</p>	The SEA is strategic in nature and considers the study area as a whole. Spatial distribution of environmental effects of the plan were addressed to some extent through the identification and assessment of cumulative effects.

Ref	Consultee	Comment	How comments have been addressed in the Draft Water Resources Management Plan Environmental Report
		environmental effects of the plan rather than just the performance against objectives.	
27	Environment Agency	<p>The appendices for the baseline is just figures and tables. It may have been easier to use the key content from these in the main report to aid ease of reading. Something along the lines of a constraints plan may be appropriate to enable the scoping process to identify potential 'hot spots'.</p> <p>Consider using some key figures in the baseline section.</p>	<p>The maps were presented as appendices due to the image size of the maps - and therefore to assist downloading of the document from the water company website for all stakeholders, some of whom have limited broadband facilities. Compressing the files any further renders the maps illegible.</p> <p>The baseline section in the Environmental Report contains the maps.</p>
28	Environment Agency	<p>Just a couple of 'error!' messages in the report where links haven't worked.</p> <p>Update links.</p>	Comment noted. These were updated.
29	Environment Agency	<p>General</p> <p>The challenge which the SEA has to make, is the scale. It needs to influence the relevant options appraisal process in the WRMP. The SEA does not make the link of how SWS would do this explicitly enough.</p>	The SEA influences the WRMP throughout the process. This was described in the Environmental Report Environmental Screening of Water Resources Management Plan Options and Section 7 Role of the SEA in draft Water Resources Management Plan Strategies.
30	Environment Agency	<p>Fisheries</p> <p>No concerns from KSL with the fish element of the SEA scoping report</p>	Thank you for your comment.
31	Environment Agency	<p>No deterioration</p> <p>Section 1.7 says "companies must ensure that its [sic] proposed activities do not result in any deterioration between status classes of any water body". The no deterioration requirement is more</p>	This is described in the future baseline section for the Water topic.

Ref	Consultee	Comment	How comments have been addressed in the Draft Water Resources Management Plan Environmental Report
		stringent. The methodology that this Scoping Report proposes resembles that for the drought plan on which we commented "It should also be noted that where deterioration has occurred between the 2009 and 2015 classification, then restoration is required to restore the earlier/better classification status. The paragraph could do with some further clarification as no deterioration is allowed within individual elements (within a given class) or overall class."	
32	Environment Agency	Needs to address diffuse pollution more under Land Use. The EA has a lot of focus on this but water companies must accept the significant role they play also.	This is described in the future baseline section for the Soil, Geology and Landuse topic. It was also be addressed in the assessment of the catchment management schemes that form part of Southern Waters draft WRMP19 strategies.
33	Environment Agency	Section 4.2.1 Priority Habitats and Species We understand that the list is not meant to be exhaustive. Species such as Coenagrion mercurale are important locally and are omitted from the list on page 34. For the purposes of clarity and to ensure the SEA is sound from the start, it would be helpful for SW to list and agree all of the NERC habitats and species they scope into this process with NE and the Agency, rather than simply present an incomplete list of examples.	The list has now been described as illustrative. Priority species (and habitats) were discussed at a strategic level in the Scoping Report and were considered as part of the SEA. More detailed assessment will be required as detailed design of schemes included in the plan included within the plan are progressed.
34	Environment Agency	Section 4.2.3 Key Issue for Biodiversity, Fauna and Flora List is sound as far as it goes. However, it focusses upon avoiding/reducing negative effects and does not explicitly address the goal to increase the area of priority habitats, as set out in the Natural Environment White Paper (see section 4.22 preceding the list in section 4.2.3). The missing issue relates to the need create new priority habitat, or at least not preclude new habitat being created in future.	The objective states 'and enhance' in relation to biodiversity. It is not the role of the WRMP to increase the area of priority habitat – we believe this will go beyond the scope of the plan.

Ref	Consultee	Comment	How comments have been addressed in the Draft Water Resources Management Plan Environmental Report
		This point needs to be better reflected in the main body of the report (Section 4) but then translated into specific objectives in Section 5.	
35	Environment Agency	Section 4.2.2 Future Baseline, for Material Assets and Resource Use Southern Water set out a target to reduce leakage from 86 million litres a day (in 2020) to 75 million litres a day by 2040. Is that sufficiently ambitious, given the economic, social and ecological value of water? I appreciate that there must be a sliding scale of diminishing returns for effort, but a 12% reduction, spread over 20 years seems somewhat lacking in ambition.	The draft WRMP19 provides full details and justification for Southern Water's plans to further reduce leakage within its supply area and the benefits have been assessed within the SEA.
36	Environment Agency	Section 4.5.1, Water Baseline, Groundwater para, page 43 Refers to groundwater extending throughout parts of Kent, Sussex and the Isle of Wight. Obviously Southern Water appreciates that it also occurs in Hampshire too, but perhaps worth saying so here, for completeness.	Text updated to include Hampshire also.
37	Environment Agency	Section 4.5.1, Water Baseline, Flood Risk para, page 45 Sentence beginning 'Coastal saltmarsh is an important.....' should say that it is an 'ecosystem service provider'.	Text updated as requested.
38	Environment Agency	Section 4.6 Soil, Geology and Land Use This section, including the key issues list, needs to better reflect two matters of importance: - A major cause of WFD failure and protected site condition is diffuse pollution, in particular soil and nutrient run-off. Section 4.5 Water discusses WFD a lot, but doesn't mention this matter, and Section 4.6 deals with Soils but equally does not give sufficient weight to the need to conserve soil for water quality and water quantity objectives as much as for its own sake as a resource for agriculture (and other ecosystem services);	The Future Baseline section of the Water section was updated to include information on catchment management and natural flood risk management.

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		<p>Similarly, Section 4.5 Water describes flooding, and Section 4.6 deals with Land Use, but neither section properly addresses the multiple benefits to be gained from natural flood management, which include better water resource management, as well as flood risk (and other ecosystem services). There is some mention of catchment management, but matters such as natural flood management need to be drawn out with a greater emphasis in this scoping report.</p> <p>These points need to be better reflected in the main body of the report (Section 4) but then translated into specific objectives in Section 5.</p>	
38	Environment Agency	<p>We strongly support many of the 'key questions' proposed in Table 5.1. In some ways this table of 'key questions' is more thorough than the description of issues in Section 4.</p> <p>For example: The need to create new priority habitat is partially addressed in a key question on page 62, but there is no thread linking this matter through the document;</p> <p>The need to consider the multiple benefits of NFM, including water resources, is addressed, but without reference to NFM, in a key question on page 65 relating to catchment management and water quantity, but again there is no thread linking this matter through the document;</p> <p>The need to consider soil conservation is partially addressed in a key question on page 67 where soil erosion is mentioned, but again the driver for this and the multiple ecosystem benefits are not set out in Section 4, so there is no thread linking this matter through the document.</p> <p>However, there are more key questions that could genuinely add value to the assessment process. For example, in the Material asset and resource use section a key question could be 'Will it</p>	<p>The multiple benefits of natural flood management and reducing soil erosion was described more explicitly in the baseline section.</p>

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39	Environment Agency	<p>create new resources (other than water, of course), like energy or waste products, of value to society that realistically can be captured?'</p> <p>SWS should ensure answers from the questions posed influence the WRMP.</p> <p>Ecosystem Services</p> <p>Ecosystem services feature highly in Table 5.1. SEA objectives and assessment approach, but are not well introduced as a concept nor well defined in Section 4, or the beginning of Section 5.</p> <p>We welcome recognition that ecosystem services are a profoundly important concept to incorporate into this SEA process, and strongly support the proposal to frame several 'key questions' to address ecosystem services in principle.</p> <p>We should like to know more about how Southern Water propose to develop and incorporate a form of ecosystem services assessment into the SEA process, so as to be able to properly address some of those key questions set out in Table 5.1.</p> <p>We encourage Southern Water to 'push the envelope' to incorporate ecosystem service assessment in WRMP SEA, in the same way that the Company are a sector-leader in other elements of the WRMP process, such as the stochastic approach to forecasting. That will ensure better socio-economic and environmental outcomes for all, and a robust WRMP, as well as enhance reputation.</p> <p>Natural Capital</p> <p>Similarly, as part of, not instead of, an ecosystem services approach, we encourage Southern Water to embrace the concept of natural capital, as per The Natural Capital Protocol, as an approach to assessing and valuing the environmental assets an organisation is responsible for and depends upon, such as rivers</p>	<p>We have mapped the SEA objectives to ecosystem services to show a good alignment between them and have considered natural capital as part of our assessments. We have also included in Section 9 in the SEA to demonstrate the effects of the WRMP on natural capital and ecosystem services.</p>

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40	Environment Agency	<p>and aquifers. Developing a natural capital approach – one that contributes to restoring and growing the assets, rather than depleting it – will result in a better WRMP for all concerned. Natural capital is very briefly mentioned in Table 5.1 (page 62) but nowhere is the concept described or the key question defined.</p> <p>Section 5.2.1 Primary Assessment, third para, page 71</p> <p>The author has mixed-up reference to some columns (four and six), so that this para and Table 5.2 are inconsistent.</p> <p>Section 5.2.1 Primary Assessment</p>	Text and table have been reviewed and updated.
41	Environment Agency	<p>In what way will the frequency of impact be considered? The text (and Table 5.2) clearly strive to consider the scale and nature of impacts, likelihood, duration and permanence, but does not explicitly address the frequency of impacts. This is important because a small scale, or short-duration effect might on it's own have no permanent effect, but if repeated at too high a frequency may have a cumulative effect, for example reducing resilience to or recoverability from impacts.</p>	Frequency of impact is considered to some extent when considering magnitude, permanence and duration of effects.
41	Historic England	<p>Historic England is a statutory consultation body in relation to the SEA Directive. However, due to high volume of consultations being received in respect of the Directive, Historic England has prepared generic guidance with regards to our involvement in the various stages of the assessment process.</p>	We have taken account of advice included within Historic England Advice Note 8: Sustainability Appraisal and Strategic Environmental Assessment (2016).
42	Howard Taylor, Upstream Dry Fly	<p>Dry Fly Fishing Ltd and Little River Management Ltd as managing agents of chalk stream fisheries in the Test, Itchen and Meon catchments, including the lower river Test would like to comment as follows:</p> <p>Abstraction from the river Test in the proposed voluntary licence changes is unsustainable and unacceptable. There is no evidence to prove this would not damage the riverine environment and therefore the Precautionary Principle should be adopted. (As the</p>	<p>Southern Water note your reflection of the importance of application of the precautionary principle concerning the possible effect of additional abstraction during low water and drought on salmon and sea trout.</p> <p>We also note you emphasise that the SEA should identify the specific data required to ensure the migratory fish population are not put under any</p>

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		<p>Weser case (C-461.13) has now made clear (see eg. paragraphs 34 and 51 of ECJ judgment), developments which “may cause” a deterioration in the status of a water body (or jeopardise the attainment of good status) must be refused authorisation, applying the precautionary principle as set out in Art.192(1) TFEU. This means that the burden of proof is on the developer to demonstrate that the project will not cause a WFD deterioration, and that a WFD compliance assessment must therefore be completed.) The SEA need to identify the specific data required to ensure the salmon and sea trout populations of this iconic river are not put under ANY threat by abstraction. The river Test is famous for brown trout populations and it is shown that a large percentage of wild brown trout populations derive from sea trout populations. It is therefore essential that further studies on river Test sea trout populations and migrations are undertaken as well as salmon. Further collection of this baseline data on which to base models is vital as the SWG advised, the data to date is incomplete and therefore the Precautionary Principle should be adopted. Water companies must ensure that proposed activities do not result in any deterioration between status classes of any water body or species therein. For example, it has been scientifically shown that salmon from the Itchen SAC will migrate up the river Test and visa versa. Therefore damage to the Test SSSI salmon population in a drought scenario is inextricably linked to damage to the salmon population of the Itchen SAC. The spatial area of the SEA must recognise the link of salmon and sea trout between these two river and commission further study here. This is a Secondary effect that has not yet been looked at. These considerations should be a clearly identified as part of the specific baseline information to be included within the Environmental Report. It is paramount that the short term cost benefits do not outweigh environmental damage to these iconic</p>	<p>threat by abstraction and you also encourage further baseline data collection.</p> <p>In preparing the new draft WRMP Southern Water have explored all potential options to maintain reliable public water supplies relative to current and future demands and environmental objectives. Information on these options, and the assessment of them, has been set out within the draft WRMP and its related SEA Environmental Report. These will both be published for consultation, expected to commence in early 2018.</p>

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		<p>chalk stream rivers. The SEA must include comprehensive studies of both salmon and sea trout migration. With a growing demand for housing and other development in the area, more sustainable options for public water supply must be a priority. It is unacceptable to continue to put pressure on rivers and ground water supplies because it is cheap. It is unacceptable to propose abstraction on the river Test above recent actual of c50 to 70M/ld without clear scientific evidence in place demonstrating that no damage will result. Water companies must look at winter storage and desalination to ensure our chalk streams environments are protected. The company should not select options that are high environmental risk [i.e increasing abstraction above recent actual], so as to progress options with a high chance of being delivered and with minimal environmental risk or impacts. No risk and lower-risk option should be selected instead such as winter storage.</p>	
43	Sussex Wildlife Trust	<p>Q2. Do you agree with the SEA spatial area under consideration (see Figure 2.3)? If you disagree, please explain why and what changes you consider are required.</p> <p>Sussex Wildlife Trust supports the inclusion of the wider study area. Given the potential impacts of bulk water transfers, the SEA must consider all areas from which water may be taken. We also support a longer 50 year planning horizon. Where practical, we recommend the inclusion of entire catchment (or sub catchment) boundaries where Southern water is active, rather than partial boundaries limited to supply areas. This will ensure that water companies can work more easily to ensure good quality water supplies across catchment management units. This also enables closer partnership working with a range of stakeholders through Catchment Partnerships, WFD and other national policy work areas such as Natural Flood Management (NFM). With regards to</p>	<p>Noted and confirm that any effects that may arise outside of the Southern Water core study area boundary were considered and assessed.</p>

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		aquifers, we suggest that entire aquifer boundaries are included in the SW SEA spatial area of influence.	
44	Sussex Wildlife Trust	<p>Q3. Are the plans and programmes that have been reviewed appropriate (see Section 3)? If not, please explain why.</p> <p>The Trust supports the majority of the 'key messages' in table 3.1, particularly those relating to Biodiversity, Flora & Fauna, ecological networks, environmental limits and those promoting a catchment-based approach. The need to protect the green infrastructure network should read 'protect and enhance' the green infrastructure network. Sustainable green infrastructure, energy production/sourcing and SUDS around SW properties should be key to SW policy. Development should be steered away from areas which flood, and also areas which are known to not be able to accommodate sufficient water resources to sustain new development in the long term. We suggest adding in an item to encourage SW to 'flood and future proof' its existing infrastructure, particularly in relation to combined sewer flows.</p> <p>We are concerned about the 8th key message for 'Water' that Southern Water must 'Balance the abstraction of water for supply with other functions and services the water environment performs or provides'. Given the level of water stress in this area, Southern Water should be aiming for 'no overall increase in the amount of water abstracted from rivers and groundwater despite increases in population and climate change' as per the Water Blueprint for PR19 - http://blueprintforwater.org.uk/blueprintforpr19/ We support the protection and enhancement of ecosystem services and natural capital, and the articulation of these services in cost benefit analyses.</p>	<p>'Protect and enhance' added</p> <p>Flooding issues are covered appropriately under Obj. 4.4, which already includes the following key message: will it provide flood plain storage, or opportunities to improve flood risk management?</p> <p>The draft WRMP19 sets out how Southern Water intends to maintain the supply demand balance taking account of environmental assessment findings for a wide range of supply and demand options. Southern Water has sought to meet any supply deficits through environmentally sustainable solutions in so far as possible, however some source development is required principally to address the reduction in supply from existing water sources to improve the water environment i.e. to address sustainability reductions.</p>
44	Sussex Wildlife Trust	Q4. Are you aware of other plans or programmes that should be considered (see Section 3)? If so, please provide references.	These policies, plans and programmes were included in the SEA Environmental Report and

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		<p>The Trust would like to see consideration of the Blueprint for Water Blueprint for PR19 – Environmental Outcomes for the Price Review: http://blueprintforwater.org.uk/blueprintforpr19/ We suggest engaging with the new national Environment Agency programme for Natural Flood Management www.gov.uk/government/publications/working-with-natural-processes-to-reduce-flood-risk-a-research-and-development-framework A narrative for conserving freshwater wetlands in the UK has been published by Natural England http://publications.naturalengland.org.uk/publication/6524433387749376 and we suggest that SW use this document as their focus for future work relating to wetlands.</p> <p>And we would recommend working closely with Portsmouth Water, Sussex IFCA and Chichester Harbour Conservancy to help implement Landscape scale plans for Chichester Harbour. There is a government led national programme of Local Action Groups for the reduction of invasive species which we recommend that SW engages in, particularly in relation to their reservoirs (crassula infestations). www.nonnativespecies.org/index.cfm?pageid=524</p>	<p>considered in the assessment of potential effects of the WRMP.</p> <p>Southern Water is already working closely with Portsmouth Water as demonstrated in the draft WRMP and will seek to work closely with the other organisations as appropriate.</p>
45	Sussex Wildlife Trust	<p>Q5. Are you aware of any further baseline data or indicators that might provide useful information in relation to the scope of the WRMP19 (see Section 0)? If so, please provide this information or a source for the data.</p> <p>Section 4.2 does not include and reference to Local Wildlife Sites. LWS are identified and selected locally using robust, scientifically-determined criteria and detailed ecological surveys. As a result they have a huge part to play in contributing to the UK's natural capital and form key components of ecological networks. It is not appropriate to leave them out of the SEA. National Parks and Areas of Outstanding Natural Beauty are not mentioned in the</p>	<p>For the SEA the sites that are assessed are of a strategic level and it is not practical to assess each local site.</p> <p>A reference to National Parks and AONBs (covered in the Landscape topic) has been added to the Biodiversity section of Appendix C.</p>

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		<p>designated sites list for biodiversity and we recommend their inclusion.</p> <p>Although key protected species are necessarily listed under priority habitats and species on page 34, this list is extremely limited and only includes 5 orders of species (mammals, birds, crustacea, gastropods and fish). The list concentrates only on 'high order' species and not on any of the invertebrates, plants or lower plants which are necessary to sustain high order species. Amphibians and reptiles are also not mentioned. In the future we would suggest developing a tiered approach to biodiversity which enables the protection of a healthy and functioning food chain with a diverse range of species groups. There are a range of nationally protected plants and invertebrates which should feature in SW's species list such as chalk river/stream indicators and plants from internationally protected sites. The emphasis should be placed on creating healthy habitats in appropriate locations, not on preserving species. With the current political situation, it would be advisable for SW to develop a contingency plan in relation to European habitat and species legislation, Water Framework Directive targets and other relevant EU legislation which is likely to change drastically over the next few years.</p> <p>There are proposed changes to the designation of the UK's coastal and floodplain grazing marsh which could have implications in the future for SW delivery and the protection of key, designated sites. We are concerned about the content of the Future Baseline for Biodiversity (section 4.2.2). In particular it is not appropriate to assume 'sufficient resources' will be in place to ensure that the condition of designated sites will improve over the next few decades. It also does not currently seem likely that objectives associated with NERC priority habitats will be achieved. The UK Biodiversity Indicators report 2015 states that the status of UK</p>	<p>Southern Water have carried out environmental scenario testing to account for the fact that the environment is undergoing change.</p> <p>Updated the future baseline section to reflect these comments, although data provided is UK-wide, rather than for the study area.</p>

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		<p>priority species showing a long term deterioration (https://www.gov.uk/government/statistics/biodiversity-indicators-for-the-uk). It is not clear what the case is for priority habitats – area of land in agri-environment schemes is given as improving over the long term, however this was before Brexit. Additionally being in agri-environment does not necessarily indicate a positive outcome for biodiversity. For example, the State of lowland calcareous grassland within the South Downs National Park report states that: ‘Biodiversity2020 aims to ensure that 95% of SSSIs and 90% of priority habitats are in favourable or recovering condition by 2020 and that 50% of SSSIs are in favourable condition. This survey identified that 41% of SSSIs surveyed were in favourable condition, with 99% favourable or recovering and 0.83% were unfavourable or destroyed. 21% of the LWS surveyed were favourable with a total of 31% LWS favourable, part favourable or recovering. 58% of sites were unfavourable or destroyed. 10% of undesignated chalk grassland sites were in favourable condition or 13% classed as favourable, part favourable or recovering. 84% of sites were unfavourable or destroyed.’</p> <p>Similarly the State of Nature report (http://www.rspb.org.uk/Images/State%20of%20Nature%20UK%20report_%202020%20Sept_tcm9-424984.pdf) states that ‘Between 1970 and 2013, 56% of species declined, with 40% showing strong or moderate declines’. The measurements were based on quantitative trends for almost 4,000 terrestrial and freshwater species in the UK.</p> <p>There is a similar downward trend in the condition of local wildlife sites as demonstrated by the Government’s Single Data List: https://www.gov.uk/government/statistical-data-sets/env10-local-sites-in-positive-conservation-management and The Wildlife Trusts’ 2014 report:</p>	

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		<p>http://www.wildlifetrusts.org/sites/default/files/secret_spaces_local_wildlife_sites_2014_summary_report.pdf .</p> <p>Given all of the above, the future baseline for biodiversity is one of decline. An assessment of future impacts must start from this basis.</p>	
46	Sussex Wildlife Trust	<p>Q6. Are the environmental issues identified for the Southern Water WRMP19 appropriate (see Section 4)? If not, please explain why and what changes you consider are required.</p> <p>On the whole, we support the issues outlined. It would also be useful for SW to recognise and protect natural capital / ecosystem services.</p> <p>Adaptation to climate change should include an element of drought proofing the landscape – particularly in relation to increasing winter droughts.</p> <p>In 4.7.3 we suggest that SW invest in a programme of carbon offsetting for their buildings and activities. We also suggest that they invest in more energy and water efficient infrastructure and more energy producing / water harvesting infrastructure for their own estate.</p> <p>We have particular concerns about the long-term viability of desalination and water transfers in the face of climate change.</p>	<p>Protecting natural capital / ecosystem services is covered under Objective 1.1 and associated key questions in the assessment.</p> <p>Southern Water have considered carbon explicitly in the WRMP development including the calculation of carbon costs for every option. The SEA has an objective to reflect carbon effects. Where the draft WRMP19 strategies include schemes with relatively high carbon footprint, Southern Water will be exploring opportunities to reduce the carbon emissions during the detailed design process to minimise carbon effects as far as possible. The SEA also includes recommendations for monitoring of carbon effects and seeking opportunities for mitigation.</p>
47	Sussex Wildlife Trust	<p>Q7. Do the environmental objectives encompass all the necessary issues (see Section 5)? If not, please explain why and what changes you consider are required.</p> <p>We congratulate SW on the breadth and depth of the issues identified for action. There may be other actions missing, but we believe that those listed will entail sufficient work / resources to carry SW forward to the next plan.</p>	<p>Noted and thank you for your comment.</p>
48	The Test & Itchen	<p>WRMP 2019 Strategic Environmental Assessment Scoping Report 28.04.2017</p>	<p>The SEA has considered the risks of abstracting from this area and the measures that are needed</p>

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	Association Ltd	<p>Thank you for the opportunity to comment on the SEA scoping report. As an organisation which has riparian owners' concerns at its heart, the Test & Itchen Association (TIA) is happy to work with all organisations to ensure that the environmental impact of any changes are kept to a minimum. The</p> <p>TIA is also involved in the Test & Itchen Catchment Partnership (TICP) which is co-hosted by Wessex Chalk Stream and Rivers Trust (WCSRT) and Hampshire and Isle of Wight Wildlife Trust (HIOWWT).</p> <p>The TIA welcomes the proposal to implement demand management and leakage reductions in the first instance. However, the above measures will not cover the supply-demand deficit in future years. Southern Water must ensure that there be no overall increase in the amount of water abstracted from our already overstretched chalk streams and groundwater, and therefore must plan for alternative supply options, as mentioned on page 12 of the report.</p> <p>The TIA believes that the protection of designated habitats along the River Itchen SAC/SSSI and River Test SSSI are key. Southern Water must commit to addressing abstraction where it is preventing achievement of 'favourable' status of these rivers, they are currently in 'unfavourable' status, or poses a risk of deterioration to 'unfavourable status deteriorating'.</p> <p>As a final point, TIA asks that Southern Water refers to the Blueprint for Water as it develops and implements the Water Resources Management Plan.</p> <p>The above comments are provided based on the information made available at this time and are not exhaustive. We look forward to receiving your response and would welcome further engagement with all stages of the SEA process.</p>	<p>to be taken in the water resource zone to minimise this risk.</p> <p>This area is a Special Area of Conservation, the Habitats Regulations Assessment (HRA) process also applies, which includes demonstrating that all appropriate alternative options have been considered before undertaking additional abstraction (for example, demand management measures, use of alternative water sources, etc.).</p>

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49	Wessex Chalk Stream Rivers Trust	<p>Thank you for the opportunity to comment on the SEA scoping report. As the co-host of the Test & Itchen Catchment Partnership, the Wessex Chalk Stream & Rivers Trust (WCSRT) wants to ensure that the environmental impact of new supply and demand management options in the Test and Itchen catchment, and any potential environmental issues that could arise from the implementation of WRMP19, are reduced to a minimum.</p> <p>WCSRT welcomes Southern Water's proposal to continue to implement demand management and leakage reduction measures in the first instance to reduce water demand. WRMP19 offers a real opportunity for Southern Water to considerably upscale its demand management programme to increase resilience through ambitious water efficiency measures, increasing overall metering of households and reducing leakage.</p> <p>However, it is clear from reading the scoping report that the above measures are unlikely to address the supply-demand deficit in future years, with a number of supply options being considered. In spite of increases in population and climate change, Southern Water must ensure no overall increase in the amount of water abstracted from our already overstretched rivers and groundwater and therefore explore alternative supply options as mentioned on page 12 of the Scoping Report. WCSRT believes the 'precautionary principle' should be applied with regards to any new surface water abstraction plans (or relocation of existing surface water abstraction), particularly from sensitive chalk rivers and streams in the Test & Itchen catchment and elsewhere where chalk streams may be of concern. Scientific evidence clearly shows that unnaturally low flows and altered flow regimes caused by water abstraction can have damaging impacts on sensitive river systems and their associated biota.</p>	<p>The SEA considers the risks of abstracting from this area and the measures that are needed in the water resource zone to minimise this risk.</p> <p>This area is a Special Area of Conservation, the Habitats Regulations Assessment (HRA) process also applies, which includes demonstrating that all appropriate alternative options have been considered before undertaking additional abstraction (for example, demand management measures, use of alternative water sources, etc.).</p>

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		Nature should be at the heart of WRMP19 and therefore the Habitats Regulation Assessment and the Water Framework Directive Assessment will be key in informing the SEA process in order to protect designated habitats, such as River Itchen SAC/SSSI and River Test/ Lower Test Valley SSSI. Southern Water must commit to addressing abstraction where it is preventing achievement of 'good' status or poses a risk of deterioration.	
50	Wessex Chalk Stream Rivers Trust	WCSRT would like to direct Southern Water to the Blueprint for PR19 environmental manifesto, which sets out the priorities that water companies should deliver for the environment as they develop and implement their Water Resource Management Plans. These are: protect and restore catchments from source to sea; stop pollution; use water wisely and price water fairly; and keep rivers flowing and wetlands wet. You can download the full publication via http://blueprintforwater.org.uk/blueprintforpr19 .	This policy has been included in the SEA Environmental Report and considered in the assessment of potential effects of the WRMP.
51	Forestry Commission England	Section 4.2.1 Baseline: Ancient woodlands The National Planning Policy Framework (NPPF) is referenced with respect to planning decisions affecting agricultural land. It is also worth note that the NPPF (paragraph 118) also indicates ancient woodland should be a planning consideration: “planning permission should be refused for development resulting in the loss or deterioration of irreplaceable habitats, including ancient woodland and the loss of aged or veteran trees found outside ancient woodland, unless the need for, and benefits of, the development in that location clearly outweigh the loss” We would suggest the inclusion of our published joint Standing Advice with Natural England on Ancient Woodlands and Veteran Trees .	This information has been included in the SEA Environmental Report and considered in the assessment of potential effects of the WRMP.

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52	Forestry Commission England	<p>Section 4.5.1 Baseline: Flood Risk & Section 4.6.1 Baseline: Soils</p> <p>Woodland creation schemes in the upper catchment areas have the potential to address both these concerns by reducing diffuse pollution and flood alleviation by increasing water filtration and reducing flooding from surface water runoff. Woodland creation schemes would support the implementation of SuDS in the lower catchment areas and help to meet the objectives of the Water Framework Directive. Further information is available on our website “Woodland for Water: Woodland measures for meeting Water Framework Directive objectives” and accompanying Woods for Water publication.</p>	<p>This information has been included in the SEA Environmental Report and considered in the assessment of potential effects of the WRMP.</p>
53	Hampshire and Isle of Wight Wildlife Trust	<p>Q2. Do you agree with the SEA spatial area under consideration (see Figure 2.3)? If you disagree, please explain why and what changes you consider are required.</p> <p>The ‘core’ geographical area under consideration for the SEA covers all of Southern Water’s WRZs, the river and/or groundwater catchments of those water sources, and the locations and sources of bulk water supply imports that serve these WRZs but which lie outside their boundaries. In addition to these areas, we welcome the consideration of an area reflecting the spatial scope of the additional options being considered for WRMP19, as defined by the wider study area, and the inclusion of potentially-affected transitional and coastal waters, which are fed by the rivers and groundwaters from which abstraction takes place, and which could be impacted by WRMP measures which operate there. These TraC waterbodies include the Solent, and the harbours of East Hampshire; their consideration is particularly important in light of the nature conservation designations that they hold. The consideration of a 50-year planning horizon (as opposed to the minimum 25 year period which applies to the WRMP) is in line with</p>	<p>The transitional and coastal water bodies and biodiversity within them are included within the SEA boundary.</p> <p>The impact to the environment is considered during the individual environmental assessment of the options and the cumulative assessment.</p> <p>Southern Water has actively considered the need for environmental resilience for chalk streams in development draft WRMP19 and has included schemes for instream river restoration works for the lower River Test and lower River Itchen, as well as a wide range of catchment management schemes in chalk catchments.</p>

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		the thinking of the Water UK Water Resources Long Term Planning Framework, which encourages companies to consider their own circumstances against a national, strategic and long term view of the issues affecting the industry, customers and stakeholders, in particular with regard to resilience. Given that the company's area of operation includes the part of the country where a large portion of the UK's chalk streams are located, the consideration of resilience (to include resilience of the environment, and not just the resilience of water supplies and capital infrastructure), will be particularly important for Southern Water.	
54	Hampshire and Isle of Wight Wildlife Trust	Q3. Are the plans and programmes that have been reviewed appropriate (see Section 3)? If not, please explain why. Those already included appear relevant and appropriate.	Noted and thank you for your comment.
55	Hampshire and Isle of Wight Wildlife Trust	Q4. Are you aware of other plans or programmes that should be considered (see Section 3)? If so, please provide references. In relation to Biodiversity, Fauna & Flora: The importance of the Catchment Based Approach as set out by Government (Defra, 2013) is further highlighted through the Water Industry Strategic Environmental Requirements for PR19 (WISER) document developed by Natural England and the Environment Agency. Southern Water are an active partner in the Test & Itchen Catchment Partnership; the area covered by which includes several of the WRZs in the company's western area. The partnership's Catchment Action Plan sets out a range of measures which the partnership collectively hope to progress in order to conserve and enhance the rivers and wetlands of the catchment, and in particular, the partnership have developed a funding bid, 'Watercress & Winterbournes' focused around the headwaters of the Test & Itchen catchment, which was submitted to HLF in May. If	Southern Water has actively considered the role for catchment management for chalk streams in development draft WRMP19 and has included schemes for instream river restoration works for the lower River Test and lower River Itchen, as well as a wide range of catchment management schemes in chalk catchments.

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		<p>successful (a decision is expected by late 2017), the scheme will see action across 7 headwater waterbodies (the Pillhill Brook, Upper Anton, Bourne Rivulet, Upper Test, Candover Stream, River Alre, and Cheriton Stream) including inriver habitat enhancements, land management measures to control pollution, and water efficiency education. If the scheme progresses, there may be value in the Company targeting additional capital works or community engagement activity in the area, in order to take advantage of the momentum created by the project. The Water Act 2014 placed a new duty upon OFWAT to further 'Resilience', defined as "the ability to cope with, and recover from, disruption, and anticipate trends and variability in order to maintain services for people and protect the natural environment now and in the future." The determination of Company plans by OFWAT will take into account the extent to which plans reflect this objective, creating a driver to ensure that plans feature actions which will increase the resilience of the natural environment. Finally, Wildlife and Countryside Link's Blueprint for PR19 sets out the Environmental Outcomes that the NGO community wish to see delivered through PR19. It describes the actions that Water Companies can take to enhance biodiversity, support WFD delivery, reduce pollution and manage water resources more sustainably. A review of Southern Water's delivery against Blueprint's ambitions for the previous PR round showed the Company's plans scoring well against most ambitions, with abstraction impacts and sewer flooding being the areas which could benefit from greater action. PR19 presents the opportunity to build upon this positive picture.</p> <p>In relation to Material Assets and Resource Use:</p> <p>The work of the National Infrastructure Commission in undertaking a National Infrastructure Assessment (NIA), to be published in 2018, should be incorporated; the NIC will look at major sectors</p>	<p>The NIA is not due to be published by the National Infrastructure Commission until 2018, but its content should be considered when made available in the future.</p>

Ref	Consultee	Comment	How comments have been addressed in the Draft Water Resources Management Plan Environmental Report
		<p>including water & wastewater, and flood risk management, considering the interdependencies, resilience and sustainability of these systems. The assessment may provide drivers for the adoption of certain options over others; for example, the use of SuDS to provide biodiversity benefit locally whilst also preventing the release of waste water to rivers caused by surface water flows overwhelming sewers.</p> <p>In relation to Water:</p> <p>Water UK's 21st Century Drainage Programme sets out work-streams to underpin the successful delivery of a new drainage framework, including via the management of CSOs, sewer misuse, groundwater infiltration of sewers, and the deterioration of drainage infrastructure. Both OFWAT and the 21st Century drainage Programme Board have expressed support for the development of Long-Term Sewerage Plans which would take a more strategic look at the management of waste water in an approach more akin to that for water resources. Whilst more relevant for Business Plans than WRMPs specifically, there may be areas of overlap. In relation to Air & Climate:</p> <p>The Environment Agency's Keeping Rivers Cool Guidance Manual describes the scope to protect rivers against the impacts of climate change by creating riparian shade. The scheme is of relevance when considering the resilience of water sources to climate change.</p>	<p>Southern Water has included several water reuse schemes in its draft WRMP19 to make use of treated wastewater effluent. Alongside the WRMP19 Southern Water is undertaking a comprehensive investigation of improved management of the water cycle through its Integrated Water Cycle Management (IWCM) programme.</p>
56	Hampshire and Isle of Wight Wildlife Trust	<p>Q5. Are you aware of any further baseline data or indicators that might provide useful information in relation to the scope of the WRMP19 (see Section 4)? If so, please provide this information or a source for the data.</p> <p>Section 4.4.2 on the future baseline relating to resource use describes Southern Water's plans to continue to reduce leakage</p>	<p>Southern Water has carried out comprehensive revaluation of SELL for the draft WRMP19, as discussed in detail in the WRMP. The draft WRMP19 provides full details and justification for Southern Water's plans to further reduce leakage</p>

Ref	Consultee	Comment	How comments have been addressed in the Draft Water Resources Management Plan Environmental Report
		from its network. Any change to the SELL calculation or the metrics that apply to externalities may alter the company's projections, potentially meaning that leakage could be further reduced in future, beyond that which is currently affordable under the terms of the calculation. In particular, analysts have noted variability in the way companies applied figures for leakage externalities ('the environmental benefit of reduced leakage; effectively the impact seen as a result of reduced abstraction') during previous PR rounds; the biodiversity baseline described in section 4.2 may be informative in determining any metrics which relate to this.	within its supply area and the benefits have been assessed within the SEA.
57	Hampshire and Isle of Wight Wildlife Trust	<p>Q6. Are the environmental issues identified for Southern Water WRMP19 appropriate (see Section 4)? If not, please explain why and what changes you consider are required.</p> <p>The key issues identified against each receptor appear comprehensive.</p>	Noted and thank you for your comment.
57	Hampshire and Isle of Wight Wildlife Trust	<p>Q7. Do the environmental objectives encompass all the necessary issues (see Section 5)? If not, please explain why and what changes you consider are required.</p> <p>Objective 1.1 – Within the key question on the restoration of natural ecosystem function, add: "in line with Natural England's Narrative for freshwater habitats". This document sets out principles that underpin the conservation of freshwater and wetland habitats in England.</p> <p>Objective 1.2 - Against the key question on the risk of spreading INNS, add: "or the diseases they carry". This is critical for example in the case of crayfish plague carried by non-native Signal Crayfish, which can be spread to native white-clawed crayfish populations via contaminated equipment, and so does not require the movement of the INNS itself.</p>	<p>Natural England's Narrative for Freshwater Habitats has now been considered within the review of plans, policies and programmes and this is used to define the objectives and is covered under Objective 1.1.</p> <p>The diseases that INNS carry are considered under Objective 1.2.</p>

Ref	Consultee	Comment	How comments have been addressed in the Draft Water Resources Management Plan Environmental Report
58	Hampshire and Isle of Wight Wildlife Trust	<p>Q8. Do you agree with the proposed assessment approach for options, programme appraisal and the WRMP as a whole (see Section 5)? If not, please explain why and what changes you consider are required.</p> <p>The overview provided in section 5.2 describes a process which appears logical and comprehensive. We welcome the inclusion of key questions against the various SEA objectives which consider the potential environmental benefits of the schemes and options alongside any negative impacts. As the assessment progresses it will be important that this information is presented clearly; the layout described should make it straightforward for users of the SEA to see where environmental benefits may be delivered, either directly or through mitigation.</p> <p>The company should adopt an approach of delivering WRMP schemes which deliver environmental benefit wherever possible, accepting that these may be more costly than schemes which deliver no benefit, or environmental harm. Within the SEA, and more so within the draft WRMP, it will therefore be important that this information is presented in a way that will enable the company, customers and stakeholders to weigh up the relative merits of different schemes in order to select those which are best, and not simply cheapest. When taking account of the SEA conclusions within the WRMP, we would welcome the use of a format which does not simply present 'cost versus environment'; instead using metrics (or perhaps monetised values) which allow stakeholders to consider the economic expenditure or savings associated with a particular measure, alongside the level of environmental damage or benefit that may result – these will need to be included if stakeholders are going to reach a truly informed decision on the future provision of water resources within Southern Water's area. In terms of the presentation of results within the SEA</p>	<p>The same assessment template is used for each option which shows the adverse and beneficial effects in a clear and consistent manner. The results were summarised by water resource zone so that all the effects of the options could be compared and contrasted and used to influence the selection of options in the draft WRMP.</p>

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		<p>Environmental Report, we welcome the proposed use of the significance matrix, evaluation matrix and cumulative effects assessment matrix which will provide a helpful visual output enabling readers to easily compare the environmental merits of the differing options, and furthermore will be consistent with the outputs of the Drought Plan SEA, which will further aid stakeholder understanding.</p> <p>Finally, it would be useful to understand, in relation to Figure 5.2, where the opportunities lie for stakeholder involvement within this process, other than via the formal Scoping Report and SEA / WRMP consultations.</p>	<p>Southern Water has carried out a range of stakeholder events as part of its draft WRMP to gain feedback on the options being considered to maintain a supply demand balance in its supply area.</p>
59	Longdown Management Limited	<p>Abstraction from the river Test is unsustainable in the proposed voluntary licence change as it puts the river environment at severe risk in times of low water and drought. The SEA must include comprehensive studies of both salmon and sea trout migration. Cost benefit should not outweigh potential environmental damage to the iconic chalk streams. We urge Southern Water provide winter water storage and other more sustainable ways of providing a public water supply.</p>	<p>Southern Water note your comment concerning our current application to make voluntary [constraining] changes to our existing River Test abstraction licence, and your view that the proposed abstraction is unsustainable due to the risk posed to the river environment in times of low water and drought.</p> <p>In preparing the new draft WRMP Southern Water have explored all potential options to maintain reliable public water supplies relative to current and future demands and environmental objectives. Information on these options, and the assessment of them, has been set out within the draft WRMP and its related SEA Environmental Report. These will both be published for consultation, expected to commence in early 2018.</p>

Ref	Consultee	Comment	How comments have been addressed in the Draft Water Resources Management Plan Environmental Report
			<p>We also note your comment about the need to include comprehensive studies of both salmon and sea trout migration. The SEA Environmental Report uses existing studies and information as part of its assessment. We have been trying to progress additional investigations to improve on existing available data and understanding of the Lower Test environment and salmon and sea trout migration since the 2015 Salmon Working Group concluded in October 2015. Unfortunately, the leaseholders, Dry Fly Fishing Ltd and Little River Management Ltd, continue to refuse us access to install monitoring equipment. We would be grateful if you would encourage them to allow us to proceed. The data we collect will be made available for the benefit of all parties.</p>
60	Amanda Barker-Mill	<p>I am commenting as one of the senior beneficiaries of the Barker-Mill Family Trust. The Barker-Mill Family Trust owns significant stretches on both of the River Tests, along with much of the adjoining land in the lower Test Valley.</p> <p>Migratory fish (salmon and sea trout) come up river to spawn mostly in the summer months, and their decision to make their passage upstream depends critically on the amount of water flowing down the river. Fish will wait for a good head of water, and if it is not forthcoming there is no migration and no spawning.</p> <p>Salmon and sea trout, and particularly salmon, have an extraordinary and magnificent life cycle that is fragile, and very rare in the south-east of England.</p> <p>Additional abstraction of water from the River Test is planned to take place during low water and drought, when the river is at its</p>	<p>Southern Water note your concerns about the effect of additional abstraction during low water and drought on salmon and sea trout and your encouragement towards "other more environment-friendly and sustainable ways of meeting water supply requirements".</p> <p>In preparing the new draft WRMP Southern Water have been exploring all potential options to maintain reliable public water supplies relative to current and future demands and environmental objectives. Information on these options, and the assessment of them, has been set out within the draft WRMP and its related SEA Environmental Report. These will both be published for</p>

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		<p>most vulnerable. This cannot fail to have a considerable effect on migratory fish.</p> <p>Southern Water has claimed that the effect will be small. What they cannot do is claim there is no adverse effect at all, or that it is known what the effect will be in the long term. So the Precautionary Principle should apply.</p> <p>The very survival of these two species, coming up through all the commercial activity of Southampton water, one of the busiest waterways in the world, is something of a miracle. We have a clear duty not to threaten it now in any way at all.</p> <p>And as Southern Water very well know, there are other, more environment-friendly and sustainable ways of meeting their water-supply requirements.</p>	<p>consultation, expected to commence in early 2018.</p> <p>We also wish to improve on existing available data and understanding of the Lower Test environment and salmon and sea trout migration. Unfortunately, the current leaseholders Dry Fly Fishing Ltd and Little River Management Ltd continue to refuse access to allow Southern Water to install monitoring equipment. We would welcome your encouragement to the leaseholders to accommodate Southern Water in this important work. The data collected will be made available to everyone.</p>
61	C. H. Layman	<p>I have been involved with the ecology of the River Test for many years. I can hardly believe that Southern Water are proposing to extract more water out of the river. Have you ever seen the River Test in summer drought conditions? At the proposed abstraction point the stones are barely covered. This is the time when migration of salmon and sea trout is at its most critical for the survival of these two superb species. For heavens sake not make their lives even more difficult than they already are. There are other ways of dealing with your water supply problems.</p>	<p>Southern Water note your concerns about the effect of additional abstraction during low water and drought on salmon and sea trout and your encouragement toward other ways of meeting water supply requirements.</p> <p>In preparing the new draft WRMP Southern Water has explored all potential options to maintain reliable public water supplies relative to current and future demands and environmental objectives. Information on these options, and the assessment of them, has been set out within the draft WRMP and its related SEA Environmental Report. These will both be published for consultation, expected to commence in early 2018.</p>

Water Resources Management Plan 2019 Annex 14: SEA Main Report Appendix B: Review of Policies, Plans and Programmes

December, 2019

Version 1



from
**Southern
Water** 

Review of policies, plans and programmes

The findings of the review of policies, plans and programmes are set out in Table 1. The purpose of the review and the key findings are set out in the 'Review of policies, plans and programmes' section of the Environmental Report. This table sets out the purpose and objectives of the policies, plans and programmes, their potential relationship with Southern Water's WRMP19 and the potential implications of the policy, plan or programme objectives for the objectives of the SEA.

Table 1 Summary of the Policies, Plans and Programmes reviewed and their link to the Strategic Environmental Assessment of Southern Water's WRMP19

Objectives identified in the Policy, Plan or Programme	Influences on the WRMP and implications for the SEA objectives
International	
The Bern Convention on the Conservation of European Wildlife and Natural Habitats (1979)	
<p>International convention which aims to ensure conservation of wild flora and fauna species and their habitats. Special attention is given to endangered and vulnerable species, including endangered and vulnerable migratory species specified in appendices.</p> <p>Enforced in European legislation through the Habitats Directive (92/43/EEC) and Birds Directive (79/409/EEC).</p>	<p>The impacts of the WRMP options on internationally designated sites, species and important Bird habitats must be considered as part of the SEA.</p>
The Bonn Convention on the Conservation of Migratory Species of Wild Animals (1983)	
<p>Aims to conserve terrestrial, marine and avian migratory species throughout their range. Enforced in European legislation through the Habitats Directive (92/43/EEC) and Birds Directive (79/409/EEC).</p>	<p>The impacts of the WRMP options on important Bird habitats (i.e. Ramsar sites and SPA designated sites) must be considered as part of the SEA.</p>
The Cancun Agreement (2011) and Kyoto Agreement (1997)	
<p>The agreement represents key steps forward in capturing plans to reduce greenhouse gas emissions and to help developing nations protect themselves from climate impacts and build their own sustainable futures. It includes a shared vision to keep global temperature rise to below two degrees Celsius.</p>	<p>The SEA should seek to promote a reduction in greenhouse gas emissions.</p>
COP21 climate change summit, Paris, 2015	
<p>Commitment to cut carbon emissions which came into force in November 2016.</p>	<p>The SEA should take account of the need to reduce carbon emissions.</p>
The Convention for the protection of the architectural heritage of Europe (Granada Convention)	
<p>This sets the framework for the approach to conservation across Europe.</p>	<p>The SEA should take into account the need to conserve heritage.</p>
The European Convention on the protection of archaeological heritage (Valletta Convention)	
<p>The Valletta Convention is one of a series of Conventions for the protection of the cultural heritage produced by the Council of Europe over the last fifty years.</p>	<p>The SEA should take into account the need to conserve heritage.</p>
Council of Europe (2003), European Soils Charter	

Objectives identified in the Policy, Plan or Programme	Influences on the WRMP and implications for the SEA objectives
International	
Sets out common principles for protecting soils across the EU and will help.	The SEA should seek to ensure that the quality of the regions land, including soils, is protected or enhanced.
Council of Europe (2006), European Landscape Convention	
<p>European Landscape Convention (ELC) is the first international convention to focus specifically on landscape. Natural England implements the European Landscape Convention in England. The aims of the 2009/10 action plan are:</p> <ul style="list-style-type: none"> Lead on improving the protection, planning and management of all England's landscapes Raise the quality, influence and effectiveness of policy and practical instruments Increase the engagement in and enjoyment of landscapes by the public Collaborate with partners across the UK and Europe. 	The implementation of the WRMP may influence landscape or the enjoyment of landscapes in the Southern Water area and as such the SEA should seek to maintain or enhance the quality of the regions landscapes and the potential enjoyment of these landscapes.
The Environment Noise Directive (END) (Directive 2002/49/EC)	
The END aims to —define a common approach intended to avoid, prevent or reduce on a prioritised basis the harmful effects, including annoyance, due to the exposure to environmental noise. It also aims to provide the basis for developing EU measures to reduce noise emitted by major sources, in particular road and rail vehicles and infrastructure, aircraft, outdoor and industrial equipment and mobile machinery.	The SEA assessment framework should include for the protection against excessive noise.
European Commission (2008), The 2008 ambient air quality directive (2008/50/EC)	
The 2008 ambient air quality directive (2008/50/EC) sets legally binding limits for concentrations in outdoor air of major air pollutants that impact public health such as particulate matter (PM10 and PM2.5) and nitrogen dioxide (NO2). As well as having direct effects, these pollutants can combine in the atmosphere to form ozone, a harmful air pollutant (and potent greenhouse gas) which can be transported great distances by weather systems.	The implementation of the WRMP may have some influence on air quality, either directly or indirectly through construction or operation activities. The SEA should seek to ensure that the region's air quality is maintained or enhanced, and that emissions of air pollutants are kept to a minimum.
European Commission (2009), Promotion of the use of energy from renewable sources Directive (2009/28/EC)	
This promotes the use of energy from renewable sources.	The SEA should seek to promote the use of renewable energy.
European Commission (2009), Birds Directive (2009/147/EC)	
The Directive provides a framework for the conservation and management of, and human interactions with, wild birds in Europe. It sets broad objectives for a wide range of activities, although the precise legal mechanisms for their achievement are at the discretion of each Member State (in the UK delivery is via several different statutes).	The SEA should seek to protect and conserve important bird habitats.
European Commission, Floods Directive (2007/60/EC)	

Objectives identified in the Policy, Plan or Programme	Influences on the WRMP and implications for the SEA objectives
International	
<p>The Directive's aim is to reduce and manage the risks that floods pose to human health, the environment, cultural heritage and economic activity. The Directive shall be carried out in coordination with the Water Framework Directive, notably by flood risk management plans and river basin management plans being coordinated, and through coordination of the public participation procedures in the preparation of these plans.</p>	<p>The SEA should seek to ensure that flood risk in the region is not adversely affected by the implementation of the WRMP.</p>
<p>European Commission, Animal health requirements for aquaculture animals and products thereof, and on the prevention and control of certain diseases in aquatic animals (2006/88/EC)</p>	
<p>The Directive establishes: Animal health requirements for the placing on the market, importation and transit of aquaculture animals and their products; Minimum measures to prevent diseases in aquaculture animals; Minimum measures to be taken in response to suspected or established cases of certain diseases in aquatic animals.</p>	<p>The implementation of the WRMP may influence biodiversity in the Southern Water District and as such the SEA should seek to maintain or enhance the quality of habitats and biodiversity.</p>
<p>European Commission (2011), The EU Biodiversity Strategy to 2020</p>	
<p>The Directive seeks to: Halt the loss of biodiversity and ecosystem services in the EU; Help stop global biodiversity loss by 2020</p>	<p>The implementation of the WRMP may influence biodiversity in the Southern Water District and as such the SEA should seek to maintain or enhance the quality of habitats and biodiversity</p>
<p>European Commission, Environmental Liability Directive (2004/35/EC)</p>	
<p>The Directive establishes a framework for environmental liability based on the "polluter pays" principle, with a view to preventing and remedying environmental damage.</p>	<p>The SEA should seek to ensure that the WRMP avoids causing direct or indirect damage to the aquatic environment or contamination of land that creates a significant risk to human health.</p>
<p>European Commission (2000), The Water Framework Directive (2000/60/EC)</p>	
<p>This Directive establishes a framework for the protection of inland surface waters, transitional waters, coastal water and groundwater. It also encourages the sustainable use of water resources.</p> <p>Key objectives are general protection of the aquatic ecology, specific protection of unique and valuable habitats, protection of drinking water resources, and protection of bathing water.</p>	<p>The SEA should seek to promote the protection and enhancement of all water resources.</p>
<p>European Commission, Drinking Water Directive (1998/83/EC) amended 2015</p>	
<p>The objective of the Drinking Water Directive is to protect the health of the consumers in the European Union and to make sure the water is clean and of good quality. To make sure drinking water everywhere in the EU is healthy, clean and tasty, the Drinking Water Directive sets standards for the most common substances (so-called parameters) that can be</p>	<p>The SEA should seek to ensure that objectives address water quality in the region, particularly drinking water quality.</p>

Objectives identified in the Policy, Plan or Programme	Influences on the WRMP and implications for the SEA objectives
International	
found in drinking water. A total of 48 microbiological and chemical parameters must be monitored and tested regularly.	
Directive 2006/118EC of the European Parliament and of the council of 12 December 2006 on the protection of groundwater against pollution and deterioration	
This Directive establishes specific measures as provided for in Article 17(1) and (2) of Directive 2000/60/EC (Water Framework Directive) in order to prevent and control groundwater pollution. This Directive is designed to prevent and combat groundwater pollution.	The SEA should seek to maintain, protect and improve water quality across the region.
European Commission Directive 2006/7/EC of the European Parliament and of the Council of 15 February 2006 concerning the management of bathing water quality and repealing Directive 76/160/EEC	
The revised Bathing Water Directive (BWD) of 2006 updated and simplified the rules of the previous BWD. States are required to monitor and assess the bathing water for at least two parameters of (faecal) bacteria. In addition, they must inform the public about bathing water quality and beach management, through the so-called bathing water profiles. These profiles contain for instance information on the kind of pollution and sources that affect the quality of the bathing water and are a risk to bathers' health (such as waste water discharges).	The SEA should seek to maintain, protect and improve water quality across the region
European Commission, Urban Waste Water Treatment Directive (1991/271/EC)	
The Directive's objective is to protect the environment from the adverse effects of urban waste water discharges and discharges from certain industrial sectors and concerns the collection, treatment and discharge of domestic waste water, mixture of waste water and waste water from certain industrial sectors.	The SEA should seek to maintain, protect and improve water quality across the region.
European Commission Nitrates Directive (91/676/EEC)	
This directive aims to protect water quality across Europe by preventing nitrates from agricultural sources polluting ground and surface waters and by promoting the use of good farming practices.	The SEA should seek to maintain, protect and improve water quality across the region.
European Commission (1992), Habitats Directive (1992/43/EC)	
The aim of the Directive is to promote the maintenance of biodiversity by requiring Member States to take measures to maintain or restore natural habitats and wild species listed on the Annexes to the Directive at a favourable conservation status, introducing robust protection for those habitats and species of European importance.	The WRMP must ensure full compliance with the Regulations. The SEA must consider impacts on internationally designated sites and species plan area.
European Commission (2013), The 7th Environmental Action Programme (EAP) to 2020 Living well, within the limits of our planet' (1386/2013/EU)	

Objectives identified in the Policy, Plan or Programme	Influences on the WRMP and implications for the SEA objectives
International	
<p>The EAP aims to guide environment policy until 2020 with three key objectives:</p> <ul style="list-style-type: none"> To protect, conserve and enhance the Union's natural capital; To turn the Union into a resource-efficient, green and competitive low-carbon economy; To safeguard The Union's citizens from environmental-related pressures and risks to health and wellbeing. 	<p>The commitment to conserving biological diversity must be considered in the WRMP and the SEA should seek to promote the protection and enhancement of biodiversity.</p>
European Commission (2012), Blueprint to Safeguard Europe's Water Resources	
<p>This strategy aims to ensure that enough good quality water is available to meet the needs of people, the economy and the environment. The strategy includes:</p> <ul style="list-style-type: none"> Improving implementation of current EU water policy; Increasing the integration of water policy objectives into other relevant policy areas such as agriculture, fisheries, renewable energy, transport and the Cohesion and Structural Funds. Filling the gaps of the current framework, particularly in relation to the tools needed to increase water efficiency. 	<p>The commitment to conserving biological diversity must be considered in the WRMP and the SEA should seek to promote the protection and enhancement of biodiversity.</p>
European Commission (2006) Thematic Strategy for Soil Protection	
<p>The Thematic Strategy for Soil Protection consists of a Communication from the Commission to the other European Institutions, a proposal for a framework Directive (a European law), and an Impact Assessment.</p>	<p>The SEA assessment framework should include soils.</p>
European Commission (2005) Thematic Strategy on Air Pollution	
<p>This strategy supplements current legislation. It sets out objectives for air pollution and proposes measures for achieving them by 2020.</p>	<p>The SEA should take account of the need to reduce air pollution through the SEA objectives.</p>
EC Regulation 1100/2007 of 18 September 2007 establishing measures for the recovery of the stock of European eel	
<p>EC Regulation 1100/2007 of 18 September 2007 establishing measures for the recovery of the stock of European eel</p> <p>This regulation provides a framework for the protection and sustainable use of the stock of European eel in Community waters, coastal lagoons, estuaries, rivers and communicating inland waters of member States that flow into specific seas.</p>	<p>The SEA should take account of the need to protect European eel.</p>
EU Regulation 1143/2014 of the European Parliament and of the Council of 22 October 2014 on the prevention and management of the introduction and spread of invasive alien species	
<p>This regulation seeks to address the problem of invasive alien species in a comprehensive way to enable the protection of native biodiversity and ecosystem services whilst minimising and mitigating the impacts on human health and the economy that such species can have. There are</p>	<p>The SEA should include an objective relating to invasive alien species.</p>

Objectives identified in the Policy, Plan or Programme	Influences on the WRMP and implications for the SEA objectives
International	
three types of interventions – prevention, early detection and rapid eradication and management.	
Ramsar Convention The Convention on Wetlands of International Importance (1971)	
<p>The Convention on Wetlands (Ramsar, Iran, 1971) (the "Ramsar Convention") is an intergovernmental treaty that embodies the commitments of its member countries to maintain the ecological character of their Wetlands of International Importance and to plan for the "wise use", or sustainable use, of all of the wetlands in their territories.</p>	<p>The impacts of the WRMP on important wetland habitats must be considered as part of the SEA.</p>
United Nations (1992), Convention on Biological Diversity (CBD)	
<p>The main objectives are: Conservation of biological diversity Sustainable use of its components Fair and equitable sharing of benefits arising from genetic resources</p>	<p>The commitment to conserving biological diversity must be considered in WRMP options and the SEA should seek to promote the protection and enhancement of biodiversity.</p>
United Nations Economic Commission for Europe (1998) Aarhus Convention - Convention on Access to Information, Public Participation in Decision-making and Access to Justice in Environmental Matters	
<p>The Aarhus Convention grants the public rights regarding access to information, public participation and access to justice, in governmental decision-making processes on matters concerning the local, national and transboundary environment. It focuses on interactions between the public and public authorities.</p> <p>The Aarhus Convention has been ratified by the European Community, which has begun applying Aarhus-type principles in its legislation, notably the Water Framework Directive (Directive 2000/60/EC).</p>	<p>The Convention is designed to improve the way ordinary people engage with government and decision-makers on environmental matters. It helps to ensure that environmental information is easy to get hold of and easy to understand.</p> <p>The SEA should seek to provide easily understood information to the public on the environmental implications of the WRMP and its constituent options.</p>
United Nations (2002), Commitments arising from the World Summit on Sustainable Development, Johannesburg	
<p>The World Summit on Sustainable Development proposed broad-scale principles which should underlie sustainable development and growth. It included objectives such as: Greater resource efficiency Work on waste and producer responsibility New technology development Push on energy efficiency Integrated water management plans needed Minimise significant adverse effects on human health and the environment from chemicals by 2020.</p>	<p>These commitments are the highest level definitions of sustainable development. The WRMP should be influenced strongly by all of these themes and should seek to take its aims into account.</p> <p>The SEA should seek to promote the achievement of the sustainable development objectives outlined in this plan.</p>

Objectives identified in the Policy, Plan or Programme	Influences on the WRMP and the SEA objectives
National	
A Green Future: Our 25 Year Plan to Improve the Environment (HM Government, 2018)	
This document provides the central policy objectives of the Government for improving the UK environment in over the next 25 years, covering land, air and water environments. It provides the strategic policy objectives for the MHCLG National Planning Policy Framework 2018 (see below)	The WRMP and SEA should take account of the relevant policy objectives set out in the 25 year plan
Ancient Monuments and Archaeological Areas Act 1979	
This act addresses the protection of scheduled monuments including the control of works affecting scheduled monuments. It also addresses archaeological areas.	The WRMP and SEA should take account of the need to protect scheduled monuments and archaeological areas.
The Climate Change Act 2008	
This act sets carbon targets for 2050. The net carbon account for 2050 at least 80% lower than 1990 baseline.	This target needs to be taken into account by the SEA.
Conservation of Habitats and Species Regulations 2017	
The Conservation of Habitats and Species Regulations 2017 is the principal statutory instrument by which the Habitats Directive is transposed in England and Wales as such its main objective is to promote the maintenance of biodiversity.	The impacts of the WRMP options on European sites and the Natura 2000 conservation objectives must be fully considered as part of the SEA.
The Countryside and Rights of Way (CROW) Act 2000	
The Act provides for increased public access to the countryside and strengthens protection for wildlife. The main provisions of the Act are as follows: Extends the public's ability to enjoy the countryside whilst also providing safeguards for landowners and occupiers Creates new statutory right of access to open country and registered common Land Use Consultants Modernises Right of Way system Gives greater protection to SSSIs Provides better management arrangements for AONBs Strengthens wildlife enforcement legislation.	The WRMP may have an effect on public access to the countryside. The SEA should include objectives that take into account public access, protection of SSSIs and the management of relevant landscape designations.
Defra (2012), National Policy Statement for Waste Water	
A framework document for planning decisions on nationally significant waste water infrastructure.	The WRMP should take into account the contents of this paper.
Defra and Welsh Government (2014), River Basin Planning Guidance	
Aims to give guidance on practical implementation of the Water Framework Directive (WFD). The river basin planning process involves setting environmental objectives for all groundwater and surface waters (including estuaries and coastal waters) within the river basin district, and devising programmes of measures to meet those objectives.	The WRMP should take into account the contents of this statutory guidance.
Defra (2002), Directing the Flow – Priorities for Future Water Policy	
This report sought out strategies and priorities for government policy on water for a duration of 20 years.	The WRMP should take into account the contents of this report.

Objectives identified in the Policy, Plan or Programme	Influences on the WRMP and the SEA objectives
National	
Environment Agency (2013), Climate change approaches in water resources planning – Overview of new methods	
Report provides research findings, case studies of the application of UKCP09 and new methods and high-level guidelines.	The WRMP should take into account the contents of this report.
Defra (2016), Creating a great place for living: Defra’s Strategy to 2020	
<p>Strategy document setting out the shared vision and strategic objectives for Defra for the period up to 2020. This includes seven strategic objectives:</p> <p>Four impact objectives explaining long term aims – relating to environment, food and farming, rural and protection.</p> <p>One delivery objective – describing high level of service and value for money for the taxpayer that Defra will strive for.</p> <p>Two organisational objectives, explaining how Defra will organise themselves to deliver and what Defra will be like.</p>	The WRMP and SEA should take into account the contents of this strategy.
MHCLG (2018), National Planning Policy Framework (NPPF)	
<p>The NPPF sets out the Government’s planning policies for England. The revision to the NPPF published in July 2018 broadly continues the guidance set out in the 2012 NPPF, with more emphasis on housing, design, efficient use of land and continued reference to an objective of achieving net gains. It constitutes guidance for local planning authorities and decision-takers both in drawing up plans and as a material consideration in determining applications.</p> <p>At the heart of the NPPF is a presumption in favour of sustainable development. However, the 'presumption in favour of sustainable development' is not applicable where any adverse impacts would significantly and demonstrably outweigh the benefits, when assessed against all policies in the NPPF or where specific policies in the NPPF indicate development should be restricted, these include proposed developments that affect European designated sites, designated as Green Belt or AONB land.</p> <p>It presents guidance under broad themes which include Promoting healthy and safe communities; Building a strong, competitive economy; Promoting sustainable transport; Making efficient use of land; Protecting Green Belt land; Meeting the challenge of climate change, flooding and coastal change; Conserving and enhancing the natural environment; and Conserving and enhancing the historic environment.</p> <p>With regard to plan-making, the NPPF identifies the requirement for strategic policies to establish a strategy and make sufficient provision for various infrastructure including water supply.</p>	The WRMP and SEA should take full account of the policies and policy objectives set out in the 2018 NPPF.

Objectives identified in the Policy, Plan or Programme	Influences on the WRMP and the SEA objectives
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National

With regard to decision-making, the NPPF states that decisions on proposed development should be approached in a positive and creative way and decision-makers at every level should seek to approve applications for sustainable development where possible. In line with its broad themes the NPPF identifies a number of land-use considerations that should underpin both plan-making and decision-making which include:

- Protection of the Green Belt;
- Avoid increased vulnerability to impacts arising from climate change;
- Consideration of flood risk;
- Protection and enhancement of valued landscapes, sites of biodiversity or geological value and soils commensurate with their statutory status;
- Improve local environmental conditions such as air quality and water quality;
- Recognising the wider benefits from natural capital and ecosystem services;
- Minimising impacts on and providing net gains for biodiversity;
- Encourage multiple benefits from the use of land in urban and rural areas, recognising that some open land can perform many functions (such as for wildlife, recreation, flood risk mitigation, carbon storage, or food production);
- Support the transition to a low carbon future in a changing climate, taking full account of flood risk and coastal change, and encourage the reuse of existing resources, including conversion of existing buildings, and encourage the use of renewable resources (for example, by the development of renewable energy);
- Encourage the effective use of land by reusing land that has been previously developed (brownfield land), provided that it is not of high environmental value;
- Conserve heritage assets in a manner appropriate to their significance, so that they can be enjoyed for their contribution to the quality of life of this and future generations;

Department for Energy and Climate Change (2007), Energy White Paper: Meeting the Energy Challenge

Meeting the energy challenge', sets our international and domestic energy strategy, in the shape of four policy goals:

- aiming to cut CO2 emissions by some 60% by about 2050, with real progress by 2020
- maintaining the reliability of energy supplies
- promoting competitive markets in the UK and beyond
- ensuring every home is heated adequately and affordably.

The implementation of the WRMP may have an influence upon Southern Water's total energy use. The SEA should seek to promote energy efficiency, as well as seeking to reduce the effects of climate change through greenhouse gas emissions. The SEA should also promote the use of renewable energy, where relevant.

Department of energy and climate change (2011), Planning our electric future: a White Paper for secure, affordable and low carbon electricity

Objectives identified in the Policy, Plan or Programme	Influences on the WRMP and the SEA objectives
National	
<p>This white paper outlines a package of reforms so that by 2030 there will be a flexible, smart and responsive electricity system, powered by a range of low carbon sources of electricity. This includes engaging with consumers on energy use. Decarbonisation is important in meeting the 2050 targets.</p>	<p>The implementation of the WRMP may have an influence upon Southern Water's total energy use. The SEA should seek to promote energy efficiency, as well as seeking to reduce the effects of climate change through greenhouse gas emissions. The SEA should also promote the use of renewable energy, where relevant.</p>
Defra (2011), Government Review of Waste Policy in England 2011	
<p>The review is guided by the "waste hierarchy", EU obligations and targets on waste management, carbon impacts, environmental objectives and the costs and benefits of different policy options. The Governments vision include a move beyond the current throwaway society to a "zero waste economy" in which material resources are re-used, recycled or recovered wherever possible, and only disposed of as the option of very last resort.</p>	<p>The WRMP may involve options that involve the generation of waste (e.g. either through construction requirements or operation of supply side options). The SEA should seek to enhance recycling and minimise the amount of waste going to landfill.</p>
Defra (2012), The UK Climate Change Risk Assessment 2012 Evidence Report	
<p>Five themes are identified that form the priorities for adaptation in the UK.</p>	<p>The SEA should take into account the need for climate change adaptation.</p>
Defra (2011), Water for Life - Water White Paper	
<p>The Water White Paper described the Government's intentions to take forward a catchment-based approach to water quality and diffuse pollution and work towards Common Agricultural Policy reforms that will promote the farming industry's role as custodian of the natural environment. The Water White Paper and subsequent Defra strategic policy supports catchment-based approaches to prevent and manage future risks to drinking water quality from agricultural activities, working in partnership with farming communities. These policy objectives are reflected in regulatory guidance (WRPG) from Government and the regulators. The catchment-based approach has now been implemented across England, with catchment partnerships now in place across the river basin to take forward the approach over the coming years</p>	<p>The WRMP should take into account the contents of this paper where it remains relevant and subsequent allied policy developments since 2011.</p>
Environment Agency and RSPB (2004), Strategic Environmental Assessment and Biodiversity: Guidance for Practitioners	
<p>This guidance aims to ensure that biodiversity considerations are appropriately addressed in SEA. It emphasises how damage should always be avoided in the first instance, mitigating only where impacts cannot be avoided and there are no alternative solutions. In particular, damage and loss should be avoided where biodiversity is particularly high, rare, threatened and difficult to replace or substitute.</p> <p>Opportunities to enhance biodiversity should also be sought wherever possible.</p>	<p>The SEA should include objectives to protect and enhance biodiversity. The SEA should also seek to ensure that the WRMP considers biodiversity protection and enhancement as part of the WRMP formulation and selection of options.</p>

Objectives identified in the Policy, Plan or Programme	Influences on the WRMP and the SEA objectives
National	
Defra (2013), Catchment Based Approach: Improving the quality of our water environment	
<p>DEFRA believe that better coordinated action is desirable at the catchment level by those who use water or influence land management and that this requires greater engagement and delivery by stakeholders at the catchment as well as local level. They highlight that this is particularly important when trying to address the significant pressures placed on the water environment by diffuse pollution.</p>	<p>The WRMP should take into account the contents of this paper and follow the catchment based approach where appropriate.</p>
Defra (2012), The UK Climate Change Risk Assessment 2012 Evidence Report	
<p>Draws together and interprets the evidence gathered by CCRA regarding current and future threats and opportunities for the UK posed by the impacts of climate change up until 2100. Findings of the assessment include:</p> <ul style="list-style-type: none"> • Increasing pressure on the UK's water resources due to changes in hydrological conditions, population growth and regulatory requirements to maintain good ecological status. Major supply-demand deficits were identified for five river basin regions including the Thames river basin district. • Increases in water demand for irrigation of crops. • Lower summer rivers flows across the UK due to warming and drying conditions. • An increase in precipitation in winter months due to a combination of greater depths and more frequent heavy rainfall events - suggesting larger volumes of runoff with potential negative impacts on flood risk and sewer overflows in urban environments. • Flash-flooding associated releases from combined sewer overflows (CSO) could in turn increase associated illnesses at the coast due to the varying occurrence of microbial pathogens in the marine environment. 	<p>The WRMP is closely linked to some of the impacts of climate change and can also influence the magnitude of such impacts.</p> <p>The SEA should seek to ensure that the WRMP considers the findings of the CCRA as part of WRMP formulation and selection of options.</p>
Defra (2011), The Natural Choice: securing the value of nature, The Natural Environment White Paper	
<p>Addresses the Government's approach to valuing economic and social benefits of a healthy natural environment while continuing to recognise nature's intrinsic value. It describes the vision of the Government for this to be the first generation to leave the natural environment of England in a better state than it inherited, requiring placing the value of nature at the heart of decision-making – in Government, local communities and businesses. Approaches to mainstream the value of nature across society include:</p> <p>facilitating greater local action to protect and improve nature;</p> <p>creating a green economy, in which economic growth and the health of our natural resources sustain each other, and markets, business and Government better reflect the value of nature;</p>	<p>The WRMP supports the provisioning service of freshwater through ensuring security of supply. Other related ecosystem services may include:</p> <ul style="list-style-type: none"> • Provisioning Services: Biodiversity • Regulating Services: Water Regulation • Cultural services: Recreation and ecotourism • Cultural services: Cultural heritage values • Cultural services: Aesthetic <p>The SEA should ensure the WRMP affects the related provisioning services in the least damaging way through informing the WRMP formulation and</p>

Objectives identified in the Policy, Plan or Programme	Influences on the WRMP and the SEA objectives
<p style="text-align: center;">National</p> <p>strengthening the connections between people and nature to the benefit of both; and showing leadership in the European Union and internationally, to protect and enhance natural assets globally</p>	<p>selection of options. The SEA should ensure the WRMP maintains, and where possible enhances and enables connectivity of habitats and ecosystems and respects environmental limits and capacities.</p>
<p>Defra (2011), UK National Ecosystem Assessment and Defra, 2014, UK National Ecosystems Assessment Follow on, Synthesis of Key Findings</p>	
<p>Ecosystems services from natural capital contribute to the economic performance of the nation.</p> <p>Information and tools to enable decision makers to understand the wider value of ecosystems and their associated services.</p>	<p>For the purposes of the readership integrating an ecosystems services approach into the SEA is not being undertaken. However, it is realised that through the ‘Objective-led’ approach, many of the services relevant to the WRMP can be considered through the objectives and key questions for example:</p> <ul style="list-style-type: none"> • Provisioning Services: Freshwater • Provisioning Services: Biodiversity • Regulating Services: Water Regulation • Cultural services: Recreation and ecotourism • Cultural services: Cultural heritage values • Cultural services: Aesthetic <p>The SEA should ensure the WRMP affects the related provisioning services in the least damaging way through informing the WRMP formulation. In the event of further guidance being issued on incorporating ESA into SEA, the anticipated approach is sufficiently flexible that it should be able to accommodate this (subject to timing).</p>
<p>Defra (2010), Making Space for Nature: A Review of England’s Wildlife Sites and Ecological Network</p>	
<p>This independent review of England’s wildlife sites and the connections between them sets objectives and recommendations to help achieve a healthy natural environment that will allow our plants and animals to thrive.</p>	<p>The SEA should seek to maintain or enhance the quality of habitats and biodiversity.</p>
<p>Defra (2009), Safeguarding our soils – A Strategy for England</p>	
<p>The new Soil Strategy for England – Safeguarding our Soils – outlines the Government’s approach to safeguarding our soils for the long term. It provides a clear vision to guide future policy development across a range of areas and sets out the practical steps that we need to take to prevent further degradation of our soils, enhance, restore and ensure their resilience, and improve our understanding of the threats to soil and best practice in responding to them.</p>	<p>The SEA should seek to ensure that the quality of the regions soils and their management is protected or enhanced.</p>

Objectives identified in the Policy, Plan or Programme	Influences on the WRMP and the SEA objectives
National	
<p>The Government's vision is that: By 2030, all England's soils will be managed sustainably and degradation threats tackled successfully. This will improve the quality of England's soils and safeguard their ability to provide essential services for future generations.</p>	
Defra (2015), The Great Britain Invasive Non-native Species Strategy	
<p>The Strategy is intended to provide a strategic framework, updated from the 2008 framework, within which the actions of government departments, their related bodies and key stakeholders can be better coordinated. Its overall aim is to minimise the risks posed, and reduce the negative impacts caused, by invasive non-native species in Great Britain.</p>	<p>The implementation of the WRMP may influence biodiversity in the southern water area and the south east and as such the SEA should seek to maintain or enhance the quality of habitats and biodiversity.</p>
Defra (2008), Future Water: the Government's water strategy for England	
<p>This strategy is the high-level Government document which outlines how the Government wants the water sector to look by 2030, considering issues of water demand, water supply, water quality in the natural environment, surface water drainage, river and coastal flooding, greenhouse gas emissions and charging. that "by 2030 at the latest, we have: Improved the quality of our water environment and the ecology which it supports, and continued to provide high levels of drinking water quality from our taps Sustainably managed risks from flooding and coastal erosion, with greater understanding and more effective management of surface water Ensured a sustainable use of water resources, and implemented fair, affordable and cost-reflective charges.</p>	<p>The SEA should seek to ensure that the themes included in the strategy objectives are also reflected in the SEA objectives, particularly around water quality in the region, the quality of aquatic ecology, drinking water quality, resource use, energy use and greenhouse gas emissions, and adaptation to climate change.</p>
Defra (2007), The Air Quality Strategy for England, Scotland and Wales	
<p>This strategy identifies air quality objectives and policy options to further improve air quality in the UK from into the long term. The options are intended to provide important benefits to quality of life and help protect the environment as well as the direct benefits to public health.</p>	<p>The implementation of the WRMP may have some influence on air quality, either directly or indirectly through construction or operation activities. The SEA should seek to ensure that the region's air quality is maintained or enhanced, and that emissions of air pollutants are kept to a minimum.</p>
Defra (2011), Biodiversity 2020: A Strategy for England's Wildlife and Ecosystem Services	
<p>The objective for the next decade is: 'to halt overall biodiversity loss, support healthy well-functioning ecosystems and establish coherent ecological networks, with more and better places for nature for the benefit of wildlife and people.' Four action areas are: A more integrated large-scale approach to conservation on land and at sea Putting people at the heart of biodiversity policy Reducing environmental pressures Improving our knowledge.</p>	<p>The SEA must consider impacts on biodiversity. The implementation of the WRMP may influence biodiversity in the area and as such the SEA should seek to maintain or enhance the quality of habitats and biodiversity, and take regards of priority species.</p>
Defra (2008), England Biodiversity Strategy –climate change adaptation principles	
<p>Government strategy presenting five principles that are fundamental to conserving biodiversity during climate</p>	<p>The SEA must consider the impacts on biodiversity whilst also taking into</p>

Objectives identified in the Policy, Plan or Programme	Influences on the WRMP and the SEA objectives
National	
change. The precautionary principle underlies all the principles.	account the potential for future climate change.
Defra (2005), Making space for water: taking forward a new government strategy for flood and coastal erosion risk management in England	
The strategy outlines how to manage the risks from flooding and coastal erosion in the UK. The strategy aims to reduce the threat of flooding to people and their property, and to deliver the greatest environmental, social and economic benefit, consistent with the Government's sustainable development principles.	The SEA should seek to ensure that flood risk in the region is not adversely affected by the implementation of the WRMP.
Defra (2005), Securing the Future: Delivering UK Sustainable Development Strategy	
The strategy for sustainable development aims to enable all people to satisfy their basic needs and enjoy a better quality of life without compromising the quality of life of future generations. The strategy places a focus on protecting natural resources and enhancing the environment.	The SEA must seek to ensure that objectives relating to sustainable development, sustainable resource use and protecting the natural environment, are considered when assessing the potential impacts of the WRMP.
Defra (2004), The First Soil Action Plan for England	
This plan is a comprehensive statement on the state of the UK's soils and how Government and other partners were working together to improve them. Ensure that England's soils will be protected and managed to optimise the varied functions that soils perform for society (e.g. supporting agriculture and forestry, protecting cultural heritage, supporting biodiversity, as a platform for construction), in keeping with the principles of sustainable development.	The SEA should seek to ensure that the quality of the region's land, including soils, is protected or enhanced.
Defra (2004), Rural Strategy	
The strategy sets out rural and countryside policy, and draws upon from lessons learnt following the rural white paper. Objectives include supporting economic and social regeneration across rural England and enhance the value of the countryside and protect the natural environment for this and future generations.	The implementation of certain WRMP options may have an effect upon rural communities and the countryside. The SEA should also seek to ensure that the quality of the region's landscapes, natural resources and biodiversity are maintained or enhanced.
Defra (2002), Working with the grain of nature: a biodiversity strategy for England	
The Strategy seeks to embed biodiversity considerations into public policy and sets out a programme for the next five years to make the changes necessary to conserve and enhance biodiversity. The strategy sets out a number of indicators for biodiversity which are to be monitored by Defra, including the condition of Sites of Special Scientific Interest, populations of wild birds and progress with implementing biodiversity action plans (BAPs).	The implementation of the WRMP may influence biodiversity in the south east and as such the SEA should seek to maintain or enhance the quality of habitats and biodiversity, and take regards of priority species identified in BAPs.
Defra (2006), Sustainable Farming and Food Strategy: Forward look	
This Forward Look considers the Government's priorities on sustainable farming and the food sector in accordance with Ed Miliband's 'One Planet Farming' speech. Its key topics are Succeeding in the Market, Improving the environmental performance of farming, Sustainable consumption and Production, Climate Change and	The implementation of the WRMP may have some indirect links with the food industry, through ensuring the availability of water for food based activities and farm nutrient and fertiliser wash and run off. The SEA should also

Objectives identified in the Policy, Plan or Programme	Influences on the WRMP and the SEA objectives
National	
Agriculture and Animal Welfare and Health in order to work towards economic, environmental and social goals.	seek to promote the most effective use of the region's natural resources, including soil, biodiversity and energy resources.
Defra (2016), Guiding principles for water resources planning for water companies operating wholly or mainly in England	
This identifies the key policy priorities to be addressed in WRMPs. This includes protecting and enhancing the environment and the promotion of efficient water use and reducing leakage.	The WRMP and SEA needs to take account of this guidance.
Defra (2013), The Programme: Making the country resilient to a changing climate	
This contains a number of objectives and actions under the headings of built environment, infrastructure, healthy and resilient communities, agriculture and forestry, natural environment, business and local government. Flooding and pressure on water services are considered to be cross cutting risks that are important to each chapter.	The SEA should consider the potential to include adaptive measures for climate change.
Defra (2015), The government's response to the Natural Capital Committee's third State of Natural Capital report	
<p>This provides a number of recommendations such as:</p> <ul style="list-style-type: none"> • Agreement for the development of a 25 year plan for a healthy natural economy. This includes helping organisations understand the economic, social and cultural value the impact their actions have on it and how to use the knowledge for better decisions; identify most important and threatened environmental assets; protection of designated areas; address outstanding monitoring and data issues to enable better decisions about strategic investments in natural capital. • Assigning institutional responsibility for monitoring the state of natural capital. • Organisations that manage land and water assets should create a register of natural capital for which they are responsible. 	Outputs from the SEA process will help to inform any future potential development by Southern Water of Natural Capital Accounting (NCA) approaches to assessing environmental asset performance. Government (led by HM Treasury and Defra) is increasingly using NCA to support future environmental policy and decision-making, and there may be future expectations on water companies to follow suit.
Defra (2016), Single Departmental Plan 2015-2020	
<p>The objectives include:</p> <ul style="list-style-type: none"> • A cleaner, healthier environment, benefitting people and the economy. • A world leading food and farming industry. • A thriving rural economy, contributing to national prosperity and wellbeing. • A nation better protected against floods, animal and plant diseases and other hazards, with strong response and recovery capabilities. 	The SEA should take account of these objectives.
Defra, Environment Agency, Natural England, Forestry Commission England (2016), Creating a great place for living	

Objectives identified in the Policy, Plan or Programme	Influences on the WRMP and the SEA objectives
National	
<p>Strategic objectives include: Environment: a cleaner, healthier environment, benefitting people and the economy; Food and farming: A world leading food and farming industry; Rural: A thriving rural economy, contributing to national prosperity and wellbeing; Protection: a nation better protected against floods, animal and plant diseases and other hazards, with strong response and recovery capabilities.</p>	<p>The WRMP and SEA needs to take account of these objectives.</p>
Department for Culture, Media and Sport (2001), The Historic Environment – A Force for the Future	
<p>This strategy outlines the Governments policy regarding the historic environment. The strategy has key aims and objectives that demonstrate the contribution the historic environment makes to the country’s economic and social wellbeing.</p>	<p>The implementation of the WRMP may have an influence on the heritage of the region. The SEA should seek to ensure any adverse effects on heritage assets are minimised or avoided.</p>
The Energy Act 2013	
<p>This provides the legislative framework for delivering secure, affordable and low carbon energy. It includes provisions for decarbonisation,</p>	<p>The implementation of the WRMP may have an influence upon Southern Water’s total energy use. The SEA should seek to promote energy efficiency, as well as seeking to reduce the effects of climate change through greenhouse gas emissions. The SEA should also promote the use of renewable energy, where relevant.</p>
Environment Act 1995	
<p>The Environment Act set up the EA to manage resources and protect the environment in England and Wales</p>	<p>The SEA should seek to promote the protection and enhancement of all water resources without having negative effects on other aspects of the Environment.</p>
Environment Agency (2011), National Flood and Coastal Risk Management Strategy for England	
<p>This strategy describes what needs to be done by all organisations involved in flood and coastal erosion risk management. These include local authorities, internal drainage boards, water and sewerage companies, highways authorities, and the Environment Agency. They all act to reduce the risk of flooding and coastal erosion, and manage its consequences.</p>	<p>The WRMP must consider potential effects to flood risk. The SEA should seek to ensure that flood risk in the region is not adversely affected by the implementation of the WRMP.</p>
Environment Agency (2010), Water Resources Action Plan for England and Wales	
<p>The strategy has four main aims: Adaptation to and mitigation of climate change; A better water environment; Sustainable planning and management of water resources; People valuing water and the water environment.</p>	<p>The SEA should seek to ensure that strategy objectives are also reflected in the SEA objectives particularly regarding the sustainable management of water resources and protecting the environment.</p>
Environment Agency (2009), Water Resources Strategy for England and Wales	

Objectives identified in the Policy, Plan or Programme	Influences on the WRMP and the SEA objectives
National	
<p>This is the national EA strategy for water resource management in the long term. It looks to 2050 and considers the impacts of climate change, the water environment, water resource and valuing water. Aims and objectives include:</p> <p>Ensure water is used efficiently in homes and buildings, and by industry and agriculture</p> <p>Provide greater incentives for water companies and individuals to manage demand</p> <p>Share existing water resources more effectively</p>	<p>The SEA should seek to ensure that strategy objectives are also reflected in the SEA objectives, particularly around water resource use and availability in the region.</p>
Environment Agency (2007), Soil a precious resource: Strategy for protecting, managing and restoring soil	
<p>Looking after soil is central to achieving the Environment Agency's vision and involves the following :</p> <ul style="list-style-type: none"> • Protect people and wildlife by preventing the build-up of harmful substances in soil • Protect water, air and soil from pollution by promoting good soil management • Protect people from flooding by encouraging land management practices which slow the rate at which water reaches the rivers • Support the clean-up of damaged soil to prevent harm to people, wildlife and the environment • Improve our understanding of soil so we can make better decisions about how to protect people and the environment. 	<p>Some options in the WRMP may affect the soil resource.</p> <p>The SEA should seek to ensure that the quality of the regions soils and their management is protected or enhanced.</p>
Environment Agency (2013), Managing Water Abstraction	
<p>This sets out how the EA manages water resources in England and Wales.</p>	<p>The SEA should consider the range of impacts that changes to abstractions could have on the environment, including water bodies, biodiversity, and water users.</p>
Environment Agency and other lead authorities: Shoreline Management Plans	
<p>A large-scale assessment of the risks associated with coastal processes with the aim to help reduce these risks to people and the developed, historic and natural environments. Coastal processes include tidal patterns, wave height, wave direction and the movement of beach and seabed materials.</p> <p>The second generation of Shoreline Management Plans (SMPs) are published and cover the entire 6000 kilometres of coast in England and Wales. This generation of plans incorporate risks from sea level rise resulting from climate change and information on current coastal defences with limited life and the improvement requirements.</p>	<p>The SEA should seek to promote a reduction of the risks identified in the relevant second generation Shoreline Management Plans.</p>
Environment Agency (undated), WFD River Basin Characterisation Project: Technical Assessment Method - River abstraction and flow regulation	
<p>This paper describes the method used to assess the likelihood of river water bodies achieving the relevant WFD objectives as a result of artificial influences on low river flows.</p>	<p>Implementation of the WRMP may impact river water quality. The SEA should seek to promote the protection</p>

Objectives identified in the Policy, Plan or Programme	Influences on the WRMP and the SEA objectives
National	
	and enhancement of biodiversity and river water quality across the region.
Environment Agency (2014), Working with natural processes to reduce flood risk. R&D Framework	
A project producing a framework for a comprehensive and prioritised programme of Working With Natural Processes research and dissemination to allow flood and coastal erosion risk management to be carried out sustainably, improving the environment or people and wildlife.	The WRMP and SEA should take account of the research identified by the project.
Environment Agency (undated), Hydroecology: Integration for modern regulation	
This paper describes clear way forward in terms of hydroecology and a strategic direction to its development and application.	The WRMP and SEA should ensure relevant ecological considerations are integral to water resource evaluation and management decisions across the range of temporal and spatial scales.
Environment Agency (2008), Sea trout and salmon fisheries. Our strategy for 2002 - 2021	
This strategy sets out how WFD fish objectives will be met. Results from this include: Self-sustaining sea trout and salmon in abundance in more rivers; Economic and social benefits optimised for sea trout and salmon fisheries; Widespread and positive partnerships, producing benefits.	The SEA should seek to protect and enhance salmon and sea trout fisheries.
The Environmental Damage (Prevention and Remediation) (England) Regulations 2015	
These regulations amend the 2009 regulations and provide additional protection to habitats and species identified on Annexes 1 and 2 of the EC Habitats Directive (92/43/EEC), SSSIs and, in some cases, classified waterbodies from environmental damage where an operator has intended to cause damage or been negligent to the potential for damage. Applies to the most serious categories of environmental damage, including: Contamination of land that results in a significant risk of adverse effects on human health Adverse effects on surface water or groundwater consistent with a deterioration in the water's status Adverse effects on the integrity of a Site of Special Scientific Interest (SSSI) or on the conservation status of species and habitats protected by EU legislation outside SSSIs.	The SEA should seek to ensure that the guidance provided by the regulations is considered when assessing the WRMP
Environmental Protection Act 1990	
This act addresses pollution control, waste (including duty of care), contaminated land, statutory nuisance and clean air.	The WRMP and actions arising from it such as construction activities must comply with this act.
The Eels (England and Wales) Regulations 2009	

Objectives identified in the Policy, Plan or Programme	Influences on the WRMP and the SEA objectives
National	
<p>Implement European Council Regulations 1100/2007 establishing measures for the recovery of the stock of European eel. The Regulations will help implement delivery Eel Management Plans. They address eel records and re-stocking, close season and reduction of fishing effort, passage of eels and entrainment.</p> <p>The key objective is to ensure that at least 40% of the potential production of silver eels returns to the sea to spawn. This will be achieved by reducing exploitation of all life-stages of the eel and restoration of their habitats.</p>	<p>The SEA should seek to should seek to maintain or enhance the quality of habitats and biodiversity, and take regard of protected species identified. This should include migratory fish species and their migratory passage.</p>
Natural England (2016), Conservation 21: Natural England’s strategy for the 21st Century	
<p>Sets out how Natural England will work to protect England’s nature and landscapes for people to enjoy and for the services that they will provide (supporting Defra’s ambitions for the environment).</p>	<p>The SEA should seek to protect and enhance landscape.</p>
English Heritage (2010), Heritage at Risk	
<p>Heritage at Risk is a national project that aims to identify the endangered sites (historic buildings and places with increased risks of neglect and decay) and then help secure them for the future. Heritage at Risk Registers were most recently published in 2015.</p>	<p>The SEA should seek to protect and enhance heritage and landscape.</p>
English Heritage (2008), Climate Change and the Historic Environment	
<p>Sets out the current thinking on the implications of climate change for the historic environment. It is intended both for the heritage sector and also for those involved in the wider scientific and technical aspects of climate change; in the development of strategies and plans relating to the impact of climate change; or in projects relating to risk assessment, adaptation and mitigation.</p>	<p>The SEA should seek to assess the implications of the WRMP in combination with climate change and the potential impacts on heritage and the historic environment.</p>
Forestry Commission and Natural England (2014), Ancient Woodland and Veteran Trees: Protecting them from development	
<p>Standing advice from the Forestry Commission and Natural England for planning authorities. Planning authorities are required to avoid, reduce or compensate for the impacts relating to proposed development affecting ancient woodland.</p>	<p>The SEA will ensure ancient woodlands are protected.</p>
Forest Research (2011), Woodland for Water	
<p>This report by the Forestry Commission’s research department reviews the latest evidence concerning the positive and negative impacts of woodland on surface and groundwaters.</p>	<p>The SEA will take account of the issues identified by the report relating to woodlands impacts on water.</p>
Flood and Water Management Act 2010 as amended	
<p>The Flood and Water Management Act 2010 aims to provide better, more comprehensive management of flood risk for people, homes and businesses. It aims improve efficiency in the water industry, improve the affordability of water bills for certain groups and individuals, and help ensure continuity of water supplies to the consumer.</p>	<p>The WRMP also aims to ensure continuity of water supplies across the region are maintained.</p>

Objectives identified in the Policy, Plan or Programme	Influences on the WRMP and the SEA objectives
National	
Historic England (2013), Strategic Environmental Assessment, Sustainability Appraisal and the Historic Environment	
<p>Guidance for addressing the historic environment in Strategic Environmental Assessment or Sustainability Appraisal. It identifies the recommended list of plans, programmes and policies for review, approach to baseline review, potential sustainability issues.</p>	<p>The SEA should consider the potential effects of the WRMP on the historic environment, particularly designated assets and their settings, and to important wetland areas with potential for paleo-environmental deposits. Historic characterisation can supplement information about designations. Sustainability issues, objectives and indicators identified in this document should be taken into account in the SEA.</p>
Historic England (2015), Historic Environment Good Practice Advice in Planning Note 3	
<p>This provides guidance on managing change within settings of heritage assets. This includes archaeological remains, historic buildings, sites, areas and landscapes.</p>	<p>The SEA should take into account effects on settings of heritage assets.</p>
HM Treasury (2015), Fixing the Foundations: Creating a More Prosperous Nation	
<p>This report refers to the importance of productivity. The government's framework for raising productivity has two pillars: Encouraging long term investment in economic capital, including infrastructure, skills and knowledge; Promoting a dynamic economy that encourages innovation and helps resources flow to their most productive use.</p> <p>A fifteen point plan for productivity is provided.</p>	<p>The SEA should take into account the need to raise productivity via long term investment and a dynamic economy.</p>
HM Treasury Infrastructure UK (2014), National Infrastructure Plan	
<p>The Plan focuses on economic infrastructure: the networks and systems in energy, transport, digital communication, flood protection, water and waste management. These are all critical to support economic growth through the expansion of private sector businesses across all regions and industries, to enable competitiveness and to improve the quality of life of everyone in the UK.</p> <p>The objectives for the water sector are 'to secure a fair deal for customers while enabling water companies to continue to attract low-cost investment needed to provide the high quality, resilient water services customers want.'</p>	<p>The WRMP could result in the production of additional waste. The SEA should seek to reduce the production of waste and ensure it is treated in line with the widely adopted 'waste hierarchy' and not sent to landfill. The WRMP can contribute to the provision of resilient water services.</p>
National Infrastructure Commission (2018), Preparing for a drier future: England's water infrastructure needs	
<p>Recommends more investment in strategic regional water resource schemes with more water trading between companies to improve supply resilience. Recommends further investment in leakage reduction and reducing per capita consumption with increased metering to reduce future growth in demand.</p>	<p>The WRMP and SEA should take account of the recommendations for improving water supply resilience</p>
Natural England's standing advice on protected species	

Objectives identified in the Policy, Plan or Programme	Influences on the WRMP and the SEA objectives
National	
<p>This standing advice comprises a number of guides on the following protected species:</p> <ul style="list-style-type: none"> • Bats • Great crested newts • Badgers • Hazel dormice • Water voles • Otters • Wild birds • Reptiles • Protected plants • White-clawed crayfish • Invertebrates • Freshwater fish • Natterjack toads • Ancient woodland and veteran trees 	<p>The SEA should seek to protect protected species and include this in the SEA objectives.</p>
Natural England (2014), Site Improvement Plans (SIPs) for Natura 2000 Sites	
<p>SIPs have been developed for each Natura 2000 site in England. They provide high level overviews of the issues affecting the condition of the Natura 2000 features on these sites and outlines the priority measures that are needed to improve the condition of the features. SIPs are live documents.</p>	<p>The SEA should take into account the relevant SIPs for Natura 2000 sites that may be affected by the WRMP and include the conservation and enhancement of designated sites in the SEA objectives.</p>
Natural England National Character Area (NCA) Profiles	
<p>Natural England has defined a series of 120 National Character Areas as a means to conserve nature in England. They are areas of countryside identified by the unique combination of physical attributes, wildlife, land use and culture. See Table C15</p>	<p>The SEA should take account of NCA profiles and include SEA objective relating to the protection of landscape character.</p>
The Natural Environment and Rural Communities Act (NERC) 2006	
<p>This Act makes provision about bodies concerned with the natural environment and rural communities in connection with wildlife, sites of special scientific interest, National Parks and the Broads. The Natural Environment and Rural Communities Act is designed to help achieve a rich and diverse natural environment and thriving rural communities.</p>	<p>The SEA should seek to maintain or enhance the quality of habitats and biodiversity. The impacts of the WRMP on any designated features, as highlighted in the Natural Environment and Rural Communities Act, should be addressed.</p>
National Nature Reserves Management Plans	
<p>Management Plans have been created for all NNRs. Plans describe the site, identifies key features, analyses and sets objectives and specifies the management and monitoring prescriptions. Plans are reviewed at least every 5 years.</p>	<p>The SEA should aim to take account of NNR Management Plans for NNRs likely to be affected by the WRMP.</p>
Natural England (2016), A narrative for conserving freshwater and wetland habitats in England	
<p>Publication providing an overview of circumstances relating to the conservation of freshwater and wetlands habitats in England, considering their ecological function, the natural and anthropogenic factors affecting them, the principles that should be applied to their management,</p>	<p>The SEA should seek to protect and enhance freshwater and wetland habitats.</p>

Objectives identified in the Policy, Plan or Programme	Influences on the WRMP and the SEA objectives
National	
and the respective roles of the main policy mechanisms involved in their conservation.	
Planning (Listed Buildings and Conservation Areas) Act 1990	
This addresses listed buildings including prevention of deterioration and damage and preservation and enhancement of conservation areas.	The WRMP and SEA should take account of the need to protect listed buildings and conservation areas.
Salmon and Freshwater Fisheries Act 1975 (amended)	
<p>The Act lays down the present basic legal framework within which salmon and freshwater fisheries in England are regulated.</p> <p>Proposals have been made to extend the legislation to apply to more fish species e.g. coarse fish, eel and lamprey species. These proposals are currently under review.</p> <p>The Act covers legislation on fishing methods and related offences, obstructions to fish passage, salmon and freshwater fisheries administration and law enforcement. Proposed extensions to the legislation (under review) include the provision of fish passes and screening of water abstraction and discharge points for coarse fish, eel and lamprey species.</p>	<p>The Act Provides statutory requirements for maintaining fish passage. The SEA will cover fish passage as an element of at least one sustainability objective. The SEA should seek to address any potential issues or effects on existing measures to address fish passage.</p>
The Water Act 2003	
<p>The Water Act 2003 is in three Parts, relating to water resources, regulation of the water industry and other provisions. The four broad aims of the Act are:</p> <ul style="list-style-type: none"> The sustainable use of water resources Strengthening the voice of consumers A measured increase in competition The promotion of water conservation. 	<p>The implementation of the WRMP may have an effect through its role in maintaining supplies of water. The SEA should seek to promote sustainable use of water resources.</p>
The Water Environment (WFD) (England and Wales) Regulations 2017	
<p>These Regulations make provision for the purpose of implementing in river basin districts within England and Wales The Water Framework Directive (2000/60/EC) of the European Parliament. The Regulations require a strategic planning process (River Basin Management Plans) to be followed for the purposes of managing, protecting and improving the quality of water resources.</p>	<p>The SEA should seek to promote the protection and enhancement of all water resources. The SEA should seek to maintain, protect and improve the quality of water bodies and overall ecological status across the region and ensure efficient use of resources.</p>
Water Resources Act 1991 (Amendment) (England and Wales) Regulations 2009 SI3104	
<p>Amends Water Resources Act 1991 by extending the use of Water Protection Zones and Works Notices, in particular to deal with harm to aquatic ecosystems caused by the physical characteristics of a water course or lake, such as quantity, structure and substrate of river/lake bed.</p> <p>Aligns the Water Resources Act with the hydromorphological requirements of the WFD</p>	<p>The SEA should include objectives that cover hydromorphological aspects and seek to ensure that hydromorphological features within the plan are maintained or enhanced.</p>

Objectives identified in the Policy, Plan or Programme	Influences on the WRMP and the SEA objectives
National	
Wildlife and Countryside Act 1981	
<p>The Act is the principle mechanism for providing legislative protection of wildlife in Great Britain.</p> <p>Species listed in Schedule 5 of the Act are protected from disturbance, injury, intentional destruction or sale. Other provisions outlaw certain methods of taking or killing listed species. This Act is brought up to date regularly to ensure the most endangered animals are on the schedule.</p> <p>The Act also improved protection for the most important wildlife habitats.</p>	<p>Some aspects of the WRMP may have effects on habitats and species in the southern area supply area and beyond. The SEA should seek to maintain or enhance the quality of habitats and biodiversity, and take regard of protected species and habitats.</p>
UKTAG on the WFD Guidance Documents (various dates)	
<p>UKTAG prepares technical guidance designed to facilitate consistent implementation of the WFD in the UK. This report identifies standards for certain chemicals known as specific pollutants, developments in assessments of risk to groundwater, non-native species, standards for flows in rivers, standards for levels in lakes, standards for acidity in rivers and standards in intermittent discharges.</p>	<p>The SEA should seek to ensure that the guidance provided by the plan is considered when assessing the WRMP, especially with respect to objectives relating to ecology, water quality and water quantity. The SEA should also ensure the guidance in the plan is used in relation to other related regulations for example the Habitats Directive. The guidance could contribute to the formulation of any criteria for assessing significance of effects.</p>
UK Climate Projections UKCP09. UKCIP, 2009	
<p>The UKCP09 Projections provide a basis for studies of impacts and vulnerability and decisions on adaptation to climate change in the UK over the 21st century. Projections are given of changes to climate, and of changes in the marine and coastal environment; recent trends in observed climate are also discussed.</p> <p>The methodology gives a measure of the uncertainty in the range of possible outcomes; a major advance beyond previous national scenarios</p> <p>The Projections will allow planners and decision-makers to make adaptations to climate change. In order to do so they need as much good information as possible on how climate change will evolve. They are one part of a UK government programme of work to put in place a new statutory framework on, and provide practical support for, adaptation.</p>	<p>The SEA should also use UKCP09 projections in the broader assessment of climate change effects and any potential cumulative effects. For example the ecological requirements of aquatic habitats that may be affected by the WRMP will also be influenced by climate change.</p>
Water Industry Act 1991	
<p>This makes provision for general duties of water undertakers including those associated with water resources management plans and sets out supply duties.</p>	<p>The WRMP must take into account this legislation.</p>
The Water Resources Management Plan Regulations 2007	

Objectives identified in the Policy, Plan or Programme	Influences on the WRMP and the SEA objectives
National	
This provides the legislation for the preparation of water resources management plans.	The WRMP should take account of these requirements.
Water UK (2016), Water Resources Planning Framework (2015-2065)	
<p>This study considers public water supply in England and Wales with the combined impacts of the challenges of climate change, population growth and the need to reduce abstractions and protect the environment. It considers the long term water needs (50 years) and the options available.</p> <p>It reports on issues such as:</p> <ul style="list-style-type: none"> • The significant and increasing risk of severe drought • Role of drought orders/permits and extent can be relied upon now and in future • Impacts of climate change • Population growth • Reduction in abstraction licenses to protect aquatic environment • Future needs uncertainty • Twin tracking demand management, new resources and regional transfers • Increased use of demand management • Strategic supply options • Promoting and enabling transfers • Social and economic consequences of severe droughts • Minimum standard of drought resilience • Adaptive management • Minimum level of drought resilience 	<p>The SEA should take account of the environmental issues and the WRMP should consider these and other relevant findings/conclusions.</p>
Wildlife and Countryside Link – Blueprint for Water 19: Environmental outcomes for the price review.	
<p>The Blueprint for PR19 environmental manifesto sets out the priorities that water companies should deliver for the environment as they develop and implement their Water Resource Management Plans (WRMPs). These include protecting and restoring catchments from source to sea; stopping pollution; using water wisely and price water fairly; and keeping rivers flowing and wetlands wet.</p>	<p>The SEA and WRMP should take account of the priorities outlined in the manifesto.</p>

Objectives identified in the Policy, Plan or Programme	Influences on the WRMP and the SEA objectives
Regional / Local	
Green infrastructure plans	
<p>The NPPF defines green infrastructure as ‘a network of multi-functional green space, urban and rural, which is capable of delivering a wide range of environmental and quality of life benefits for local communities’ (including rivers and ponds). Local planning authorities are required to plan positively for strategic networks of green infrastructure, and take account of the benefits of green infrastructure in reducing the risks posed by climate change. The majority of LAs have therefore developed Green Infrastructure Strategies or Studies addressing these issues. Green infrastructure will often play a large part in local recreational resources.</p>	<p>The SEA should take account of the need to protect and enhance the green infrastructure network.</p>
Public Rights of Way Improvement Plans (ROWIP)	
<p>These plans are prepared by local authorities to describe how improvements to the public rights of way network will be undertaken to provide a better experience for a range of users. ROWIPs are reviewed every ten years.</p>	<p>The WRMP may affect public rights of way (PRoW) for example due to construction. The SEA should include an objective that protects PRoW.</p>
Environment Agency (2016), South West River Basin district Flood Risk Management Plan	
<p>This sets out the measures to manage flood risk now and in the future. It will help to develop and promote a better understanding of flood and coastal erosion risk, provide information about the economic and environmental benefits to inform decision makers and identify communities with the highest risk of flooding to enable the targeting of investment.</p>	<p>The SEA should avoid increasing any potential flood threats or effects.</p>
Environment Agency (2015), South West River Basin District, River basin management plan	
<p>The purpose is to provide a framework for protecting and enhancing the benefits provided by the water environment. The plan sets out the current state of the environment, environmental objectives and identifies the measures to achieve the environmental objectives.</p>	<p>The WRMP may have an effect on some of the RBMP objectives. The SEA should include objectives that take into account the objectives of the RBMP.</p>
Environment Agency (2011), Water Resources Strategy – A Regional Action Plan for Thames Region.	
<p>The vision of the plan is for more people in London and the South East to enjoy new and improved water related recreation contributing to a better quality of life, health and environment.</p> <ul style="list-style-type: none"> • The strategic priorities are designed to: • Encourage action by a range of interested parties and individuals; • deliver well managed, new and better opportunities for more people to enjoy 	<p>The WRMP operation may have the potential to affect the water environment in London and the South East, such as reducing river levels with potential impacts on recreation activities. The SEA should include objectives that take into account the maintenance of the water environment to ensure access, recreation and enjoyment.</p>

Objectives identified in the Policy, Plan or Programme	Influences on the WRMP and the SEA objectives
Regional / Local	
<ul style="list-style-type: none"> • water environments; • Tackle some of the issues that arise from changes in the demand for recreation, • the supply of water bodies and gaps in provision; • Ensure everyone can enjoy water environments. 	
Environment Agency (2010), Water Resources Strategy – A Regional Action Plan for Thames Region.	
<p>Explains how the aims of the EA national strategy will be progressed by regional teams. Brings a sustainable approach to water management, taking into account regional challenges. This plan takes the aims and objectives of the strategy and identifies regional actions that will enable:</p> <ul style="list-style-type: none"> • water to be abstracted, supplied and used efficiently; • the water environment to be restored, protected and improved so that habitats and species can better adapt to climate change; • supplies to be more resilient to the impact of climate change, including droughts and floods; • water to be shared more effectively between abstractors; • improved water efficiency in new and existing buildings; • water to be valued, and for prices to act as an incentive for efficient use, while safeguarding vulnerable sectors of society; • additional resources to be developed where and when they are needed in the context of a twin-track approach with demand management; • sustainable, low-carbon solutions to be adopted; • Stronger integration of water resources management with land, energy, food and waste. 	<p>The aims and objectives of the Regional Action Plan for Thames Region would act to strategically reduce the requirement for the operation of a WRMP. The WRMP should be aligned to these objectives.</p>
Environment Agency (2006), River Thames Alliance: Thames Waterway Plan 2006-2011	
<p>The strategy aims to plan and promote water-related sport and recreation to achieve the maximum economic, social and environmental benefits. The main objectives are based on creating opportunities for recreation on or near our inland and coastal waters:</p> <ol style="list-style-type: none"> 1. Creating a better place to play by improving the environment 	<p>The SEA must consider the provision of water resources required to support water based sport and recreation across the region.</p>

Objectives identified in the Policy, Plan or Programme	Influences on the WRMP and the SEA objectives
Regional / Local	
2. Improving access for all 3. Making recreation sustainable 4. Promoting the outdoors	
Environment Agency and Defra (2016), Thames River Basin District River Basin Management Plan	
<p>Updated as 2009 plans superseded by 2015 plans. Reference is made to the environmental objectives of the WFD are:</p> <ul style="list-style-type: none"> • To prevent deterioration of the status of surface waters and groundwater; • To achieve objectives and standards for protected areas; • To aim to achieve good status for all water bodies or, for heavily modified water bodies and artificial water bodies, good ecological potential and good surface water chemical status; • To reverse any significant and sustained upward trends in pollutant concentrations in groundwater; • The cessation of discharges, emissions and losses of priority hazardous substances into surface waters; • Progressively reduce the pollution of groundwater and prevent or limit the entry of pollutants. <p>Environmental objectives are set for each of the protected areas and water bodies in the river basin district.</p>	<p>The WRMP may have an effect on some of the Thames RBMP objectives. The SEA should include objectives that take into account the objectives of the Thames RBMP where relevant (e.g. abstraction and WFD status).</p>
Mayor of London (2011), Securing London's Water Future The Mayor's Water Strategy	
<p>This sets out the water challenges for London and actions needed to manage them. It calls for organisations involved in the city's water management</p> <ul style="list-style-type: none"> • to invest in a water management and sewerage infrastructure system that's suitable for a world class city • support and encourage people to take practical actions to save water, save energy and save money off utility bills • work in partnership to manage flood risk <p>Demand for water will increase due to population increases and higher seasonal rainfall and hotter summers mean water availability will decrease when required the most. London's supply-demand balance will become increasingly unsustainable and therefore action is required to balance supply and demand.</p>	<p>The WRMP and SEA should take into account of the strategy and the need to balance water supply and demand whilst protecting the environment.</p>
Port of London Authority (2016) The Vision for the Tidal Thames	

Objectives identified in the Policy, Plan or Programme	Influences on the WRMP and the SEA objectives
Regional / Local	
<p>The Thames Vision is a 20 year view of the river's future, developed with stakeholders with the goal of making the most of its potential, for the benefit of all. The Vision sees the value of the Thames better understood and its potential realised. The goals and priority actions are as follows:</p> <ul style="list-style-type: none"> • Port of London: More trade, more jobs • Inland Freight: More goods off roads onto the river • Passenger Transport: More journeys • Sport and Recreation: More participants • Environment and Heritage: Improved tidal Thames environment • Community and Culture: More people enjoying the Thames and its banks 	<p>The WRMP operation may have the potential to affect the water environment and river levels and therefore access to the River Thames. The SEA should include objectives that take into account navigation, recreation and tourism.</p>
Southern Water Drought Plan, 2013	
<p>Water companies in England and Wales have a duty to prepare and maintain a Drought Plan under Sections 39B and 39C of the Water Industry Act 1991, as amended by the Water Act 2003.</p> <p>The purpose of this Drought Plan is to set out the actions the Company would take if a drought were to occur over the next three years.</p>	<p>The WRMP and SEA needs to take account of the Drought Plan such as in cumulative effects.</p>
Environment Agency (2009), Water Resources Strategy. Regional Action Plan for Southern Region.	
<p>The vision of the plan is for more people in the South East to enjoy new and improved water related recreation contributing to a better quality of life, health and environment.</p> <p>The strategic priorities are designed to:</p> <ul style="list-style-type: none"> • Encourage action by a range of interested parties and individuals; • deliver well managed, new and better opportunities for more people to enjoy water environments; • Tackle some of the issues that arise from changes in the demand for recreation, the supply of water bodies and gaps in provision; • Ensure everyone can enjoy water environments. 	<p>The WRMP operation may have the potential to affect the water environment in the South East, such as reducing river levels with potential impacts on recreation activities. The SEA should include objectives that take into account the maintenance of the water environment to ensure access, recreation and enjoyment.</p>
Defra (2015), Climate adaptation reporting second round: relevant water companies	
<p>This report sets out the progress of water companies in adapting to the current and future predicted effects of climate change</p>	<p>The WRMP should take account of these requirements.</p>
Environment Agency (2007), Water for the Future - Managing Water in the South East of England.	
<p>A short paper explaining why water resources are going to become an increasingly important issue</p>	<p>The aims and objectives of the Regional Action Plan for the Southern Water region</p>

Objectives identified in the Policy, Plan or Programme	Influences on the WRMP and the SEA objectives
Regional / Local	
<p>in the south east of England due to Government proposed development, climate change, available resources and usage patterns. Promotes consumer management of water resources by changing behaviour, and suggests this may preclude the need for some development schemes which have environmental impacts. Mentions a number of ways by which water companies can reduce water demand, including:</p> <ul style="list-style-type: none"> • leakage reduction • installation of water meters • new tariffs to encourage efficient water use • retrofitting water saving devices to existing homes and businesses, designing new homes to be water-efficient • sharing of resources by water companies 	<p>would act to strategically reduce the requirement for the operation of a WRMP. The WRMP should be aligned to these objectives where possible. For example, sharing of resource by water companies.</p>
<p>Environment Agency (2016), South East River Basin District Flood Risk Management Plan 2015 - 2021</p>	
<p>This plan puts into place measures for preventing flooding from rivers, the sea, surface water, ground water and reservoirs over the 9 catchments and 1 flood risk area of the South East river basin district. Working with local councils, internal drainage boards, Highways England and lead local flood authorities to prevent, prepare and protect from flood risks.</p>	<p>The SEA should avoid increasing any potential flood threats or effects.</p>
<p>Environment Agency and Defra (2015), South East River Basin District River Basin Management Plan</p>	
<p>Updated as 2009 plans superseded by 2015 plans. Reference is made to the environmental objectives of the WFD are: To prevent deterioration of the status of surface waters and groundwater; To achieve objectives and standards for protected areas; To aim to achieve good status for all water bodies or, for heavily modified water bodies and artificial water bodies, good ecological potential and good surface water chemical status; To reverse any significant and sustained upward trends in pollutant concentrations in groundwater; The cessation of discharges, emissions and losses of priority hazardous substances into surface waters; Progressively reduce the pollution of groundwater and prevent or limit the entry of pollutants.</p> <p>Environmental objectives are set for each of the protected areas and water bodies in the river basin district.</p>	<p>The WRMP may have an effect on some of the RBMP objectives. The SEA should include objectives that take into account the objectives of the RBMP where relevant (e.g. abstraction and WFD status).</p>

Objectives identified in the Policy, Plan or Programme	Influences on the WRMP and the SEA objectives
Regional / Local	
Environment Agency Catchment Abstraction Management Strategies (CAMS)	
<p>CAMS was the approach used by the Environment Agency to assess the amount of water available for further abstraction licensing taking account of the needs of the environment. The relevant Catchment Abstraction Management Strategies (CAMS) were last produced in 2013-14 and have now been incorporated into the WFD process since the 2nd cycle River Basin Management Plans in 2015.</p> <p>The aims of abstraction strategies are to:</p> <ul style="list-style-type: none"> • make information on water resource availability and the catchment licensing strategy more readily available • provide a consistent and structured approach to local water resource management • recognise both the abstractor's reasonable need for water and environmental needs • provide mechanisms to assess water resources availability • provide results which ensure the relevant Water Framework Directive objectives are met • provide tools to aid licensing decisions – particularly management of time limited licences. 	<p>The WRMP could affect issues identified within in the individual CAMS within the area. The SEA will include objectives that ensure that the effect of the WRMP on the sustainable water abstraction assessed.</p>
Exmoor National Park Partnership Plan 2012-2017	
<p>Objectives comprise those associated with:</p> <ul style="list-style-type: none"> • A thriving, living landscape • Connecting people and places • Towards a sustainable future 	<p>The WRMP may have the potential to affect the achievement of objectives. SEA will include objectives that take into account aspects such as landscape quality and character, historic and cultural features, habitats and biological diversity, climate change and better use of resources.</p>
Partnership Plan for the New Forest National Park (2015), An update of the National Park Management Plan with actions for 2015 -2020	
<p>This update is designed to form a simple supplement to the 2010 National Park Management Plan.</p>	<p>The WRMP may have the potential to affect the achievement of objectives. SEA will include objectives that take into account aspects such as landscape quality and character, historic and cultural features, habitats and biological diversity, climate change and better use of resources.</p>
South Downs National Park (2013), Partnership Management Plan, Shaping the future of your south downs national park 2014-2019.	

Objectives identified in the Policy, Plan or Programme	Influences on the WRMP and the SEA objectives
Regional / Local	
<p>This is the five-year strategy for the management of the South Downs National Park. It provides a framework for the park wide local plan. Outcomes are under three headings: A thriving living landscape People connected with places Towards a sustainable future</p> <p>One of the outcomes comprises 'More responsibility and action is taken by visitors, residents and businesses to conserve and enhance the special qualities and use resources more wisely.</p>	<p>The WRMP may have the potential to affect the achievement of objectives. SEA will include objectives that take into account aspects such as landscape quality and character, historic and cultural features, habitats and biological diversity, climate change and better use of resources.</p>
South East Biodiversity Strategy (2009), South East England Biodiversity Forum	
<p>The strategy aims to be a clear, coherent and inspiring vision and framework that guides and supports all those who can impact biodiversity in the south east region.</p> <p>The South East Biodiversity Strategy aims to:</p> <ul style="list-style-type: none"> • Be a clear, coherent and inspiring vision for the south east • Provide a framework for the delivery of biodiversity targets that guide and support all those who have an impact on biodiversity in the region • Embed a landscape scale approach to restoring whole ecosystems in the working practices and policies of all partners • Create the space needed for wildlife to respond to climate change • Enable all organisations in the south east to support and improve biodiversity across the region • Be a core element within the strategies and delivery plans of organisations across the south east region. 	<p>The implementation of the WRMP may influence biodiversity in the south east and as such the SEA should seek to maintain or enhance the quality of habitats and biodiversity.</p>
Water Resources Management Plans from adjacent water companies (2012- 2040)	
<p>These set out the plans to manage water resources by companies in adjacent areas. These include:</p> <ul style="list-style-type: none"> • Affinity Water • Portsmouth Water • South East Water • Sutton East Surrey Water • Bournemouth Water • Wessex Water • Thames Water 	<p>The WRMP should not conflict with the other water company operations and the SEA to take these into account for the cumulative effects assessment.</p>
Drought Plans from adjacent water companies	
<p>These include:</p> <ul style="list-style-type: none"> • Affinity Water 	<p>The WRMP and SEA to take these into account such as in the cumulative effects assessment.</p>

Objectives identified in the Policy, Plan or Programme	Influences on the WRMP and the SEA objectives
Regional / Local	
<ul style="list-style-type: none"> • Portsmouth Water • South East Water • Sutton East Surrey Water • Bournemouth Water • Wessex Water • Thames Water 	
Environment Agency, The Wild Trout Trust and the Atlantic Salmon Trust South Coast Sea Trout Action Plan (2011)	
<p>The Plan details a programme of work. Key actions are identified. Which include: Improve fish passage and habitat connectivity; Spawning habitat improvement; Protection of sea trout stocks; Protect and improve water resources and water quality; Mitigate the impact of climate change; Improve understanding of sea trout; Raise awareness</p>	<p>The WRMP operation may have the potential to impact on fish migration. The SEA will cover fish passage as an element of at least one sustainability objective.</p>
Southern Water (2013), updated Strategic Statement 2015-40 (Parts 1 to 4) and Southern Water (2011) Strategic Statement 2015-40	
<p>The strategic statement sets out how Southern Water proposes to meet the challenges facing the industry over the following 25 years and deliver improved services to their four million customers.</p>	<p>The WRMP should take account of this strategic statement.</p>
Southern Water (2013), Five Year Business Plan 2015-2020	
<p>Southern Waters Business Plan shows how they will deliver the improvements to their customers, how average bills will fall by eight per cent (excluding inflation) and sets out 26 clear promises to their customers.</p>	<p>The WRMP should take account of this strategic statement.</p>
Defra (2010), Eel Management plans for the United Kingdom South East River Basin District	
<p>The Eel Management Plan for the South East River Basin District (RBD) aims to describe the current status of eel populations, assess compliance with the target set out in Council Regulation No 1100/2007 and detail management measures to increase silver eel escapement.</p>	<p>The WRMP operation may have the potential to impact on fish and eel migration. The SEA will cover fish and eel passage as an element of at least one sustainability objective.</p>
Dorset AONB - A Framework for the Future AONB Management Plan 2014 – 2019	
<p>Provides local & spatial plans, catchment plans, marine planes, development management, rural investment strategies and community planning to guide and inform users and stakeholder on activities affecting the AONB. The plan emphasises the key concepts of Sustainable Development, Ecosystem Approach and Landscape Approach.</p>	<p>The WRMP operation may have the potential to affect several of the objectives of the Dorset AONB. The SEA will include objectives that take into account the AONB objectives where relevant.</p>
Blackdown Hills AONB Management Plan 2014 to 2019	

Objectives identified in the Policy, Plan or Programme	Influences on the WRMP and the SEA objectives
Regional / Local	
Objectives include those associated with Landscape, Sustainable Development and Communication and Management.	The WRMP operation may have the potential to affect several of the objectives for managing the Blackdown Hills AONB. The SEA should include objectives that take into account the objectives of the Blackdown Hills AONB management where relevant.
Chiltern Hills AONB Management Plan 2014-2019	
Objectives are under the headings of conserving and enhancing natural beauty, landscape, farming, forestry and other land management, biodiversity, water environment, historic environment and development.	The WRMP operation may have the potential to affect the broad aims and policies identified in the vision of the Chilterns AONB management plan. The SEA should include objectives that take into account the broad aims and policies important to the vision of the Chilterns AONB management plan where relevant (e.g. conserving river and wetland habitats.)
Cotswolds AONB Management Plan 2013-2018	
Objectives include those associated with conserving and enhancing the AONB.	The WRMP operation may have the potential to affect several of the objectives for managing the Cotswolds AONB. The SEA should include objectives that take into account the objectives of the Cotswolds AONB management where relevant.
Cranborne Chase AONB Management Plan 2014-2019	
The plan determines strategies for conserving, protecting and educating about the AONB's history, environment and culture. Key focuses include the sustainable management of natural resources within the AONB, allowing free movement of wildlife.	The WRMP operation may have the potential to affect several of the objectives of the Cranborne Chase and West Wiltshire Downs AONB. The SEA will include objectives that take into account the AONB objectives where relevant.
East Devon AONB Management Strategy 2014-2019	
Objectives are under three themes comprising Landscape, Sustainability and Communication and Management.	The WRMP operation may have the potential to affect several of the objectives for managing the East Devon AONB. The SEA should include objectives that take into account the objectives of the East Devon AONB management where relevant.
Quantock Hills AONB Management Plan 2014-2019	
<p>Objectives are identified within the following themes:</p> <ul style="list-style-type: none"> • Landscape quality • Land management farming and forestry • Biodiversity wildlife and habitats • Historic environment and cultural influences • Geology and coast • Development and infrastructure • Visitors, access and the local economy • Community and volunteering • Understanding 	The WRMP operation may have the potential to affect several of the objectives for managing the Quantock Hills AONB. The SEA should include objectives that take into account the objectives of the Quantock Hills AONB management where relevant.

Objectives identified in the Policy, Plan or Programme	Influences on the WRMP and the SEA objectives
Regional / Local	
Mendip Hills AONB Management Plan 2014-19	
<p>Objectives are identified within the following themes:</p> <ul style="list-style-type: none"> • Landscape quality • Biodiversity and geodiversity • Historic environment and cultural heritage • Recreation, access and tourism • Natural resources • Land management • Development and transport • Participation 	<p>The WRMP operation may have the potential to affect several of the objectives for managing the Mendip Hills AONB. The SEA should include objectives that take into account the objectives of the Mendip Hills AONB management where relevant.</p>
West Sussex County Council (2005), A Strategy for the West Sussex Landscape	
<p>This strategy aims to enhance and protect the character and diversity of the West Sussex landscape.</p>	<p>The WRMP should take account of this plan.</p>
The North Wessex Downs AONB Management Plan 2014-19	
<p>The areas covered by the plan include the overall management of the AONB, sustainable development, landform and landscape character, biodiversity, farmed landscape, woodland and trees, historic and cultural heritage, heritage coast, geology and natural resources, vibrant communities and access, enjoyment and understanding.</p>	<p>The WRMP operation may have the potential to affect several of the objectives of the North Wessex Downs AONB. The SEA will include objectives that take into account the AONB objectives where relevant.</p>
Isle of Wight AONB Management Plan 2014 – 2019 (Wight AONB Partnership)	
<p>The areas covered by the plan include the overall management of the AONB, sustainable development, landform and landscape character, biodiversity, farmed landscape, woodland and trees, historic and cultural heritage, heritage coast, geology and natural resources, vibrant communities and access, enjoyment and understanding.</p>	<p>The WRMP operation may have the potential to affect several of the objectives of the Isle of Wight AONB. The SEA will include objectives that take into account the AONB objectives where relevant.</p>
Chichester Harbour AONB 2014-20019 (Chichester Harbour Conservancy)	
<p>The areas covered by the plan include the overall management of the AONB, sustainable development, landform and landscape character, biodiversity, farmed landscape, woodland and trees, historic and cultural heritage, heritage coast, geology and natural resources, vibrant communities and access, enjoyment and understanding.</p>	<p>The WRMP operation may have the potential to affect several of the objectives of the Chichester Harbour AONB. The SEA will include objectives that take into account the AONB objectives where relevant.</p>
Surrey Hills AONB Management Plan 2014-2019 (Surrey Hills Board)	
<p>The areas covered by the plan include the overall management of the AONB, sustainable development, landform and landscape character, biodiversity, farmed landscape, woodland and trees, historic and cultural heritage, heritage coast, geology and natural resources, vibrant</p>	<p>The WRMP operation may have the potential to affect several of the objectives of the Surrey Hills AONB. The SEA will include objectives that take into account the AONB objectives where relevant.</p>

Objectives identified in the Policy, Plan or Programme	Influences on the WRMP and the SEA objectives
Regional / Local	
communities and access, enjoyment and understanding.	
Kent Downs AONB Management Plan 2014-2019	
<p>The areas covered by the plan include the overall management of the AONB, sustainable development, landform and landscape character, biodiversity, farmed landscape, woodland and trees, historic and cultural heritage, heritage coast, geology and natural resources, vibrant communities and access, enjoyment and understanding.</p>	<p>The WRMP operation may have the potential to affect several of the objectives of the Kent Downs AONB. The SEA will include objectives that take into account the AONB objectives where relevant.</p>
The High Weald AONB Management Plan 2014-2019 (High Weald Joint Advisory Committee)	
<p>The areas covered by the plan include the overall management of the AONB, sustainable development, landform and landscape character, biodiversity, farmed landscape, woodland and trees, historic and cultural heritage, heritage coast, geology and natural resources, vibrant communities and access, enjoyment and understanding.</p>	<p>The WRMP operation may have the potential to affect several of the objectives of the High Weald AONB. The SEA will include objectives that take into account the AONB objectives where relevant.</p>
Water Resources in the South East (WRSE) Group (forthcoming) regional water resources strategy	
<p>The WRSE's group aim is to develop a regional water resources strategy to contain a range of options to determine the best long term solutions for customers and the environment of the south east of England. Once prepared and publicly available this will form the 'building blocks' of water companies' next set of WRMPs.</p>	<p>The WRMP and SEA should take account of this strategy subject to when it becomes available.</p>
Surrey Wildlife Trust 5-year Plan 2013-2018	
<p>This is the five year strategy for the management of the wildlife sites managed by Surrey Wildlife Trust.</p> <p>The purpose of the plan is to deliver: protection and accessibility of wildlife, its habitats and places of natural beauty; teaching the community about nature, biodiversity, wildlife conservation and sustainable development; and support research into natural heritage to promote evidence based activity.</p>	<p>The WRMP may have the potential to affect several of the ambitions for the Surrey Wildlife Trust Management Plan. The SEA will include objectives that take into account the plan objectives where relevant.</p>
RSPB Pagham Harbour Local Nature Reserve Management Plan 2013-2018	
<p>This is a five-year strategy for the management of the RSPB's Pagham Harbour Local Nature Reserve.</p> <p>The purpose of the plan is maintain, improve and extend the important habitats within the area. The habitats support some of the most important wetland bird populations and wildlife in southern England. A key objective is to maintain its SPA and Ramsar status for Brent Geese, Black-tailed Godwits, Pintails and Little Terns.</p>	<p>The WRMP may have the potential to affect several of the ambitions for the Pagham Harbour Local Nature Reserve Management Plan. The SEA will include objectives that take into account the plan objectives where relevant.</p>

Water Resources Management Plan 2019 Annex 14: SEA Main Report Appendix C: Environmental Baseline

December, 2019

Version 1



from
**Southern
Water** 

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1. Environmental baseline

Annex 1 of the SEA Directive requires the following specific baseline information to be included within the Environmental Report to identify the environmental characteristics of areas likely to be significantly affected by the WRMP19:

- 'the relevant aspects of the current state of the environment and the likely evolution thereof without implementation of the plan or programme'
- 'the environmental characteristics of areas likely to be significantly affected'
- '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 (the 'Birds Directive') and 92/43/EEC (the 'Habitats Directive').'

An essential part of the SEA process is to identify the current baseline conditions and their likely evolution in the absence of this plan. It is only with knowledge of baseline conditions that potential impacts of this plan and its schemes can be identified, monitored, and if necessary mitigated. However, it is important to note that the future baseline is not a 'do nothing' option with respect to water resources planning. There will be elements of Southern Water's current WRMP14 that will continue in the absence of the new 2019 plan (e.g. increased water metering, continuing leakage reduction and water efficiency measures to implement Southern Water policy), which will act to alter the future baseline.

The temporal period covered by the WRMP is of a long duration presenting uncertainties in considering the future baseline.

In this Appendix, the best available projections for environmental and social characteristics have been considered and summarised, but there is significant uncertainty which increases with time. A scenario approach is therefore proposed as part of the assessment process to test the sensitivity of the WRMP against the central assessment of environmental and social effects based on known or likely changes. In this way, the resilience of options, programmes and the overall plan can be assessed and used to inform decision-making as well as future recommendations for monitoring of the effects of the plan to provide data for subsequent WRMPs and associated SEAs.

In view of the area under consideration for the WRMP, effects from some options for the WRMP could result in environmental effects occurring beyond our supply area (i.e. the Core Study Area), for example in the River Thames basin.

Baseline data have been drawn from a variety of sources, including a number of the plans, policies and programmes reviewed and summarised **Appendix B**. The sections below also summarise the likely future trends in the environmental and social issues considered (where information is available to do so). The key issues arising from the review of baseline conditions are summarised at the end of each sub-section.

Limitations of the data and assumptions made

The principal limitations surround the future social and environmental baseline where there is substantial differences in the availability and temporal resolution of robust projections across the various SEA topic areas: for example, whilst some water companies are planning up to 80 years ahead and climate change estimates extend to a similar horizon, regional population and housing forecasts rarely go beyond a 40 year horizon and forecasts of how the natural environment may change are very limited. As discussed above, a scenario-based approach will therefore be adopted to test central forecasts (and 'best view' assumptions where forecasts are lacking or do not extend sufficiently far ahead) as part of the assessment process.

The study area for the SEA is relatively large and covers a number of different geographical and political regions, which makes establishing a baseline at the sub-regional level challenging. There are also challenges around extrapolating information from data collated at differing spatial resolutions. Spatial data have been obtained for most of the SEA topics, and the baseline is presented graphically as mapped information where appropriate. In some instances, reporting cycles mean that available information is dated.

SEA is a high-level assessment aimed at highlighting potential environmental concerns. The environmental data to be used in this assessment is based on that which is readily available from existing sources, e.g. statutory organisations. No primary research or survey work has been carried out specifically to inform the SEA and therefore it is possible that at the individual option level, there may be additional environmental issues that could have an influence on a WRMP option.

1.1 Biodiversity, flora and fauna

1.1.1 Baseline

Biodiversity comprises the variety of plants (flora) and animals (fauna) in an area, and their associated habitats. The importance of preserving biodiversity is recognised from an international to a local level. Biodiversity has importance in its own right and has value in terms of quality of life and amenity. The baseline for biodiversity, flora and fauna is provided in the following sections.

1.1.2 Designated sites

The area under consideration includes a variety of sites that are designated at a European, national or local level as important for biodiversity, flora and fauna, including:

- 28 Special Protection Areas (SPA)¹ and 1 proposed SPAs (see Table 1)
- 90 Special Areas of Conservation (SAC)² and 4 proposed SACs (see Table 2)
- 22 Ramsar Sites and 1 proposed Ramsar sites (see Table 3)
- 1271 Sites of Special Scientific Interest (SSSI)³
- 73 National Nature Reserves (NNR)⁴
- 591 Local Nature Reserves (LNR)⁵
- 19 coastline-related Marine Conservation Zones (MCZ) (Table 4)⁶
- Two Biosphere Reserves (Brighton and Lewes Downs and North Devon)⁷
- 49 National Character Areas (NCA)⁸

¹ Special Protection Areas (SPAs) are strictly protected sites classified in accordance with Article 4 of the EC Directive on the conservation of wild birds (79/409/EEC), also known as the Birds Directive, which came into force in April 1979. They are classified for rare and vulnerable birds, listed in Annex I to the Birds Directive, and for regularly occurring migratory species.

² Special Areas of Conservation (SACs) are protected sites designated under the EC Habitats Directive. Article 3 of the Habitats Directive requires the establishment of a European network of important high-quality conservation sites.

³ Protected under the Wildlife and Countryside Act 1981 (as amended by the Countryside and Rights of Way Act 2000).

⁴ NNRs are protected under Sections 16 to 29 of the National Parks and Access to the Countryside Act, 1949 and the Wildlife and Countryside Act, 1981.

⁵ LNRs – places with wildlife or geological features that are of special interest locally.

⁶ MCZs are designated offshore waters under the Marine and Coastal Access Act 2009 and protect a range of nationally important marine wildlife, habitats, geology and geomorphology.

⁷ Biosphere Reserves are areas of terrestrial and coastal ecosystems promoting the conservation of biodiversity with sustainable use and serve to demonstrate integrated management of land, water and biodiversity.

⁸ NCAs divide England into 159 distinct natural areas. Each is defined by a unique combination of landscape, biodiversity, geodiversity, history, and cultural and economic activity.

Figures 1 and 2 in Appendix F show the location of these designated sites. There are also known Sites of Community Importance (SCI)⁹ in the area.

Natural England National Character Areas (NCAs), National Parks and Areas of Outstanding Natural Beauty (AONBs) are discussed under the Landscape and Visual Amenity topic.

Table 1 Special Protection Areas (SPA) within the Study Area

1	Arun Valley
2	Ashdown Forest
3	Avon Valley
4	Chesil Beach & the Fleet
5	Chew Valley Lake
6	Chichester and Langstone Harbours
7	Dorset Heathlands
8	Dungeness, Romney Marsh and Rye Bay
9	Lee Valley
10	Medway Estuary & Marshes
11	New Forest
12	Outer Thames Estuary
13	Pagham Harbour
14	Poole Harbour
15	Porton Down
16	Portsmouth Harbour
17	Salisbury Plain
18	Severn Estuary
19	Solent & Southampton Water
20	Somerset Levels & Moors
21	South West London Waterbodies
22	Stodmarsh
23	Thames Basin Heaths
24	Thames Estuary & Marshes
25	Thanet Coast & Sandwich Bay
26	The Swale
27	Thursley, Hankley & Frensham Commons
28	Wealden Heaths Phase II
Proposed sites	
29	Poole Harbour and Solent & Dorset Coast

⁹ SCIs are protected sites that have been adopted by the European Commission but not yet formally designated by the government of each country.

Table 2 Special Areas of Conservation (SAC) within the Study Area

30	Ashdown Forest
31	Bath & Bradford on Avon Bats
32	Bridlesford Copses
33	Mottisfont Bats
34	Rooksmoor
35	Sandwich Bay
36	Wimbledon Common
37	River Itchen
38	Dover to Kingsdown Cliffs
39	Hestercombe House
40	Crookhill Brick Pit
41	Rook Clift
42	Holme Moor & Clean Moor
43	Queendown Warren
44	Great Yews
45	Hackpen Hill
46	Bracket's Coppice
47	Cothill Fen
48	Lewes Downs
49	Little Wittenham
50	Woolmer Forest
51	Solent & Isle of Wight Lagoons
52	Chilmark Quarries
53	Oxford Meadows
54	St Albans Head to Durlston Head
55	North Meadow & Clattinger Farm
56	Wye & Crundale Downs
57	The New Forest
58	Burnham Beeches
59	Quants
60	Hartslock Wood
61	Shortheath Common
62	The Mens
63	Mole Gap to Reigate Escarpment
64	Exmoor & Quantock Oakwoods

- 65 Lydden & Temple Ewell Downs
- 66 Isle of Wight Downs
- 67 Solent Maritime
- 68 South Wight Maritime
- 69 Folkestone to Etchinghill Escarpment
- 70 Wormley-Hoddesdonpark Woods
- 71 Holnest
- 72 Cerne & Sydling Downs
- 73 Stodmarsh
- 74 Blean Complex
- 75 Kennet & Lambourn Floodplain
- 76 Kennet Valley Alderwoods
- 77 River Lambourn
- 78 Epping Forest
- 79 Avon Gorge Woodlands
- 80 Castle Hill
- 81 Mendip Limestone Grasslands
- 82 Severn Estuary
- 83 Thanet Coast
- 84 Exmoor Heaths
- 85 West Dorset Alder Woods
- 86 Richmond Park
- 87 Kingley Vale
- 88 North Downs Woodlands
- 89 Parkgate Down
- 90 Chesil & The Fleet
- 91 Duncton to Bignor Escarpment
- 92 Prescombe Down
- 93 Butser Hill
- 94 Mells Valley
- 95 Isle of Portland to Studland Cliffs
- 96 Ebernoe Common
- 97 North Somerset & Mendip Bats
- 98 Emer Bog
- 99 Chilterns Beechwoods
- 100 Aston Rowant

- 101 Singleton and Cocking Tunnels
- 102 Windsor Forest & Great Park
- 103 East Hampshire Hangers
- 104 Dungeness
- 105 Hastings Cliffs
- 106 Peters Pit
- 107 Dorset Heaths
- 108 Dorset Heaths (Purbeck & Wareham) & Studland Dunes
- 109 Sidmouth to West Bay
- 110 Pewsey Downs
- 111 River Avon
- 112 Salisbury Plain
- 113 Fontmell & Melbury Downs
- 114 Thursley, Ash, Pirbright & Chobham
- 115 Mendip Woodlands
- 116 Solent Maritime
- 117 South White Maritime
- 118 Margate and Longsands
- 119 Arun Valley
- Proposed sites**
- 120 Pevensey Levels
- 121 Tankerton Slopes and Swalecliffe
- 122 Studland to Portland
- 123 Lyme Bay and Torbay

Table 3 Ramsar sites within the Study Area

- 124 Pevensey Levels
- 125 Portsmouth Harbour
- 126 Arun Valley
- 127 Medway Estuary & Marshes
- 128 The Swale
- 129 Avon Valley
- 130 New Forest
- 131 Pagham Harbour
- 132 Thames Estuary & Marshes
- 133 Chichester and Langstone Harbours
- 134 Somerset Levels & Moors

- 135 Stodmarsh
- 136 Thanet Coast & Sandwich Bay
- 137 Severn Estuary
- 138 Lee Valley
- 139 South West London Waterbodies
- 140 Thursley & Ockley Bogs
- 141 Chesil Beach & the Fleet
- 142 Dungeness, Romney Marsh and Rye Bay
- 143 Dorset Heathlands
- 144 Poole Harbour
- 145 Solent & Southampton Water

Table 4 Marine Conservation Zones

- 1 Hythe Bay
- 2 Selsey Bill and the Hounds
- 3 Fareham Creek
- 4 Yarmouth to Cowes
- 5 Bembridge
- 6 Norris to Ryde
- 7 Beachy Head East (Roral Sovereign Shoals)
- 8 Thames Estuary
- 9 Studland Bay
- 10 Broad Beach to Kimmeridge Bay
- 11 Thanet Coast
- 12 Chesil Beach and Stennis Ledges
- 13 Pagham Harbour
- 14 Medway Estuary
- 15 Beachy Head West
- 16 The Needles
- 17 Dover to Deal
- 18 The Swale Estuary
- 19 Dover to Folkestone

1.1.3 Priority habitats and species

Species and habitats of principal importance for the conservation of biodiversity in England are identified in the Natural Environment and Rural Communities (NERC) Act 2006 Section 41.

Habitats¹⁰ designated under the Natural Environmental and Rural Communities (NERC) Act within the area include rivers and streams (e.g. sensitive chalk rivers), reedbeds, fens and water meadows. An illustrative list of important water-related NERC species that have been identified from baseline data in the area are listed below (this list is not exhaustive and focuses on habitats and species most likely to be affected by the WRMP options under consideration).

- Otter
- Water vole
- Atlantic salmon
- European eel
- Sea/Brown trout
- River lamprey
- White clawed crayfish
- Depressed River Mussel
- Desmoulins Whorl Snail
- Snipe
- Lapwing
- Daubenton's Bat
- Pipistrelle Bat

1.1.4 Ancient woodlands

Ancient woodlands in England are important habitats that should be protected. An ancient woodland is any wooded area that has contained woodland continuously since at least 1600 AD. They tend to be more ecologically diverse and of a higher nature conservation value than those developed recently, or where cover on the site has been intermittent. They often also have cultural importance. The National Planning Policy Framework (NPPF) (Department for Communities and Local Government, 2012a) indicates that ancient woodland should be a planning consideration; "planning permission should be refused for development resulting in the loss or deterioration of irreplaceable habitats, including ancient woodland and the loss of aged or veteran trees found outside ancient woodland, unless the need for, and benefits of, the development in that location clearly outweigh the loss". Areas of ancient woodland are shown on Figure 2 of Appendix F; here is approximately 1,800 km² of ancient woodland within the study area (approximately 5% of the total land area).

1.1.5 Water Framework Directive - ecological status

The WFD ecological status classification considers the condition of biological quality elements (e.g. aquatic invertebrates, plants and fish), the morphology of the habitat available in each water body (e.g. a defined stretch of river), and concentrations of supporting physico-chemical elements (e.g. oxygen or ammonia and concentrations of specific pollutants). See the 'Water' topic for details on water quality and ecological condition of water bodies.

Water abstraction and associated infrastructure can sometimes result in adverse effects on water-related sites. Impacts on biodiversity may be caused by the drying out of wetland habitats, lower water levels and slower flows in watercourse, deterioration in water quality, change in water temperature, or the transfer or proliferation of invasive species. The WFD South Eastern River Basin District Management Plan (RBMP) identifies barriers to fish passage as one of the major issues affecting the ecology of rivers in the South East River Basin District, some of which are related to abstraction impacts on migratory flow conditions and/or abstraction infrastructure (e.g. intakes or weirs).

1.1.6 Future baseline

It is not expected that many additional sites will be designated under international or national legislation, with the focus therefore on achieving the conservation objectives set for each of these

¹⁰ Species or habitats of principal importance for the conservation of biodiversity in England, identified in the Natural Environmental and Rural Communities (NERC) Act 2006 Section 41. Species can be protected without being included on the S41 species list; all bats in Britain are protected under Schedule 5 of the Wildlife and Countryside Act of 1981.

sites, and in a small number of cases in the area, the provision of compensatory habitat where development activities have led to an adverse effect on a European Site. There is an ongoing designation process for MCZs with the third tranche of designations planned to be finalised in 2018.

The number of locally designated sites may increase slightly in response to growing community activities and the development of local environmental initiatives. An improving trend in condition of these sites is also anticipated with greater resources (particularly voluntary resources) devoted to their protection and enhancement. It is acknowledged that there is a need to allow wildlife to adapt to the impacts of climate change.

The Natural Environment White Paper (Defra, 2011a) identified the government's aims to work to achieve more, bigger, better and less-fragmented areas for wildlife, including no net loss of priority habitat and an increase of at least 200,000 hectares in the overall extent of priority habitats and at least 50% of SSSI to be in favourable condition, while maintaining at least 95% in favourable or recovering condition.

More broadly, the White Paper and subsequent more recent government policy encourages partnership working by a wide range of organisations (including water companies where applicable) to take a catchment and/or landscape-scale perspective to the management of biodiversity, flora and fauna. Catchment-based approaches are likely to be increasingly taken with respect to the delivery of biodiversity and ecological objectives for water-dependent sites and species, with partnership working a key component of the delivery of improvement activities.

Climate change is likely to have an impact on wildlife in the future by exacerbating existing pressures such as changes to the timing of seasonal activity, and water scarcity. There is therefore a need to allow wildlife to adapt to climate change.

At this stage, the future baseline for biodiversity is one of decline. At the national level, the UK Biodiversity Indicators Report 2017 (Defra, 2017) states that the status of UK priority species is showing a long-term deterioration. Areas of land in agri-environment schemes has also begun to decline since 2013 (affecting priority habitats), although it is also important to note that being in agri-environment does not necessarily indicate a positive outcome for biodiversity.

1.1.7 Key issues

The key sustainability issues arising from the baseline assessment for biodiversity are:

- The need to protect or enhance and support the achievement of favourable condition the region's biodiversity, particularly within designated sites, species and habitats of principal importance.
- The need to avoid activities likely to cause irreversible damage to natural heritage.
- The need to take opportunities to improve connectivity between fragmented habitats to create functioning habitat corridors and habitat patches or stepping stones.
- The need to control the spread of Invasive Non-Native Species (INNS).
- The need to recognise the importance of allowing wildlife to adapt to climate change.
- The need to recognise the potential issues relating to high population and development pressures in the water supply area which are likely to impact on the need for water and related condition of the environment, and subsequently its ability to withstand additional pressures of climate change, new water resources and future growth.

- The need to engage more people in biodiversity issues so that they personally value biodiversity and know what they can do to help, including through recognising the value of the ecosystem services.

1.2 Population and human health

1.2.1 Baseline

The baseline for population and human health is provided in the following sections.

1.2.2 Population

The greater South East region is a densely populated part of the UK. The annual average percentage growth rate for the South East over the 10-year period 2004-2014 was 0.9% (ONS, 2015a). The population is projected to increase to 9.6 million by 2024 (8.1% increase) (ONS, 2014).

The long-term issues relating to population growth and associated requirement for housing and water (and wastewater) infrastructure provision represent key issues for the strategies required within the long-term planning horizon of the WRMP. However, the current political processes leading to the UK's exit from the European Union (EU) may lead to greater short-term uncertainty regarding future population and housing growth.

We supply water to around 152,000 unmeasured households and 848,000 measured households. There is a resident population in our supply region of just over 2.4 million. In addition, the company supplies water to 5,500 unmeasured non-households and 55,000 measured non-households.

1.2.3 Human health and deprivation

The WRMP has the potential to influence quality of life, including human health, well-being, amenity and community, through alterations to the operation of existing infrastructure, the construction and operation of new infrastructure, changes to the methods used for water charging, and the price of water. For example, emissions of pollutants to air from operations and transportation could affect respiratory health, whilst traffic, odour and noise could create nuisance and reduce quality of life.

Water resources management and planning is of critical importance in maintaining water reliable and safe water supplies for health and wellbeing of the population supplied by the company. Some established water resource schemes (e.g. reservoirs) can also provide benefits to quality of life through the provision of recreational (passive or active) opportunities (e.g. Bewl Water reservoir, Weir Wood reservoir).

Health-related sustainability indicators are reported in the annual Office for National Statistics (ONS) Sustainable Development Indicators report (ONS, 2015b). In general, the health of the population is good for the UK with the healthy life expectancy for both men and women increasing during the period of 2009 to 2011, reaching 64.2 years for men and 66.1 years for women. Water is considered a vital resource that is managed carefully to ensure both that people have access to affordable and safe drinking water and sanitation. Data relating to air quality, which could also be affected by the WRMP, and as a result affect health, are covered in the air quality section of this SEA Scoping Report.

It has been shown that, in some cases, people in disadvantaged areas experience greater exposure to negative impacts on human health including air pollution, sea flooding, and proximity to large industrial and waste management sites (Defra, 2006b). The Index of Multiple Deprivation combines a number of indicators, chosen to cover a range of economic, social and housing issues¹¹, into a

¹¹ Income Deprivation, Employment Deprivation, Health Deprivation and Disability, Education Skills and Training Deprivation, Barriers to Housing and Services, Living Environment Deprivation, and Crime.

single deprivation score for each Lower Super Output Area¹² in the UK. This allows each area to be ranked relative to one another according to their level of deprivation. The indices are used widely to analyse patterns of deprivation, identify areas that would benefit from special initiatives or programmes and as a tool to determine eligibility for specific funding streams. The English Index of Multiple Deprivation (2015) map¹³ shows much of the least deprived areas in the country lie within the study area. However, areas such as Rother and Swale are facing high levels of deprivation.

The WRMP could also affect communities in terms of nuisance, loss of sense of place and other adverse effects on well-being. It is not possible to collect baseline data against which to assess such effects. These effects will need to be assessed in the SEA based on the specific effects identified at the option, programme and plan level taking account of any planned mitigation measures to be included.

1.2.4 Affordability

Nationally, approximately 24% of households spend more than 3% of their income (after housing costs) on water and sewerage bills, and 11% spend more than 5% (Ofwat, 2015). Ofwat and government policy has focused on addressing this issue through continued incentives for water companies to drive out financial efficiencies in its operations and investment programmes, as well as consider the use of 'social tariffs' for those struggling to pay their water bills. Water metering can help customers reduce their bills through improved water use efficiency. However, there are concerns that metering can disadvantage vulnerable and low-income groups: this is recognised by Southern Water through various activities to offer help to customers on low incomes, including special tariffs.

1.2.5 Recreation and tourism

WRMP options have the potential to affect areas with recreation value. Effects could arise as a result of scheme operation (for example on river water levels), or due to scheme construction (for example due to restricted access).

Figure 3 in Appendix F shows some of the areas that may be used for recreation within the area. This includes National Parks, National Trails, Areas of Outstanding Natural Beauty (AONB) (see Landscape and Visual Amenity topic), and National Nature Reserves (NNRs) and Local Nature Reserves (LNRs) see Biodiversity, Flora and Fauna topic. Our surface water reservoirs are accessible to the public and provide a range of recreation facilities, including bird-watching, walking, sailing or fishing. Some sections of rivers in the area are of particular importance with respect to navigation (e.g. the River Arun and River Medway) and angling (e.g. River Test). Angling is a popular pastime with over 339,000 rod licences sold in 2014/15 in the Environment Agency South East Region (Environment Agency and Natural Resources Wales, 2015).

Tourism is the fifth largest industry in the UK and supports 22 million jobs in England (forming England's third largest employer), contributing nearly £97 billion to the economy. There are over 12 million domestic day visitors a day (2011-2013) and the tourism industry makes up 7 to 11% of employment within the study area¹⁴.

Public areas of open space, National Parks (see Landscape and Visual Amenity topic), country parks¹⁵, Rights of Way, walking routes and cycle routes are also important with respect to recreation and tourism (e.g. South Downs Way national trail). The National Planning Policy Framework (NPPF)

¹² Super Output Areas (SOAs) are a set of geographical areas developed following the 2001 census. The aim was to produce a set of areas of consistent size, whose boundaries would not change, suitable for the publication of data such as the Indices of Deprivation. They are an aggregation of adjacent Output Areas with similar social characteristics. Lower Layer Super Output Areas (LSOAs) typically contain 4 to 6 OAs with a population of around 1500

¹³ Indices of Deprivation 2015 explorer <http://dclgapps.communities.gov.uk/imd/idmap.html>

¹⁴ <http://www.neighbourhood.statistics.gov.uk/HTMLDocs/Tourism/atlas.html>

¹⁵ [Area designated for people to visit and enjoy recreation in a countryside environment](#)

states planning policies should protect and enhance public rights of way and access. All Local Authorities are required to prepare and publish Rights of Way Improvement Plans (ROWIPs). These plans explain how improvements made by local authorities to the public rights of way network will provide a better experience for a range of users, including pedestrians, cyclists, horse riders, horse and carriage drivers, people with mobility problems, and people using motorised vehicles (e.g. motorbikes).

The NPPF defines green infrastructure as ‘a network of multi-functional green space, urban and rural, which is capable of delivering a wide range of environmental and quality of life benefits for local communities’ (including rivers and ponds). Local planning authorities are required to plan positively for strategic networks of green infrastructure and take account of the benefits of green infrastructure in reducing the risks posed by climate change. The majority of local authorities have therefore developed Green Infrastructure Strategies or Studies addressing these issues. Green infrastructure will often play a large part in local recreational resources.

The Archaeology and Cultural Heritage topic identifies the importance of the study area with respect to heritage assets, including nine internationally-recognised World Heritage Sites and over 6,000 Scheduled Monuments.

1.2.6 Economy and employment

The Greater South East region is a prosperous region of the UK and has relatively low rates of unemployment. The Greater South East as a whole has shown a greater level of resilience to the effects of the recession that followed the banking crisis in 2008 compared to other parts of the UK. This is evident in economic indicators such as house prices and un-employment rates. Compared to a UK average in 2015¹⁶ of 5.1%, with the rate in the South East was 3.9% (ONS, 2016). However, all are considerably lower than in 2010. The South East region is one of the most densely populated and urbanised parts of the UK, where business services make up a significant proportion of the economy.

¹⁶ National Statistics: Regional Trends No.43 2010/11 edition
http://www.statistics.gov.uk/downloads/theme_compendia/RegionalSnapshot/rt43-rc-profiles.pdf

1.2.7 Future baseline

Population is projected to grow at a rate of 7.8% across the South East (10 years from 2012 to 2022) (ONS, 2014). The political process for the UK's exit from the European Union (EU) may lead to greater uncertainty in the short term regarding future population and housing growth.

Changes in water bills in the medium term are likely to remain at or below the rate of inflation as regulatory pressure and incentives, further competition and innovation drive cost-effective responses to future water service challenges, thereby limiting the impact on customer bills. Social tariffs will continue to be offered to provide support to customers experiencing affordability problems.

In response to national policy direction, access to the recreational resources, green spaces and the historic environment will have greater importance in future planning. For example, the National Ecosystem Assessment and the Marmot Review, Fair Society, Healthy Lives, demonstrate the positive impact that nature has on mental and physical health and as a result the government intends to establish a Green Infrastructure¹⁷. Partnership with civil society to support the development of green infrastructure in England. Improvements to the quality of the water environment and certain potential climate change impacts will present opportunities for an expanding tourist industry in the region (Defra, 2012).

1.2.8 Key issues

The key sustainability issues arising from the baseline assessment for population and human health are:

- The need to ensure water supplies remain affordable especially for deprived or vulnerable communities, reflecting the importance of water for health and wellbeing.
- The need to ensure continued improvements in levels of health across the region, particularly in urban areas and deprived areas.
- The need to ensure water quantity and quality is maintained for a range of uses including tourism, recreation, navigation and other use such as agriculture.
- The need to ensure a balance between different aspects of the built and natural environment that will help to provide opportunities for local residents and tourists, including opportunities for access to, protecting and enhancing recreation resources, green infrastructure and the natural and historic environment.
- The need to accommodate an increasing population and housing growth through provision of essential services including water supply.
- The need to protect sites of nature conservation importance, heritage assets, water resources, important landscapes and public rights of way contribute to recreation and tourism opportunities and subsequently health and wellbeing and the economy.

1.3 Material assets and resource use

1.3.1 Baseline

The baseline for material assets and resource use is provided in the following sections.

1.3.2 Water use

We supply nearly 530 million litres of drinking water each day from its 94 water supply works along over 13,800 kilometres of water mains to customers' taps. Between 2015 and 2020, we are planning to save an extra two million litres of water each day by repairing and replacing pipes that lose treated

¹⁷ Green infrastructure is a term used to refer to the living network of green spaces, water and other environmental features in both urban and rural areas.

water from its distribution network. In 2015, we had one of the lowest leakage levels of any of the water and sewerage companies. We are actively pursuing measures to encourage its customers to reduce their water use and use water wisely, particularly in dry conditions. We have invested significantly in installing water meters for a high proportion of its customers to encourage efficient use of water and it has an active programme to promote water conservation to both household and commercial properties. These measures are particularly relevant to the WRMP when water efficiency activity provides the greatest benefit to safeguarding water supplies. In 2015/16, 88% of our domestic customers were being charged on a metered basis with a per capita consumption of 125 l/h/day for metered properties and 159 l/h/day for unmetered properties and 130 l/h/day for all households.

1.3.3 Resource use and waste

There is an ongoing need for society to reduce the amount of waste it generates, by using materials more efficiently, and improving the management of waste that is produced.

Waste going to landfill has more than halved over the period 2004/5 to 2014/15 (19,822 thousand tonnes to 6,361 thousand tonnes) and a rate of 24%; household recycling rates have climbed to nearly 44% (2014/15) (Defra, 2015); waste generated by businesses declined by 29% in the six years to 2009 and business recycling rates are above 50% (Defra, 2011b). In line with the widely adopted 'waste hierarchy', best practice for waste management is to reduce, re-use, recycle and recover, and only then should disposal (or storage) in landfill be considered.

Data on waste arisings is collected in a range of categories. The activities of the water industry contribute to construction, demolition and excavation waste (CDEW), through construction of new infrastructure. The water industry also contributes to several waste streams through the operation of facilities. Waste streams include commercial and industrial waste (C&I) (statistics include waste arisings from the power and utilities sector, which includes water supply and sewage removal), and also hazardous wastes.

Table 6 shows waste according to waste type in the UK in 2012 (and by region in 2006 in Table 5). Table 5 to Table 8 provide further baseline information regarding waste.

Water resource management options which require infrastructure may result in the use of raw materials and the production of waste. The operation of WRMP options may result in additional chemical use and the production of waste.

Table 5 Waste arisings by management and sector (Defra, 2006a)

Waste Figures	East of England	London	South East	South West
Commercial and Industrial (C&I) waste arisings produced in region (million tonnes)	6.3	7.0	8.3	5.3
Construction & Demolition Environmental Waste (CDEW)	11.5	8.0	14.1	9.4
Total waste produced by region	23.5	18.7	30.9	44.5

Table 6 Waste generation split by NACE economic activity in England ('000 tonnes) (Defra, 2015b)

Waste Figures	2012
Commercial and Industrial (C&I) ('000 tonnes)	38,976
Construction ('000 tonnes)	85,240
Household	22,744
Other	16,291
Total	163,252

Table 7 Waste from households in England – 2010-14

England	Waste arisings ('000 tonnes)	Recycled ('000 tonnes)	Recycling rate
2010	22,131	9,112	41.2
2011	22,170	9,596	43.3
2012	21,956	9,684	44.1
2013	21,564	9,523	44.2
2014	22,355	10,025	44.8

Table 8 Municipal waste and Biodegradable Municipal Waste (BMW) to landfill in England 2010-2013 (Defra, 2015b)

England	Municipal waste to Landfill ('000 tonnes)	Of which BMW to Landfill ('000 tonnes)	BMW to Landfill as % of 1995 target baseline
2010	20,298	10,339	36%
2011	18,421	9,360	32%
2012	16,187	8,129	28%
2013	14,780	7,347	25%

Note: 1995 baseline for England 29,030,000 – no greater than 50% baseline by 2013 and 35% baseline by 2020.

1.3.4 Future baseline

We aim to reduce leakage from its network over the next 25 years with several schemes planned to further reduce the amount of water lost through leaks. In the short term, we have set a leakage target of 86 million litres a day by 2020, equating to a reduction of almost two million litres a day, and to reduce leakage to 75 million litres each day by 2040. The WRMP19 will include a review of these targets.

The government's national aspiration is to reduce water usage to an average of 130 l/h/day by 2030. We are already meeting this aspiration with an average of 129.8 l/h/day reported for the year 2015/16. During AMP5 (2010-2015) Southern Water's Universal Metering Programme (UMP), increased the number of metered households up to 88%.

There is the potential for increase in operational waste from the water sector as regional population increases and standards of treatment are increased through regulatory requirements. With the Waste Strategy for England, diminishing landfill capacity and a fast-growing waste recycling and recovery industry, the proportion of waste sent to recovery rather than landfill is set to continue to increase in the future. One of the Waste Framework Directive targets is for at least 70% of construction and demolition waste to go to recovery by 2020.

The government's first National Infrastructure Plan (NIP) (HM Treasury Infrastructure UK, 2010) included visions to manage natural capital sustainably; treat water and waste in ways that sustain the environment and enable the economy to prosper; ensure a supply of water that meets the needs of households, businesses and the environment now and in the future and deals with waste in accordance with the waste hierarchy. The plan was updated in 2014, setting out progress to date whilst including detailed delivery plans to 2020 in key economic sectors (HM Treasury, 2014).

1.3.5 Key issues

The key sustainability issues arising from the baseline assessment for material assets and resource use are:

- The need to minimise the consumption of resources, including water and energy.
- The need to reduce the total amount of waste produced in the region, from all sources, and to reduce the proportion of this waste sent to landfill.
- The need to reduce the proportion of waste sent to landfill.
- The need to continue to reduce leakage from the water supply system to help reduce demand for water.
- Daily consumption of water is relatively high and consequently there is a continued need to encourage more efficient water use by consumers.

1.4 Water

1.4.1 Baseline

In the context of the WFD, the water environment includes rivers, lakes, estuaries, groundwater and coastal waters out to one nautical mile. The aquatic environment of the South East and Thames river basins has been characterised as part of the UK government's reporting obligations to the EU under the WFD and this provides the most appropriate baseline reference (Defra, 2005). The WFD brings together the planning processes of a range of other European Directives. These Directives establish protected areas to manage water, nutrients, chemicals, economically significant species, and wildlife, and have been brought in line with the planning timescales of the WFD.

The area is classified as water-stressed; the South East is one of the driest regions in the country, with an average rainfall of 730mm a year. The amount of rain in a year can vary widely from a maximum of 1,070mm to a minimum of 340mm. Most of this rain falls between October and March and is critical to recharging groundwater each year. Rainfall during the rest of the year is usually taken up by plants, lost through evaporation or runs off the land. We have a variety of different water sources which react differently to weather patterns.

1.4.2 Surface waters: rivers and canals

The area under consideration lies within the South East River Basin District and partially within the Thames, Severn and South West Basin Districts. The main rivers in the Core Study Area include the Test and Itchen in Hampshire, the Arun and the Western Rother in Sussex; and the Medway and the Stour in Kent. River abstractions account for 23% of the Southern Water supply, most notably: the Medina and Eastern Yar on the Isle of Wight; the Test and Itchen in Hampshire; the Western Rother and Arun in West Sussex; the Eastern Rother and Brede in East Sussex; and the Teise, Medway and Great Stour in Kent.

Surface water features for the study area are shown in Figure 4 of Appendix F.

1.4.3 Surface waters: lakes and reservoirs

There are 28 lakes within the South East River Basin District, along with a small number of man-made reservoirs owned by various water companies. The four Southern Water surface water impounding reservoirs are responsible for 7% of the company's supply: the largest is Bewl Water on the Kent/Sussex boundary, followed by Weir Wood, Darwell and Powdermill reservoirs situated in Sussex. The total storage capacity of all the supply reservoirs amounts to 42,390 million litres (although South East Water are entitled to 25% of supplies from the River Medway Scheme which incorporates Bewl Water reservoir). Ardingly, Arlington and Bough Beech reservoirs are also located in the study area but are owned and operated by other water companies.

1.4.4 Transitional and Coastal (TraC)

The South East River Basin District includes 23 estuarine ('transitional waters') and 11 coastal water bodies, as shown in Figure 4 of Appendix F.

1.4.5 Groundwater

The water supply in the area predominantly comes from the transmission and storage of groundwater, from the widespread chalk aquifer across the region. This extends throughout parts of Kent, Sussex, the Isle of Wight and Kent. In total groundwater contributes 70% of the total supply for Southern Water. The majority of supply comes from chalk aquifers but a small proportion comes from the Lower Greensand aquifer.

The Environment Agency considers that licensed groundwater abstraction is fully utilised over much of the South East river basin. Both the quantity and quality of groundwater is extremely important in maintaining these resources. Groundwater is vulnerable to pollution from surface activities since aquifers underlie up to two-thirds of the land surface in this densely populated area.

Under the WFD there are two separate classifications for groundwater bodies: chemical status and quantitative status. A groundwater body will be classified as having poor quantitative status in the following circumstances: where low groundwater levels are responsible for an adverse impact on rivers and wetlands normally reliant on groundwater; where abstraction of groundwater has led to saline intrusion; where it is possible that the amount of groundwater abstracted will not be replaced each year by rainfall. For a groundwater body to be at good status overall, both chemical status and quantitative status must be good. In addition to assessing status, there is also a requirement to identify and report where the quality of groundwater is deteriorating as a result of pollution and which may lead to a future deterioration in status.

Source Protection Zones (SPZ) provide additional protection to safeguard drinking water quality. This is achieved through constraining the proximity of an activity that may impact upon drinking water abstraction. They are defined around large and public potable groundwater abstraction sites, and the groundwater travel time to an abstraction.

Aquifers and geological features for the study area are shown in Figure 5 of Appendix F.

1.4.6 Catchment abstraction management strategies

A national review of abstraction licences was undertaken by the Environment Agency through the Catchment Abstraction Management Strategies (CAMS) process in 2004. This has been updated in subsequent years where applicable and to align the assessment process with the WFD. The latest review was undertaken in 2013 and 2014 and the outputs for each CAMS area were reported in Abstraction Licensing Strategies that set out:

- the relative balance between the environmental requirements for water and how much is licensed for abstraction;

- whether water is available for further abstraction; and
- areas where abstraction may need to be reduced.

The results have subsequently been mapped onto the 2015 WFD Cycle 2 boundaries and are represented by different water resource availability colours showing the availability of water resource for further abstraction. Figure 6 in Appendix F shows the Environment Agency representation of resource availability based on the worst downstream water body at low flows (the flow percentile exceeded 95 percent of the time, or “Q95” flow). It is apparent from Figure 6 in Appendix F that little surface water is actually available and the status of most rivers is identified as ‘water not available for licensing’ or ‘restricted water available for licensing’.

1.4.7 Water Framework Directive classification

Since 2007, the health of water bodies has been classified according to several quality elements in line with the requirements of the WFD.

For surface waters, there are two separate status classifications for water bodies: ecological and chemical. For a water body to be in overall ‘good’ status both ecological and chemical status must be at least ‘good’. Biological status classification considers the condition of biological quality elements, e.g. aquatic invertebrates, plants and fish, the morphology of the habitat available, concentrations of supporting physico-chemical elements (e.g. oxygen or ammonia and concentrations of specific pollutants).

Of the 408 river water bodies within the Core Study Area, with regard to their ecological status or potential, 5% were classified as ‘bad’, 24% as ‘poor’, 61% as ‘moderate’, 10% as ‘good’ and 0% as ‘high’. 99% were classified ‘good’ for their chemical status (see Table 9). In terms of the percentage of water bodies with ‘good’ or better ecological status in the study area, lakes were 29% (Table 10) and transitional water were 28% (Table 11).

Table 9 Ecological and chemical classification for Rivers 2015

RBD	No. of water bodies	Ecological status or potential					Chemical Status	
		Bad	Poor	Mod	Good	High	Fail	Good
Thames	163	9	40	106	8	0	3	160
South East	214	10	55	127	22	0	2	212
South West	31	3	4	15	9	0	0	31
Total for Study Area	408	22	99	247	39	0	5	403

Table 10 Ecological and chemical classification for Lakes and Reservoirs 2015

RBD	No. of water bodies	Ecological status or potential					Chemical Status	
		Bad	Poor	Mod	Good	High	Fail	Good
Thames	37	0	5	25	7	0	0	38
South East	29	1	3	15	10	0	0	28
South West	11	0	0	6	5	0	0	11
Total for Study Area	77	1	8	46	22	0	0	77

Table 11 Ecological and chemical classification for Transitional water bodies 2015

RBD	No. of water bodies	Ecological status or potential					Chemical Status		
		Bad	Poor	Mod	Good	High	Fail	Good	
Thames	8	0	0	4	4	0	0	8	
South East	23	0	2	16	5	0	2	21	
South West	1	0	0	1	0	0	0	1	
Total for Study Area	32	0	2	21	9	0	2	30	

Out of 67 groundwater bodies in the Core Study Area, 33 of them are classified as good for quantitative status (49%) and 36 for chemical status (54%) (see Table 12). The main reason for poor quantitative status is that abstraction levels, mainly for public water supply, exceed the rate at which aquifers recharge (Environment Agency, 2015).

Table 12 Chemical and quantitative classification for Groundwaters 2015

No. of water bodies	Quantitative status		Chemical status	
	Poor	Good	Poor	Good
67	34	33	31	36

1.4.8 Flood risk

Flooding can result from rivers and the sea, directly from rainfall on the ground surface and rising groundwater, overwhelmed sewers and drainage systems, and from reservoirs, canals and lakes and other artificial sources. The Environment Agency's Flood Risk Maps available on its website show what is at risk of flooding, including people, economic activity and natural and historic environment (Environment Agency, 2013a; Environment Agency, 2013b). There are two defined "high flood risk" areas in the core study area – the City of Brighton & Hove and the Medway area. These are areas where there is a significant risk of flooding from local sources, such as surface water, groundwater and ordinary watercourses, combined with a significant population at risk of the effects of flooding. The City of Brighton & Hove flood risk area contains 283,690 people, of which 3,899 are at high risk¹⁸ of flooding. The Medway flood risk area contains 234,260 people, of which 6,639 are at high risk of flooding.

The extreme floods of 2007 prompted the Pitt Review 2008 and the subsequent Flood and Water Management Act 2010 which in part regulates the implementation of sustainable drainage systems (SuDS) to increase infiltration and reduce flooding from surface water runoff. In 2008-2009, the Environment Agency spent approximately £427 million on building, improving and keeping flood defences such as managed river channels, walls and raised embankments, flood barriers and pumps in good condition, which reduced the risk of flooding to over 176,000 households across England. The government further recognised the importance of investing in flood risk and coastal management and committed to increase public spending on it from £600 million in 2007-2008 to £800 million in 2010-2011. Climate change may have a significant effect upon future flood risk in the region. This is discussed further below and in the Air and Climate Change topic.

Coastal saltmarsh is an important natural resource and ecosystem service provider. Through reducing wave energy close to tidal defences, it can provide demonstrable flood and coastal risk management benefits, as well as supporting wildlife habitats and species of national and international significance. Saltmarsh habitat extent is conserved and enhanced through management measures driven in particular by the Habitats and Birds Directives, the WFD and Natural Environment and Rural Communities Act 2006.

¹⁸ High risk means there is a chance of flooding if greater than 1 in 30 (3.3%)

1.4.9 Future baseline

Originally, the WFD set a target of aiming to achieve at least ‘good status’ in all water bodies by 2015. However, provided that certain conditions are satisfied, it was acknowledged that in some cases the achievement of good status may be delayed until 2021 or 2027. Where deterioration has occurred between the 2009 and 2015 classification, then restoration is required to restore the water body to its previous status classification. The primary objective in the short-term is to ensure no deterioration in status between status classes or within a class. No deterioration between status classes is permitted unless certain and specific conditions apply. The 2015 water body classification is the baseline from which deterioration between or within classes is assessed. Catchment partnerships have been developed across England (including in the study area) to implement the catchment-based approach and in the support for catchment management schemes in the 2019 water company price review process for Southern Water and other water companies in the area.

Climate change is considered likely to adversely impact on surface and groundwater resources over the longer term, with some modest impacts potentially arising over the medium term to 2040. The Catchment Flood Management Plans (CFMP) (Environment Agency, 2009a) assumes the following key trends:

- Milder wetter winters resulting in increases in peak river flows of 20%, meaning that flooding will happen more often and large scale severe flooding will be more likely to happen.
- More frequent, short duration intense storms in summer causing more widespread and regular flash flooding from overwhelmed drainage systems and some rivers.

The NPPF (DCLG, 2012) states that inappropriate development in areas at risk of flooding (in Flood Zone 1¹⁹, Flood Zone 2²⁰, Flood Zone 3a²¹ or Flood Zone 3b - the functional floodplain); should be avoided by directing development away from areas at highest risk. The NPPF requires that where development is necessary, it should be made safe without increasing flood risk elsewhere, as defined in the Technical Guidance to the NPPF (Communities and Local Government, 2012).

The Environment Agency have just published the “Working with Natural Processes – Evidence Directory” (Environment Agency, 2017) to give flood risk management practitioners and other responsible bodies easy access to information which explains the evidence base relating to the effectiveness of a range of different measures from a flood risk and ecosystem services perspective. A wide range of techniques can be used to reduce flood risk by slowing and attenuating flow which can also achieve other benefits (e.g. remaindering rivers and improving floodplain connectivity). The Environment Agency highlight that the other benefits from natural flood risk management include:

- reducing soil erosion and sedimentation of lakes and rivers
- improving water quality
- reconnecting rivers with species-rich floodplain wetlands
- enhancing recreation opportunities
- creating new habitat to help restore biological diversity

Over the next 30 years, there will be an even higher demand for water due to increases in population, housing growth and economic development. The Environment Agency Water Resources Strategy

¹⁹ Low probability of river or sea flooding (<0.1%) which has critical drainage problems

²⁰ Medium probability of river (1%-0.1%) or sea flooding (0.5%-0.1%)

²¹ High probability of river (>1%) or sea flooding (>0.5%)

Regional Action Plan for the Southern Region (Environment Agency, 2009b) used future scenarios to look at future pressures on water resources. The scenarios consider a range of responses by government, regulators, water companies, abstractors and individuals to the way that water is used and managed. They are not forecasts, but show a range of possible demands in the future. Under the worst case scenario, a further 500 million litres/day may potentially be necessary by 2050 to meet the additional needs of the public, industry and agriculture. By 2050, climate change could reduce river flow by 10 to 15% on an annual average basis, and could reduce summer river flows by 50 to 80%. The action plan identified five key priorities which include:

- Driving water efficiency;
- Protecting the water environment;
- Greater integration between policy, planning and operations of water resources and water quality;
- 'Design standards' for public water supply and the related risk to the environment; and
- Water industry progress.

The UK Climate Change Risk Assessment (CCRA) 2012 Evidence Report (Defra, 2012) draws together and interprets the evidence gathered by CCRA regarding current and future threats and opportunities for the UK posed by the impacts of climate change up until 2100. Findings of the assessment include:

- Increasing pressure on the UK's water resources due to changes in hydrological conditions, population growth and regulatory requirements to maintain good ecological status. Major supply-demand deficits were identified for five river basin regions including the South East.
- Increases in water demand for irrigation of crops.
- Lower summer rivers flows across the UK due to warming and drying conditions.
- An increase in precipitation in winter months due to a combination of greater depths and more frequent heavy rainfall events - suggesting larger volumes of runoff with potential negative impacts on flood risk and sewer overflows in urban environments.
- Flash-flooding associated releases from combined sewer overflows (CSO) could in turn increase associated illnesses at the coast due to the varying occurrence of microbial pathogens in the marine environment.

1.4.10 Key issues

The key issues arising from the baseline assessment for water are:

- The need to further improve the quality of the regions river, estuarine and coastal waters taking into account WFD objectives.
- The need to maintain the quantity and quality of groundwater resources taking into account WFD objectives.
- The need to improve the resilience, flexibility and sustainability of water resources in the region, particularly in light of potential climate change impacts on surface waters and groundwaters.
- The need to ensure sustainable abstraction to protect the water environment and meet society's needs for a resilient water supply.
- The need to ensure that people understand the value of water.

- The need to reduce and manage flood risk.

1.5 Soil, geology and land use

1.5.1 Baseline

The baseline for soil, geology and land use is provided in the following sections.

1.5.2 Geology

Geological sites may be sensitive to changes in water quality, water levels (e.g. waterlogged deposits), pollution and land use practices. The study area is geologically diverse and includes a number of major aquifers including major chalk aquifers and interbedded sandstones and siltstones (see Figure 5 in Appendix F).

Geological Conservation Review (GCR) sites have been highlighted, which relate to geological important sites, related to their scientific elements and understanding of earth sciences, which are important on a national and international level²². GCRs are also designated as SSSIs. Several geological SSSIs are found within the area, however some are not directly designated because of geology, although the geological variation does impact on the flora present. The main reason for a geological citation for an SSSI are related to disused quarries and geological important sites such as gravels and cliffs. There are 416 GCRs within the study area.

1.5.3 Soils

The majority of rural land in the study area is farmed, and it is noted that agricultural practices have a major influence on soil quality. Good soil structure is beneficial to water retention and crop yield. It can be seen from Figure 7 in Appendix F that the majority of agricultural land is classified as Grade 3 or higher. Soil quality and structure is affected by changes in land use, groundwater levels and farming practices. Soil quality can influence run-off rates and therefore flooding and water quality.

1.5.4 Future baseline

The vision of Defra's Soils Strategy for England (Defra, 2009) is for all England's soils to be managed sustainably and degradation threats tackled successfully by 2030. This will improve the quality of England's soils and safeguard their ability to provide essential services for future generations.

The Water White Paper described the government's intentions to take forward a catchment-based approach to water quality and diffuse pollution and work towards Common Agricultural Policy reforms that will promote the farming industry's role as custodian of the natural environment (Defra, 2011a). The Water White Paper also identified that strategic policy would give a strong steer for government support for approaches that offer good value for customers and the potential to prevent and manage future risks to drinking water quality. These policy objectives were reflected in development of catchment partnerships across England (including in the study area) to implement the catchment-based approach and in the support for catchment management schemes in the 2019 water company price review process for Southern Water and other water companies in the area.

One of the core planning principles of the National Policy Planning Framework (NPPF) is to encourage the effective use of land by reusing land that has been previously developed (brownfield land), provided that it is not of high environmental value. The NPPF also places great importance with respect to Green Belt policy, the aim of which is to prevent urban sprawl by keeping land permanently open. Green Belt serves five purposes: to check the unrestricted sprawl of large built-up areas; to prevent neighbouring towns merging into one another; to assist in safeguarding the countryside from encroachment; to preserve the setting and special character of historic towns; and to assist in urban regeneration, by encouraging the recycling of derelict and other urban land.

²² <http://jncc.defra.gov.uk/page-2947>

Although the NPPF promotes a presumption in favour of sustainable development, this does not apply where proposed developments may affect European or other designated sites covered by specific policies.

1.5.5 Key issues

The key sustainability issues arising from the baseline assessment for soil, geology and land use are:

- The need to protect and enhance geological features of importance (including geological SSSIs) and maintain and enhance soil function and health.
- The need to manage the land more holistically at the catchment level, benefitting landowners, other stakeholders, the environment and sustainability of natural resources (including water resources).
- The need to make use of previously developed land (brownfield land) and to reduce the prevalence of derelict land in the region.

1.6 Air and climate

1.6.1 Baseline

The baseline for air and climate is provided in the following sections.

1.6.2 Local air quality

The baseline situation can be best described through reference to the local authorities that have declared Air Quality Management Areas (AQMA). A local authority declares an AQMA when UK National air quality objectives are unlikely to be met. The local authorities in the area which have declared an AQMA within their boundaries are illustrated in Figure 8 in Appendix F. There are 233 AQMAs in total within the study area. The majority of the AQMAs have been declared because of emissions from road transport.

This latest air quality strategy (Defra, 2007) does not remove any of the objectives set out in the previous strategy or its addendum, apart from replacing the provisional 2010 PM₁₀ objective with the exposure reduction approach and a new ozone (O₃) objective to protect ecosystems, in line with the EU target value set out in the Third Daughter Directive.

The Air Pollution Information System (www.apis.ac.uk) will be consulted during the assessment process to help understand the baseline risks of air pollution on habitats/sensitive and or designated sites.

1.6.3 Greenhouse gases and climate change

The predominant greenhouse gas of interest is carbon dioxide (CO₂). National and regional CO₂ emissions totals are provided in Table 13 and are apportioned to their source categories Table 14.

Table 13 Carbon dioxide emissions by area (2013)

Area	Annual CO ₂ Emissions / million tonnes	Annual CO ₂ Emissions (% of UK total)
South East	55.8	12.5%
South West	34.5	7.7%
East of England	40.0	9%
Greater London	41.2	9.2%
UK	445.9	100%

Source: DECC (2015) Local Authority Carbon Dioxide Emissions Estimates 2013: Statistical Release

Table 14 Percentage contribution to carbon dioxide emissions by sector (2013)

Area	Percentage Contribution by Source Sector			
	Industry & Commercial % (millions tonnes)	Domestic % (millions tonnes)	Road Transport % (millions tonnes)	Land Use Change % (millions tonnes)
South East	9.4% (18.6)	13.8% (18.4)	15.5% (18.9)	-0.1
South West	6% (11.9)	8.1% (10.8)	9.2% (11.2)	0.5
East of England	7% (13.9)	9.2% (12.3)	10.8% (13.2)	0.6
Greater London	9.3% (18.3)	11.4% (15.2)	6.2% (7.6)	0.0
UK	44.2% (196.9)	29.9% (133.3)	27.3% (121.8)	0.38% (-6.0)

We are one of the largest users of energy in the South East due to the significant amounts of energy needed to pump water and wastewater and treat it to high quality standards. Between 2015 and 2016, 267 kilotonnes of carbon dioxide and other greenhouse gases were produced by Southern Water and over 17% of its total energy use is from renewable sources (Southern Water, 2013).

Forecast future climate change is likely to influence processes within the hydrological cycle such as runoff and evapotranspiration. The impact of climate change on the water environment and water-related infrastructure is summarised in

Table 15.

Table 15 Potential impact of climate change on the water environment and water-related infrastructure

Sector	Impact
Water Resources (i). water supply	Reduction in yields, either in total or at certain times of the year. Increased evaporation losses from surface water stores Increased sediment and pollution runoff into watercourses. Increased risk of algal blooms and pollution in reservoirs. Increase in demands in summer months leading to increase in average and peak requirements.
(ii). water demand	Increased pressure on treatment and distribution system. Increased requirements for agriculture.
Flood management	Increased riverine storm occurrence and flood risk. Improvements and higher specifications required for flood defences, urban drainage and rainwater disposal.
Water quality management	Lowered water quality in lowland rivers, with implications for instream ecosystems and water abstractions. Altered potential for polluting incidents. Increased potential for combined sewer overflows due to an increase in extreme storm occurrences.
Navigation	Lower summer flows leading to reduced navigation opportunities in rivers and canals.
Aquatic ecosystems	Altered habitat potential, with species at their environmental margins most affected.
Water-based recreation	Impacts through changes in river flows and water quality.

1.6.4 Adaptation to climate change

The UK Climate Change Risk Assessment (CCRA) 2012 Evidence Report (Defra, 2012) draws together and interprets the evidence gathered by CCRA regarding current and future threats and opportunities for the UK posed by the impacts of climate change up until 2100. Overall, the findings of the CCRA indicate that the greatest need for early adaptation action (i.e. within the next 5 years) is in the following areas:

- Flood and coastal erosion risk management
- Specific aspects of natural ecosystems, including managing productivity and biodiversity (the management of forest pests and diseases, low summer river flows and the movement of plants and animal species are all highlighted as high priorities for action)
- Managing water resources, particularly in areas with increasing water scarcity
- Overheating of buildings and infrastructure in the urban environment
- Health risks associated with heatwaves and other risks that may affect the NHS
- Opportunities for the UK economy, particularly to develop climate adaptation products and services.

1.6.5 Future baseline

Government and international targets indicate significant cuts in greenhouse gas emissions will take place by 2027. The UK is currently projected to meet its first three legislated carbon budget targets (until 2022) (DECC, 2015). Objectives are being achieved for many air pollutants (lead, benzene, 1,3-butadiene and carbon monoxide (CO)). However, measurements show that long-term reducing trends for NO₂ and PM₁₀ are flattening or even reversing at a number of locations, despite current policy measures. Projections suggest with a high degree of certainty that objectives for PM₁₀, NO₂ and O₃ will not be achieved by 2020 (Defra, 2007).

The 2009 UK Climate Projections (UKCP09 – which remain the most up-to-date projections currently available for the UK) estimate that summers in the south of England are likely, on average, to be hotter and drier which could affect the frequency and severity of drought events.

1.6.6 Key issues

The key sustainability issues arising from the baseline assessment for air and climate are:

- The need to reduce air pollutant and greenhouse emissions and limit air emissions to comply with air quality standards.
- The need to reduce greenhouse gas emissions (industrial processes and transport).
- The need to adapt to the impacts of climate change for example through, sustainable water resource management, water use efficiencies, specific aspects of natural ecosystems (e.g. connectivity) as well as accommodating potential opportunities afforded by climate change.

Archaeology and cultural heritage

1.6.7 Baseline

Implementation of WRMP options could affect historic landscape character and historic structures associated with the water environment and the historical context of their setting. Archaeological remains are sensitive to changes in water quality, water levels (e.g. waterlogged deposits), pollution and land use practices.

Heritage designations for the study area are shown in Figure 9 in Appendix F. The study area includes 9 internationally recognised World Heritage Sites²³, for example Canterbury Cathedral.

Nationally important archaeological sites are statutorily protected as Scheduled Monuments (SMs)²⁴. There are currently around 19,850 entries in the Schedule for the UK (English Heritage, 2015). There are approximately 6,166 SMs located within the study area. Registered Parks and Gardens also make up part of the UK’s cultural heritage of national importance (756 in the study area). An overview of all cultural heritage sites in the study area is provided in Table 16.

Table 16 Heritage assets in the study area

Asset	Study Area
World Heritage Sites	9
Scheduled Monuments	6,166
Listed Buildings	151,394
Heritage Coasts	5
Registered Historic Parks and Gardens	756
Registered Historic Battlefields	13
Protected Historic Wrecks	3

Conservation Areas are usually designated by the local planning authority or Historic England (previously known as English Heritage). They are designated for their special architectural and historic interest. Conservation Areas can include historic town and city centres, fishing and mining villages, 18th and 19th century suburbs, model housing estates, country houses set in historic parks and/or historic transport links and their environment. There are over 8,000 conservation areas in

²³ World Heritage Sites are places of international importance for the conservation of mankind’s cultural and natural heritage. The World Heritage List was set up by the World Heritage Convention, established by UNESCO in 1972. www.english-heritage.org.uk

²⁴ Nationally important archaeological sites designated under the Ancient Monuments and Archaeological Areas Act, 1979, www.culture.gov.uk/historic_environment/scheduled_ancient_monuments/

England. Individual local authority information will be used to identify specific conservation areas that may be affected by WRMP options.

Historic England collects data on heritage assets at risk. There were 5,534 designated assets on the Heritage at Risk (HAR) register in 2015. 604 sites were removed from the HAR register since 2014, and 327 added. One third of sites on the 2010 HAR register have now been removed (English Heritage, 2015).

For other types of heritage assets, the long-term trends are not yet firmly established but a very small reduction in the number of sites on the HAR register between 2009 and 2010 has been reported. The source of risk to SMs resulting from water abstraction or dewatering is 1.71% nationally²⁴. However, other assets such as those composed of organic material and preserved in waterlogged or anaerobic conditions are proportionately more at risk (e.g. palaeoenvironmental deposits).

Historic Environment Record (HER) databases linked to a Geographic Information System (GIS) are held by County Councils, District Councils or Unitary Authorities. They represent unique repositories of, and signposts to, information relating to landscapes, buildings, sites and artefacts spanning from the Palaeolithic period to modern times. Presenting this wealth of information for the study area would be difficult, however, it will be interrogated to assess whether any WRMP option has the potential to affect such assets.

In relation to unknown assets, waterlogged conditions preserve waterlogged archaeology, such as wooden artefacts and structures such as trackways. Remains may be rain-fed or groundwater fed. If the latter, then clearly abstraction levels can be a critical factor in maintaining conditions in which preservation of the remains is viable. In addition, there are waterlogged deposits that are specifically associated with chalk, such as springs and their intimately associated wetlands which again can contain important archaeological information, especially palaeoenvironmental evidence. Such water-dependent heritage assets will be considered when assessing WRMP options.

1.6.8 Future baseline

The NPPF was introduced in 2012 to replace the Planning Policy Statements. The NPPF aimed to make the planning system less complex and more accessible, and changed the emphasis on planning to have a presumption in favour of development. However, core planning principles include those aiming to protect heritage assets, including “conserve heritage assets in a manner appropriate to their significance, so that they can be enjoyed for their contribution to the quality of life of this and future generations” (Department for Communities and Local Government, 2012).

Recent and ongoing national economic difficulties may have a negative effect on removing heritage assets from the heritage at risk register. Climate change could have variable impacts on heritage assets in the future. Some types of assets and landscapes have already experienced and survived significant climatic changes in the past and may demonstrate considerable resilience in the face of future climate change. However, many more historic assets are potentially at risk from the direct impacts of future climate change (English Heritage, 2010).

1.6.9 Key issues

The key sustainability issues arising from the baseline assessment for archaeology and cultural heritage are:

- The need to conserve or enhance sites of archaeological importance and cultural heritage interest, particularly those which are sensitive to the water environment.

1.7 Landscape and visual amenity

1.7.1 Baseline

The landscape character network²⁵ defines landscape character as 'a distinct, recognisable and consistent pattern of elements in the landscape that makes one landscape different from another, rather than better or worse'. Some landscapes are special because they have a particular amenity value, such as those designated as Areas of Outstanding Natural Beauty (AONB) or are part of a National Park. Others may have an intrinsic value as good examples, or be the only remaining examples, of a particular landscape type. Some landscapes are more sensitive to development whereas others have a greater capacity to accommodate development. Assessments of landscape character and landscape sensitivity enable decisions to be made about the most suitable location of development to minimise impacts on landscapes.

WRMP options have the potential to influence landscape and visual amenity, for example, effects on water levels in rivers or new infrastructure. Nationally designated landscape sites (including AONBs, National Parks and Green Belt) and Natural England National Character Areas (NCAs) are shown on Figure 10 in Appendix F for the study area.

1.7.2 Nationally designated sites

AONBs are defined as 'precious landscapes whose distinctive character and natural beauty are so outstanding that it is in the nation's interest to safeguard them'²⁶. They are designated under National Parks and Access to the Countryside Act, 1949, strengthened by the Countryside and Rights of Way Act, 2000. The primary purpose of the AONB is 'to conserve and enhance the natural beauty of the landscape.' There are fourteen AONB within or partially within the wider study area, these are listed in Table 17.

Table 17 AONBs within the study area

Name of Site	Key Characteristics
Kent Downs	<ul style="list-style-type: none"> The Kent Downs AONB is a strip of rolling countryside that from Dover on the east coast of England and meets up with the Surrey Hills AONB. Crossed by 3 river valleys – the Darent, the Medway and the Stour. The AONB is orientated SE by NW and follows two ridge outcrops of greensand and chalk. This geology has an impact of the habitats above, and forms healthlands and acid woodlands, and grasslands, scrub and broadleaf woodlands respectively. The Archaeology of the area is very interesting, and the AONB holds the remains of many invasions of England. The area also is home to traditional Kentish orchards and hop gardens. The AONB is flanked by the urban areas of Ashford, Maidstone and Medway towns. The North Downs Way National Trail traverses the back of the escarpment.
North Wessex Downs	<ul style="list-style-type: none"> Includes the uplands of Marlborough, Berkshire and North Hampshire Downs. Richly farmed landscapes including Pewsey Meadows. Includes the Neolithic stone circle at Avebury and other important archaeological sites, as well as the White Horse of Uffington. Recreation resource – at Avebury, also Ridgeway National Trail and Kennet and Avon Canal.
Surrey Hills	<ul style="list-style-type: none"> Predominately made from chalk landscapes, open unimproved heath, deciduous woodland. Recreation resource – Box Hill and Devil's Punch Bowl, Greensand Way and North Downs National Trail, and 'Gateway to the South Downs'

²⁵ www.landscapecharacter.org.uk

²⁶ <http://www.landscapesforlife.org.uk/>

Name of Site	Key Characteristics
	<ul style="list-style-type: none"> The urban areas of the area are predominately commuter towns, with transport links to Portsmouth and London
Isle of Wight	<ul style="list-style-type: none"> The Isle of Wight AONB is scattered across the Isle of Wight island, cropping up in the centre and south downlands, and paleontologically important coastline. The AONB is predominately located on the island's white, chalky upfolds, and include the famous sea stacks of the Needles, and also incorporates the salt marshes and mudflats of the heritage coast as well as chalk downland, arable farmland, wooded dairy pasture, small areas of heathland and hay meadows, sea cliffs and creeks. Four fifths of the island are rural farmland, which is typically heavily weighted to the grazing of sheep and cows. The island is a popular tourist destination, and the Isle of Wight coastal footpath and other trails run through much of the AONB.
Chichester Harbour	<ul style="list-style-type: none"> This AONB is composed of a series of tidal inlets that back onto the South Downs. Mudflats and saltmarshes in the area are home to around 55,000 birds. Many pretty villages are dotted along the coastline, which is also home to 12,500 boats. The village of Selsey boasts some fossil hunting locations. Other leisure activities in the area are those typically associated with the seaside.
High Weald	<ul style="list-style-type: none"> The AONB is composed of remote ancient woodland and patchwork fields which cover rolling hills of sandstone and clay, open heathland, descended of old hunting ground, and scattered farms and hamlets. The area is traversed by the valleys of the Rother, the Brede and the Tillingham rivers. The High Weald is home to many medieval and historically important landscapes. The area depends heavily upon agriculture and forestry, though several commuter towns do exist within its bounds.
Cranborne Chase and West Wiltshire Downs	<ul style="list-style-type: none"> Cranborne Chase is a chalky landscape with both rolling topography and steeply cut valleys. Wiltshire downs (to the north) consists of large ridges and elegant knolls. Ecologically important area as home to fens and river meadows, deciduous former hunting forests, and ancient downland. The AONB is home to a rich cultural history including C18 and C19 stately homes, ancient monuments and prehistoric archaeological sites. This AONB has a distinct lack of urbanisation, with the main industries being agriculture and forestry.
Dorset	<ul style="list-style-type: none"> The Dorset AONB is made up of inland ridges and valleys, and chalky ridge, limestone plateaus and sand heathland near the coast The Dorset coast is famous for its limestone and sandstone, geology that has formed famous landscapes of Durdle Door, Lulworth Cove and Chesil beach. This geology is often fossiliferous and contains important 185ma vertebrate fossils giving it its name of 'the Jurassic Coast', the first British Natural World Heritage Site. Inland, the heathlands and downlands are scientifically important and contain many SSIs, NNRs and rare flora and fauna as well as many archaeological sites, including the Iron Age fort of Maiden Castle. The area has a strong tourism industry with several million visitors a year, but the main industries are agriculture and mineral related.
Chilterns	<ul style="list-style-type: none"> The Chilterns AONB's rounded hills are part of the chalk ridge which crosses England from Dorset to Yorkshire. The characteristic scarp slope looks out north over the panorama of the Vale of Aylesbury.

Name of Site	Key Characteristics
	<ul style="list-style-type: none"> • The dip slope, dissected by steep dry valleys, curves gently down into the London Basin. • The Chilterns contain an important diversity of habitats ranging from chalk grassland and to the country's most extensive areas of beech woodland, with the finest stretches protected under EU legislation as Special Areas of Conservation. • The heavily wooded character of the Chilterns, based on clay-with-flint deposits, gives way in the north to the open downland of Ivinghoe Beacon and Dunstable Downs. • In addition to the 80,000 people living within the area, half a million people live within two km (two million within 10 km) of the Chilterns, one of South-East England's major recreation resources. • Leisure use is largely informal scenic drives, walking and riding.
Cotswolds	<ul style="list-style-type: none"> • Jurassic limestone gives the Cotswolds their distinctive character, and an underlying unity in its use as a building material throughout the area. • The limestone lies in a sloping plateau with a steep scarp slope in the west drained by short streams in deep cut wooded valleys, and a gentle dip slope which forms the headwaters of the Thames. • The Cotswolds are nationally important for their rare limestone grassland habitat and for ancient beechwoods with rich flora. • Motorways together with a central location, make the Cotswolds accessible to a huge urban visitor area including Bristol, London and the West Midlands. • The AONB, with 'honey pot' villages such as Bourton-on-the-Water, Bibury and Castle Combe, is a national and international tourist destination as well as an important local recreation area.
East Devon	<ul style="list-style-type: none"> • The East Devon AONB, designated in 1963, covers 268 sq kms and a third of East Devon District. • The AONB skirts the major settlements in the area with the exception of Budleigh Salterton. • The World Heritage Site 'Jurassic' coastline and South West Coast Path play an important role in the popularity of the AONB. • With its dramatic cliffs, a unique insight into 185 million years of earth history and attractive coastal villages that still retain a vernacular character and rural charm, the coast brings in significant economic benefit to the area.
Mendip Hills	<ul style="list-style-type: none"> • The Mendip Hills most dramatic landscape is in the centre of the AONB, site of the famous Cheddar Gorge and Wookey Hole Caves. • The Mendips rise to a high, bare plateau around Priddy and Charterhouse, criss-crossed by drystone walls and rich in archaeological remains. • Other areas of the AONB are well-wooded with a prosperous farmland fringe. • Several important landscape features help to create the AONB's distinctive character, ranging from dew ponds and drystone walls to the 'gruffy ground' of old mine workings. • The AONB, with two National Nature Reserves and many Sites of Special Scientific Interest, contains varied and important natural habitats including limestone pastures, ancient woodland and the gorge cliffs themselves with their rare flora.
Quantock Hills	<ul style="list-style-type: none"> • A narrow, gently curving 19-km ridge, the Quantock Hills run north west from the Vale of Taunton Deane to the Bristol Channel coast. • The heathland and sessile oak woodlands of the AONB are nationally important wildlife habitats, notably rich in species. • Much of southern Britain's heathland has vanished or survives as fragments, making the AONB's extensive heaths particularly valuable. • Native red deer still roam the Quantock Hills. • Tourism is a significant part of the economy, based on farm accommodation and guest houses.

Name of Site	Key Characteristics
	<ul style="list-style-type: none"> The AONB is also a highly popular local recreational area with heavy demand from the towns on its fringe.
Blackdown Hills	<ul style="list-style-type: none"> The Blackdown Hills are a group of hills lying on the border of Devon and Somerset. Broadly, the area extends from Wellington in the north to Honiton in the south and from Cullompton in the west to Chard in the east. As part of the only extensive outcrop of Upper Greensand in the region, the geology of the Blackdown Hills is unique in Britain. Not only giving rise to the area's distinctive topography, the underlying non-calcareous rock has created a notably diverse pattern of plant communities.

National Parks are areas protected due to their beautiful countryside, wildlife and cultural heritage. The New Forest National Park and South Downs National Park are located within the core study area (see Table 18).

Table 18 National Parks within the Study Area

National Park Name	Key Messages
New Forest	The New Forest National Park includes one of the largest remaining tracts of unenclosed pasture land, heathland and forest in the heavily populated south east of England. It covers southwest Hampshire and extends into southeast Wiltshire and towards east Dorset.
South Downs	The South Downs National Park, covers an area of 1,627 km ² in southern England, stretching for 140 kilometres from Winchester in the west to Eastbourne in the east through the counties of Hampshire, West Sussex and East Sussex. The national park covers the chalk hills of the South Downs and a substantial part of a separate physiographic region, the western Weald, with its heavily wooded sandstone and clay hills and vales. The South Downs Way spans the entire length of the park and is the only National Trail that lies wholly within a national park.
Exmoor	The Exmoor National Park is primarily an upland area with a dispersed population living mainly in small villages and hamlets. The largest settlements are Porlock, Dulverton, Lynton, and Lynmouth, which together contain almost 40% of the park's population. Exmoor was once a Royal forest and hunting ground, covering 7,610 ha. Several areas within the Exmoor National Park have been declared as SSSIs due to their flora and fauna.

The main characteristics of Green Belt is their openness and their permanence. The main aim of Green Belt policy is described above. Green Belt areas within the study area are shown on Figure 10 in Appendix F.

1.7.3 Natural England National Character Areas and Heritage Coasts

Natural England National Character Areas also take account of landscape (also referred to in the Biodiversity, Flora and Fauna topic). These are shown geographically in Figure 10 in Appendix G and

Table 19 summarises the key features.

Table 19 Natural England National Character Areas (NCAs) within the study area

National Character Area Name	Key Messages
Chilterns	<ul style="list-style-type: none"> • The Chilterns NCA is a predominantly wooded and farmed landscape with an underlay of chalk bedrock rising from the London Basin and offering wide views over adjacent vales. • River Thames breaches escarpment to the south at Goring Gap, flowing past riverside towns such as Henley. • The surrounding countryside is an area utilised for agriculture interspersed with woodland and hedged boundaries. • Parts of Chilterns area furthest from London are recognised as special and attractive, falling within the Chilterns AONB. • Major urban fringe and growth areas such as Luton and Hemel Hempstead are located within the Chilterns NCA, although outside of these AONBs.
North Kent Plain	<ul style="list-style-type: none"> • The North Kent Plain is a strip of open, low and gently undulating land between the Thames Estuary to the north and the chalk of the Kent Downs to the south. • It is a highly productive agricultural area with good quality soils used predominately for arable farming. • Ancient woodland surrounds Blean, with additional woodland further west. Despite this, the landscape is mostly open and expansive, leading to the area being called as the “Garden of England”.
North Downs	<ul style="list-style-type: none"> • Forming a chain of chalk hills, the North Downs NCA extends from Hogs Back in Surrey to the famous White Cliffs of Dover. • The settlements in the area consist of traditional small villages and farms while twisting sunken lanes cut across the scarp and are a feature of much of the dip slope. • The beauty of the area is reflected by its location within the Kent Downs and Surrey Hills AONB.
Thames Basin Lowlands	<ul style="list-style-type: none"> • The Thames Basin Lowlands is a low lying plain situated within the London Basin between the suburbs of South Norwood and Hale, located on the Surrey/Hampshire border. • Overall the landscape is largely flat, with small sections of gently undulating land. • The underlying geology consists mostly of London Clay, with small outcrops of Bracklesham and Barton Group sand, silt and clay between Esher and Cobham. • Part of the North Downs Chalk bedrock, fringed with Thanet Formation and Lambeth Group sediments, underlies Croydon and Sutton.
High Weald	<ul style="list-style-type: none"> • High Weald NCA is covered by ancient countryside and cited as one of the best surviving medieval landscapes in northern Europe. • It encompasses the ridged and faulted sandstone core of the Kent and Sussex Weald and comprises a mixture of fields, small woodlands and farmsteads with extensive connections to these areas through historic tracks and paths. • The majority of the area (78%) is covered by the High Weald AONB with prominent medieval patterns of small pasture fields enclosed by thick hedgerows and shaws (narrow woodlands) remaining fundamental to the character of the landscape.
Low Weald	<ul style="list-style-type: none"> • A broad area of low lying clay which wraps around the northern, western and southern edges of the High Weald. • Mostly agricultural land able to support pastoral farming as a result of the heavy clay soils, although lighter soils can be found to the east. • The landscape is predominantly covered by densely wooded areas with a large amount of ancient woodland. • Approximately 9% of the NCA is situated within the adjacent designated Surrey Hills, Kent Downs and High Weald AONB with 23% of the land categorised as greenbelt.

National Character Area Name	Key Messages
Wealden Greensand	<ul style="list-style-type: none"> • Around 25% of the area contains extensive belts of woodland, including ancient woods and more recent conifer plantations. Area also features open areas of heath on acidic soils, river valleys and mixed farming with areas of fruit growing. • Over half of area covered by South Downs National Park, Kent Downs AONB and Surrey Hills AONB and serves as a significant place of interest for landscape, geology and biodiversity. • Underlying geology has shaped the scarp-and-dip slope topography with clear links apparent between vernacular architecture, industry and local geology. • The area accommodates a mix of internationally and nationally designated sites related to biodiversity, including 3 SPAs 2 RAMSAR sites and 8 SACs.
Thames Valley	<ul style="list-style-type: none"> • Majority of the landscape is urban with low lying land situated within a wedge shaped area. It widens from Reading, including Slough, Windsor, the Colne Valley and the southwest London Fringes. • Hydrological features are the most prominent within the area and include the Thames and its tributaries, the Grand Union Canal and the reservoirs which form the South- West London Waterbodies SPA and Ramsar site. These features are vital for providing water supply services to London and surrounding suburbs whilst also being crucial for wildlife and recreation. • Due to the flood risk, flows and water levels in the River Thames are managed upstream of Teddington. Both flood defence and water quality improvement techniques enhance opportunities for biodiversity and recreation throughout the NCA.
Berkshire and Marlborough Downs	<ul style="list-style-type: none"> • A vast area containing arable fields stretching across rolling Chalk hills with scattered settlements. The escarpment provides wide views of the Berkshire and Marlborough Downs with visible landmarks including chalk-cut horse figures, beech clumps and ancient monuments. • Avebury stone circle is a popular visitor destination and part of a World Heritage Site, with numerous other Scheduled Monuments and heritage features across the landscape, although Heritage features are at risk from damage by cultivation and animal burrowing.
Salisbury Plain and West Wiltshire Downs	<ul style="list-style-type: none"> • An area dominated by its gently rolling chalk downland which forms part of the sweep of Cretaceous Chalk spanning the Dorset coast and across the Chilterns to north of the wash. • The area is sparsely populated with a main focus on agriculture. There are few settlements, leading to a vast, open landscape and a strong sense of remoteness • The plain is predominantly covered by its chalk grassland, one of the largest remaining areas of calcareous grassland in north western Europe • The area is well protected with SPA, SAC and SSSI designations due to its rich populations of stone curlew, hen harrier and rare bumblebee species
Greater Thames Estuary	<ul style="list-style-type: none"> • A largely remote and tranquil landscape between the North Sea and rising ground inland, consisting of shallow creeks, drowned estuaries, mudflats and broad tracts of tidal salt marsh. • Despite proximity to London, the NCA only has a few major settlements and small villages towards the higher ground. It contains some of the most scarcely populated sections of the English coast and is vastly different to the densely populated urban areas towards London. • Sea defences protect large areas of reclaimed grazing marsh and its associated ancient fleet and ditch systems, and productive arable farmland. Historic military landmarks are characteristic features of the coastal landscape.
Hampshire Downs	<ul style="list-style-type: none"> • Part of the central southern England belt of chalk, the Hampshire Downs rises 297m in the north-west and is located on the Hampshire-Wiltshire border. • A steep scarp to the north delineates the Downs. The area overlooks the Thames Basin the Weald to the east. It is characterised by its elevated, open and rolling

National Character Area Name	Key Messages
	<p>landscape covered by large arable fields with low hedgerows on thin chalk soils, scattered woodland blocks and shelterbelts.</p> <ul style="list-style-type: none"> • The Chalk is a large and important aquifer; hence groundwater protection and source inerrability designations cover most of the area. Catchment sensitive farming to control pollution, run-off and soil erosion is a vital activity. • The aquifer feeds a number of small streams flowing north and east, although the dominant catchments are those of the rivers Test and Itchen, which flow in straight sided with relatively deeply incised valleys across most of the area. • The Itchen is a SAC and the Test a designated SSSI. These rivers, with the watermeadows, peat soils, mires and fens of their flood plains, are the most important habitats of the area. • The valleys are home to the main settlements, the local road system and important economic activities such as watercress growing and fly fishing.
Isle of Wight	<ul style="list-style-type: none"> • The Isle of Wight is a 380 km² island separated from the south coast of England by the Solent. It is comprised of packages of farmed arable coastal plains, pastures and woodland, steep chalk downs, diverse estuarine seascapes and dramatic sea cliffs and stacks, such as the needles. • The island is scientifically very important. Almost half of the island falls into an AONB, there are 41 SSSI and 395 SINCS, several dark sky observation areas and Special Protection Areas, home to wetland birds, rare invertebrates and rare plants. • The geology of the island is diverse, but it is mainly dominated by Paleogene and Cretaceous sediments, often partly comprised of extremely well preserved dinosaur fossils. There are many important bronze age, iron age, and roman archaeological sites are found on the Isle of Wight • The predominately rural island also bears host to popular seaside resorts, post-medieval towns, all attracting many tourists to come and visit and try a wide range of leisure activities.
New Forest	<ul style="list-style-type: none"> • The New Forest NCA, spanning from the lower Hampshire Avon Valley to industrialised Totton and Fawley is predominately comprised up by the New Forest National Park. • The area is a lowland plateau, geologically comprised of Paleogenic deposits overlain by Quaternary gravels, and is home to some bronze age (and onwards) archaeological sites. The areas soils are acidic leading to unique Natura 200 habitats. • The ancient area has been retained largely due to its designation as a William the Conqueror's royal hunting forest, the survival of grazing as part of a pastoral tradition, ancient Forest Law and more recent conservation policies. • The centre of the NCA is comprised of open heathland and woodland where wild pigs and wild horses roam free through ancient oak and beech trees. • Major urban areas are located at Ringwood, Fordingbridge and Lymington around the edge of the National Park, and large villages within it, notably Beaulieu, Brockenhurst, Burley, Lyndhurst and Sway. In the south-east the ancient Borough town of Christchurch (in Dorset) has spread to the east, over the Avon, extending in a large area of suburban housing along the coast to New Milton.
Penvensey Levels	<ul style="list-style-type: none"> • This predominately rural NCA is a low-lying area is situated in East Sussex between Eastbourne and Bexhill. • Over a third of the area is a SSSI and the entire area is a wetland of national and international conservation importance. • The south east border is a long coastline of shingle beaches with a huge system of sea defences due to Penvensey Level's high vulnerability to the effects of climate change. • The NCA is framed by the steep scarp of the South Downs in the west and the higher ground of the High Weald in the north, with views of the English Channel to the south.

National Character Area Name	Key Messages
	<ul style="list-style-type: none"> The busy Victorian seafront of Eastbourne is the main settlement, attracting over 5 million visitors each year.
Romney Marshes	<ul style="list-style-type: none"> Romney Marshes are a low reclaimed marshland stretching from large shingle beaches, mudflats and coastal habitats of the English Channel over marshland and arable and grazing land to Hythe, Kent and Pett, Sussex. This have been anthropogenically modified via the use of drainage channels, gravel digging, military activity and tourist amenities. The area is scientifically important, and is a SAC, SPC, SSSI and proposed Ramsar site, as well as being home to some of the UK's rarest species. The NCA acts as a corridor between other important habitats, such as the High Weald and the valleys of Rother and Brede
South Coast Plain	<ul style="list-style-type: none"> The South Coast Plain is a flat coastal landscape nestled between the dip slope of the South Downs and South Hampshire lowlands and the English Channel, the Solent and Southampton Water. The area is significantly urbanised, and hosts the site of the Portsmouth conurbation and a handful of large seaside towns which heavily rely on protection from the sea. The economies of these areas are intricately linked to marine and recreational activities. A very small percentage of the South Coast Plain is comprised of SSSIs. The area also hosts four SPAs, two SAC and four Ramsar sights. Despite the urban build up, the coastal area feels wide and open. The Isle of Wight can be seen from many places along the South Coast Plain.
The South Downs	<ul style="list-style-type: none"> The striking open rolling chalk hills and the remote woodland of the South Downs stretches across a spine of chalk from the Hampshire downs on the west and coastal cliffs of East Sussex in the East. The area is only eight percent urbanised, although the rest of the NCA is largely influenced by agriculture and forestry. The South Downs Way National Trail stretches along the back of the northern scarp, and attracts many cyclists, hikers and horse riders. The Cretaceous chalk of the South Downs is very permeable and absorbs much of the rain in the NCA, replenishing the chalk aquifer below. This aquifer is often under stress as it supplies Brighton and surrounding areas. The coast of the South Downs often hosts a clifly landscape, and a small portion of the NCA is recognised as heritage coast.
South Hampshire Lowlands	<ul style="list-style-type: none"> The South Hampshire Lowlands NCA stretches from Hampshire and the South Downs to Southampton Water. The large urban area of Southampton and its surrounding areas fills just under a third of the NCA. Otherwise the area is comprised of farmland, wetland and woodland. Much of this woodland is ancient, a legacy of the Forest of Bere, a Royal Hunting Forest that once spanned area. This woodland can be seen at West Walk near Wickham, Botley Wood at Swanwick and Ampfield Wood near Romsey. The mudflat and salt marsh wetlands of the area are home to breeding and overwintering waterfowl and waders. Three Natura 2000 designations cover parts of the area. The delicate and unique river areas of this NCA are home to otters. The geology of the South Hampshire Lowlands is mainly consisting of open marine, estuarine and freshwater Tertiary deposits.
Thames Basin Heaths	<ul style="list-style-type: none"> The Thames Basin Heaths covers westwards from Weybridge, Surrey to the countryside around Newbury in Berkshire. The London greenbelt incorporates countryside around Chobham and the River Wey and River Mole. The NCA housing the large urban conurbations of Bracknell and Camberley and the large M25 and M3 road network.

National Character Area Name	Key Messages
	<ul style="list-style-type: none"> • Away from London, the settlement pattern is a mix of dispersed hamlets, farmsteads and houses interspersed with villages, and as well as parkland, ancient woodland and semi-natural grassland. • A quarter of the NCA is woodland, with the majority planted on former heathland, commonly comprised of rhododendron and conifers. • Common land is found across the NCA on deposits of Tertiary sands and gravels, leading to only rough pasture. Other land uses include military bases such as Aldershot, and plantations. • Wilder areas are formed by wet and dry heathland, and are of international importance and are protected by SSSI and SAC statuses. These areas provide habitats for nightjars, Dartford warblers and woodlarks. Due to their proximity with urban settlements these areas often suffer from fly tipping and arson.
Blackmoor Vale and the Vale of Wardour	<ul style="list-style-type: none"> • To the south of this NCA there is Upper Greensand Terraces and a wide expanse lowland clay vale. The NCA expands to the north to the edge of Salisbury Plain and West Wiltshire Down NCA. • The fertile area of the terraces is the site of several stately homes and their estates of parks and woodland. • Blackmore vale has many veteran hedgerow trees and hedgefields which often become waterlogged due to the pattern of overlapping rivers and streams. • Urban areas comprised of large towns (e.g. Sturminster Newton and Gillingham) making the area 1% urbanised, many small towns, villages and hamlets, some of which are medieval. • Disused quarries show the Jurassic and Cretaceous geology of the area.
Dorset Downs and Cranbourne Chase	<ul style="list-style-type: none"> • Spans within the counties of Dorset, Wiltshire and Hampshire. • Heavily agricultural NCA due to large open arable and pasture fields. The NCA is very rural with a low population density. The largest towns are Dorchester and Blandford Forum. • The NCA is also blanketed by pockets of woodland, with the entire area overlaying Cretaceous chalk. • The area is archeologically important and shows evidence of Mesolithic activity (8000 years ago). • 15km long transect of the South West Coast Path National Trail runs through this NCA.
Dorset Heaths	<ul style="list-style-type: none"> • This NCA overlaps the towns of Poole, Bournemouth and Christchurch. • The area is scientifically important, and contains a number of SPAs due to the presence of rare reptiles, insects, birds and heathland. • Major land uses include agriculture, military training and open cast mineral working. • Tourism is a major industry within the area, attracting visitors to archetypical sandy beaches.
Inner London	<ul style="list-style-type: none"> • The Inner London NCA lies at the centre of the Thames Basin and is characterised by a series of flood plain terraces. • Rare open spaces, such as reservoirs and wetland areas (e.g. the Lea Valley) within the NCA provide space for leisure activities in an otherwise urban area. • The area bares a long and rich cultural history which has carried forward into the present day and is now a major hub for international business and tourism. • Due to the heavy urbanisation, the area is heavily dependent on transport schemes, such as a complex subterranean tunnel system, and ecosystem services such as flood alleviation.

A Heritage Coast is a section of coast exceeding one mile in length that is of exceptionally fine scenic quality, substantially undeveloped and containing features of special significance and interest. They are agreed between Natural England and the local authority. There are five Heritage Coast areas within the study area shown in Figure 10 in Appendix F.

1.7.4 Tranquillity areas

'Tranquillity' can be defined as the quality of calm that is experienced by people in places full of the sites and sounds of nature. The Campaign for Rural England (CPRE) developed tranquillity mapping for England to identify areas that are either disturbed or undisturbed by urban areas (towns and cities), traffic (road, rail and airports), power stations, pylons, power lines and open-cast mines. Areas closer to large cities within the study area are the least tranquil and there are areas of high tranquillity distributed throughout the study area²⁷.

1.7.5 Future baseline

Due to pressure for housing in many parts of the study area, there are likely to be some threats to visual amenity more broadly beyond designated landscape areas (including within Green Belt). Climate change and land use change (e.g. due to agricultural reform associated with the UK's exit from the EU and Common Agricultural Policy) may also, in the longer term, lead to changes to landscape character.

1.7.6 Key issues

The key sustainability issues arising from the baseline assessment for landscape and visual amenity are:

- The need to protect and improve the natural beauty of the area's AONBs, National Parks and other areas of natural beauty.
- The need to protect and improve the character of landscapes and townscapes.

²⁷ CPRE tranquillity mapping for England, 2007, <https://www.cpre.org.uk/resources/countryside/tranquil-places/item/1839>

2. References

- Communities and Local Government, 2012, “Technical guidance to the National Policy Planning Framework”
- CPRE, 2007, Tranquillity Map: England, [online] Available at: <https://www.cpre.org.uk/resources/countryside/tranquil-places/item/1839> [Accessed 27 November 2019]
- DECC, 2015, “Local Authority carbon dioxide emissions estimates 2013: Statistical release” [online] Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/437384/2005_to_2013_UK_local_and_regional_CO2_emissions_statistical_release.pdf [Accessed 27 November 2019]
- DECC, 2015, “Updated energy and emissions projections 2015” [online] Available at: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/501292/eepReport2015_160205.pdf [Accessed 27 November 2019]
- Defra, 2005, “Water Framework Directive: Summary report of the characterisation, impacts and economics analyses required by Article 5”, South East River Basin District and Thames River Basin District.
- Defra, 2006a, “Waste Arisings by Management and Sector, Waste Statistic Regulation – Regional Sustainable Development Indicators - not updated”
- Defra, 2006b, “Air Quality and Social Deprivation in the UK: an environmental inequalities analysis”
- Defra, 2007, “The Air Quality Strategy for England, Scotland and Wales”.
- Defra, 2009, “Safeguarding our soils – A Strategy for England”.
- Defra, 2011a, “The Natural Choice: securing the value of nature”, Natural Environment White Paper
- Defra, 2011b, “Government Review of Waste Policy in England 2011”
- Defra, 2011c, “Water for Life - Water White Paper”
- Defra, 2012, “The UK Climate Change Risk Assessment 2012 Evidence Report”
- Defra, 2015a, “Local authority collected waste statistics – local authority data”
- Defra, 2015b, “UK Statistics on Waste” [online] Available at: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/487916/UK_Statistics_on_Waste_statistical_notice_15_12_2015_update_f2.pdf [Accessed 27 November 2019]
- Defra, 2017, “UK Biodiversity Indicators 2017” [online] Available at: <https://www.gov.uk/government/statistics/biodiversity-indicators-for-the-uk> [Accessed 27 November 2019]

- Department for Communities and Local Government, 2012, “National Planning Policy Framework” [online] Available at: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/6077/2116950.pdf [Accessed 27 November 2019]
- English Heritage, 2010, “Climate Change and the Historic Environment”.
- English Heritage, 2015, “Heritage counts 2015”
- Environment Agency and Natural Wales, 2015, “Salmonid and Freshwater Fisheries Statistics for England and Wales, 2014” [online] Available at: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/459174/FishStatsReport2014.v4.pdf [Accessed 27 November 2019]
- Environment Agency, 2009a, “South East River Basin District Catchment Flood Management Plans” [online] Available at: <https://www.gov.uk/government/collections/catchment-flood-management-plans> [Accessed 27 November 2019]
- Environment Agency, 2009b, “Water Resources Strategy Regional Action Plan for Southern Region” [online] Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/289918/geho1209brlc-e-e.pdf [Accessed 27 November 2019]
- Environment Agency, 2013a, “Flood Risk Maps – Risk of Flooding from Surface water – Thames River Basin District” [online] Available at: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/456969/LIT8979_FloodRiskMaps_Thames_SurfaceWater_v2.pdf [Accessed 27 November 2019]
- Environment Agency, 2013b, “Flood Risk Maps – Risk of Flooding from Surface water – South East River Basin District” [online] Available at: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/456968/LIT8974_FloodRiskMaps_SouthEast_SurfaceWater_v2.pdf [Accessed 27 November 2019]
- Environment Agency, 2015, “South East River Basin District River Basin Management Plan” [online] Available at: <https://www.gov.uk/government/collections/river-basin-management-plans-2015> [Accessed 27 November 2019]
- Environment Agency, 2017, “Working with natural processes to reduce flood risk” [online] Available at: <https://www.gov.uk/government/publications/working-with-natural-processes-to-reduce-flood-risk> [Accessed 27 November 2019]
- HM Treasury Infrastructure UK, 2010, “National Infrastructure Plan”.
- HM Treasury, 2014, “National Infrastructure Plan 2014” [online] Available at: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/381884/2902895_NationalInfrastructurePlan2014_acc.pdf [Accessed 27 November 2019]

- National Statistics: Regional Trends No.43 2010/11 edition [online] Available at:
http://www.statistics.gov.uk/downloads/theme_compendia/RegionalSnapshot/rt43-rc-profiles.pdf [Accessed 2016]
- Ofwat, 2015c, “Affordability and debt 2014-15” [online] Available at:
http://www.ofwat.gov.uk/wp-content/uploads/2015/12/prs_web20151201affordability.pdf
[Accessed 27 November 2019]
- ONS, “Tourism” [online] Available at:
<http://www.neighbourhood.statistics.gov.uk/HTMLDocs/Tourism/atlas.html>
- ONS, 2014, “Subnational population projections for England: 2012-based” [online] Available at:
<http://www.ons.gov.uk/peoplepopulationandcommunity/populationandmigration/populationprojections/bulletins/subnationalpopulationprojectionsforengland/2014-05-29> [Accessed 27 November 2019]
- ONS, 2015a, “Overview of UK population” [online] Available at:
<http://www.ons.gov.uk/ons/rel/pop-estimate/population-estimates-for-uk--england-and-wales--scotland-and-northern-ireland/mid-2014/sty---overview-of-the-uk-population.html>
[Accessed 25 June 2015]
- ONS, 2015b, “Sustainable Development Indicators: July 2015” [online] Available at:
<https://www.ons.gov.uk/peoplepopulationandcommunity/wellbeing/articles/sustainabledevelopmentindicators/2015-07-13> [Accessed 27 November 2019]
- ONS, 2015c, “Housing Statistical Release 2012-based Household Projections: England, 2012-2037” [online] Available at:
https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/407556/Household_Projections_-_2012-2037.pdf [Accessed 27 November 2019]
- ONS, 2016, “Regional Labour Market February 2016” [online] Available at:
<https://www.ons.gov.uk/employmentandlabourmarket/peopleinwork/employmentandemployeetypes/bulletins/regionallabourmarket/february2016> [Accessed 27 November 2019]
- Southern Water, 2013, “Five-year Business Plan 2015-2020”, Southern Water Services, Worthing.

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RESTRICTED INFORMATION IN SEPARATE PDF, AVAILABLE UPON REQUEST

Water Resources Management Plan 2019 Annex 14: SEA Main Report Appendix E: Quality Assurance Checklist

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Quality Assurance Checklist

ODPM Guidance¹ on SEA contains a Quality Assurance checklist to help ensure that the requirements of the SEA Directive are met. The checklist is reproduced in Table 1, indicating where this Scoping Report meets the requirements, and which requirements will be addressed in the Environmental Report.

Table 1 Quality Assurance Checklist

Checklist item	Comments
Objectives and context	
The plan's or programme's purpose and objectives are made clear.	The purpose of the WRMP19 is set out in the section ' Background and purpose of report ' of this Environmental Report.
Environmental issues and constraints, including international and EC environmental protection objectives, are considered in developing objectives and targets.	Objectives of other relevant plans and programmes are set out in the ' Policy context ' section and Appendix B .
SEA objectives, where used, are clearly set out and linked to indicators and targets where appropriate.	SEA objectives are set out in the section ' Assessment framework ' of this Environmental Report.
Links with other related plans, programmes and policies are identified and explained.	Links are identified in the section ' Cumulative effects assessment ' of this Environmental Report.
Conflicts that exist between SEA objectives, between SEA and plan objectives and between SEA objectives and other plan objectives are identified and described	Compatibility conflicts have been identified as part of the cumulative assessment completed during Stage B1 of the assessment of options and are presented in the section ' Cumulative effects assessment ' of the Environment Report.
Scoping	
Consultation Bodies are consulted in appropriate ways and at appropriate times on the content and scope of the Environmental Report.	The previously published Scoping Report was part of the consultation process required to meet the requirements of the SEA Directive and was circulated to consultees. Responses to the consultation have been considered and addressed in this Environmental Report (see Appendix A and the Statement of Response for details on how comments were addressed). Further consultation will be undertaken on the Environmental Report and draft WRMP. The consultation process is described in the ' Consultation ' section
The assessment focuses on significant issues.	The proposed scope of the assessment reflects the geographic extent of the potential options under consideration by Southern Water, and provides a comprehensive approach to assessment of potentially significant impacts.
Technical, procedural and other difficulties encountered are discussed; assumptions and uncertainties are made explicit.	Difficulties and assumptions are set out in the section ' Limitations of the data and assumptions made ' of this Environmental Report.

¹ Office of the Deputy Prime Minister, 2005, "A Practical Guide to the Strategic Environmental Assessment Directive".

Checklist item	Comments
Reasons are given for eliminating issues from further consideration.	The proposed objectives provide a comprehensive basis for assessment and at this stage, no issues have been eliminated.
Alternatives	
Realistic alternatives are considered for key issues, and the reasons for choosing them are documented.	An appraisal framework has been used to assess options, programmes and the WRMP. This is set out in the 'Methodology' section and in the section 'Assessment of WRMP feasible options' of this Environmental Report. A wide range of alternative options are considered as reported in this Environmental Report.
Alternatives include 'do minimum' and/or 'business as usual' scenarios wherever relevant. The environmental effects (both adverse and beneficial) of each alternative are identified and compared. Inconsistencies between the alternatives and other relevant plans, programmes or policies are identified and explained. Reasons are given for selection or elimination of alternatives.	Assessment of alternatives has been considered in developing the WRMP19. Details of the environmental assessment of the alternatives are provided this Environmental Report in the section 'Assessment of the WRMP19 strategies'
Baseline information	
Relevant aspects of the current state of the environment and their likely evolution without the plan or programme are described.	The key issues relating to the current state of the environment and predicted future baseline is set out in the 'Environmental baseline review' section of this Environmental Report for each SEA topic and in Appendix C .
Environmental characteristics of areas likely to be significantly affected are described, including areas wider than the physical boundary of the plan area where it is likely to be affected by the plan.	The environmental characteristics of the area under consideration for the SEA are described in the 'Introduction' section and Appendix C .
Difficulties such as deficiencies in information or methods are explained.	Difficulties and limitations are set out in the section 'Limitations of the data and assumptions made'
Prediction and evaluation of likely significant environmental effects	
Effects identified include the types listed in the Directive (biodiversity, population, human health, fauna, flora, soil, water, air, climate factors, material assets, cultural heritage and landscape), as relevant; other likely environmental effects are also covered, as appropriate.	Potential effects are set out in the section 'Assessment of WRMP feasible options' of the Environmental Report.
Both positive and negative effects are considered, and the duration of effects (short, medium or long-term) is addressed.	The nature and duration of potential effects are set out in the section 'Assessment of WRMP feasible options' of the Environmental Report, using the appraisal framework described in the 'Assessment framework' section.
Likely secondary, cumulative and synergistic effects are identified where practicable.	These effects have been identified in the Environmental Report in the 'Cumulative effects assessment' section.

Checklist item	Comments
Inter-relationships between effects are considered where practicable.	These effects have been identified in the ' Cumulative effects assessment ' section of the Environmental Report.
The prediction and evaluation of effects makes use of relevant accepted standards, regulations, and thresholds.	Relevant standards have been used where appropriate in undertaking the assessment in the Environmental Report.
Methods used to evaluate the effects are described.	The Environmental Report includes a section on monitoring requirements (see the section ' Secondary, cumulative and synergistic environmental effects ').
Mitigation measures	
Measures envisaged to prevent, reduce and offset any significant adverse effects of implementing the plan or programme are indicated.	Mitigation measures for potential negative effects have been incorporated into the assessment undertaken in preparing the Environmental Report.
Issues to be taken into account in project delivery.	Such mitigating measures, if required, are highlighted in the ' Mitigation and enhancement of significant effects ' section of the Environmental Report considers mitigation measures.
The Environmental Report	
Is clear and concise in its layout and presentation.	The Environmental Report is clear and concise.
Uses simple, clear language and avoids or explains technical terms.	The Environmental Report uses simple, clear language, and explains technical terms, as appropriate.
Uses maps and other illustrations where appropriate.	The Environmental Report uses maps and illustrations where appropriate.
Explains the methodology used.	SEA methodology has been described in the ' SEA methodology ' section of the Environmental Report.
Explains who was consulted and what methods of consultation were used.	The consultation strategy, including organisations and dates of consultation, has been included in the Environmental Report (see the ' Consultation ' section).
Identifies sources of information, including expert judgement and matters of opinion.	Sources of information have been detailed in the Environmental Report.
Contains a non-technical summary covering the overall approach to the SEA, the objectives of the plan, the main options considered, and any changes to the plan resulting from the SEA.	The Environmental Report includes a Non-Technical Summary.
Consultation	
The SEA is consulted on as an integral part of the plan-making process.	The Scoping Report was consulted on, and this Environmental Report will be part of the consultation process required to meet the requirements of the SEA Directive and will be circulated to consultees (alongside the draft WRMP). The consultation process is described in the ' Consultation ' section.
Consultation Bodies and the public likely to be affected by, or having an interest in, the plan or programme are consulted in ways and at times which give them an early and effective	This Environmental Report is a part of the consultation process required to meet the requirements of the SEA Directive and will be

Checklist item	Comments
opportunity within appropriate time frames to express their opinions on the draft plan and Environmental Report.	circulated to consultees (alongside the draft WRMP). The consultation process is described in the ' Consultation ' section.
Decision-making and information on the decision	
The environmental report and the opinions of those consulted are taken into account in finalising and adopting the plan or programme.	Responses from consultation on the draft Environmental Report will be incorporated in the development of the final Environmental Report. After finalisation of the WRMP, a statement will be published describing how the SEA and the responses to consultation have been taken into account during the preparation of the WRMP (see the ' Introduction ' and ' Role of the SEA in developing the WRMP19 ' sections of this Environmental Report).
An explanation is given of how they have been taken into account.	Consultation responses, and how they have been incorporated in the final Environmental Report have been incorporated as described in Appendix A . After finalisation of the WRMP, a statement will be published describing how the SEA and the responses to consultation have been taken into account during the preparation of the WRMP.
Reasons are given for choosing the plan or programme as adopted, in the light of other reasonable alternatives considered.	This has been set out following consultation on the draft WRMP and Environmental Report. Details of the environmental assessment of the preferred programme and alternatives are provided this Environmental Report in the section ' Assessment of the WRMP19 strategies '
Monitoring measures	
Measures proposed for monitoring are clear, practicable and linked to the indicators and objectives used in the SEA.	The Environmental Report includes a section addressing proposals for monitoring (' Monitoring ' section).
Monitoring is used, where appropriate, during implementation of the plan or programme to make good deficiencies in baseline information in the SEA.	Suggestions for monitoring have been made in the Environmental Report, with monitoring taking place following implementation of the WRMP, further to consultation with regulatory authorities including the Environment Agency, Natural England, Historic England
Monitoring enables unforeseen adverse effects to be identified at an early stage. (These effects may include predictions which prove to be incorrect.)	Suggestions for monitoring have been made in the Environmental Report, with monitoring taking place following implementation of the WRMP, further to consultation with regulatory authorities including the Environment Agency, Natural England, Historic England
Proposals are made for action in response to significant adverse effects.	Mitigation measures for adverse effects have been addressed in the section ' Mitigation and enhancement of significant effects ' of the Environmental Report.

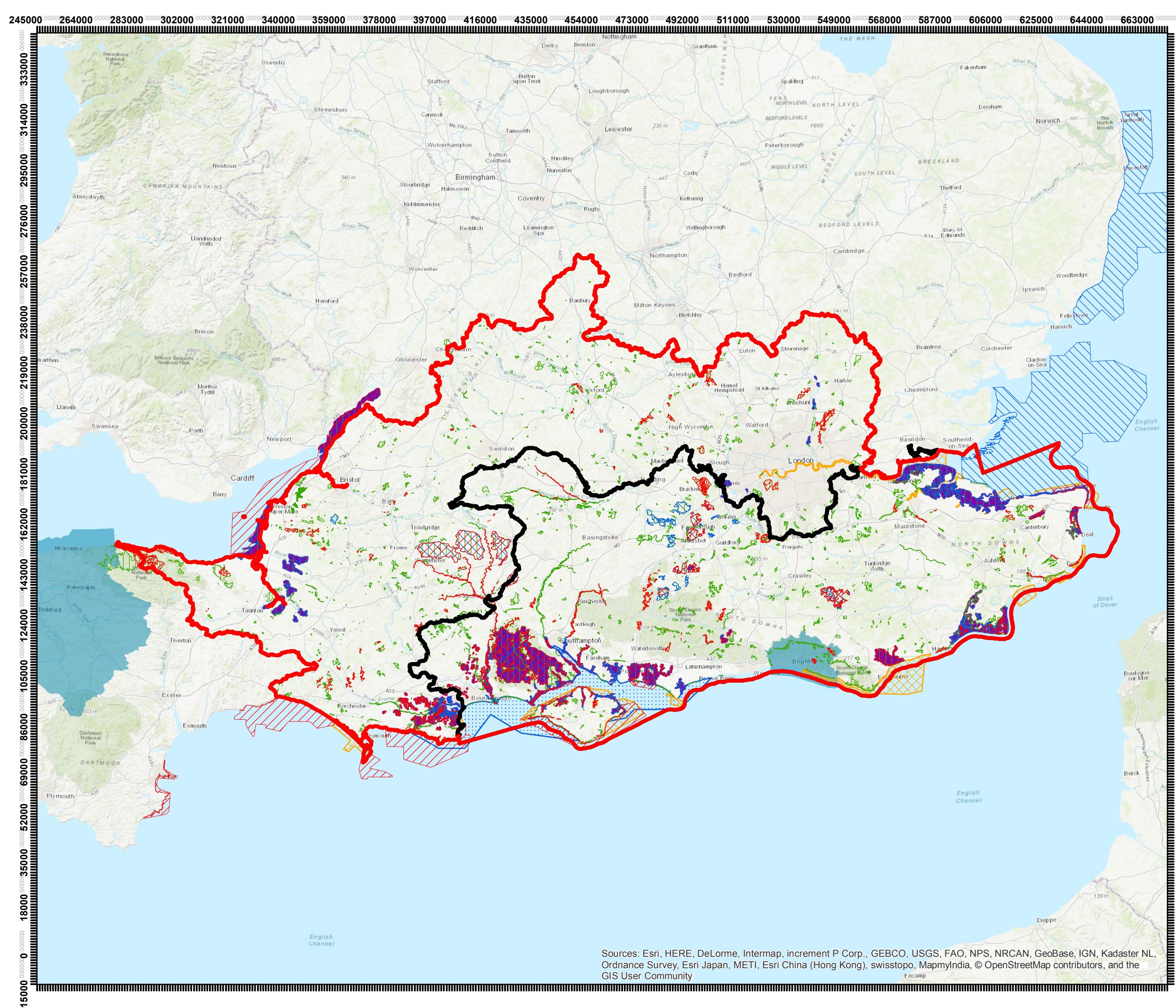
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Legend

- Study Area
- Core Study Area
- SAC
- SPA
- SSSI
- Ramsar Sites
- Marine Conservation Zones
- Biosphere Reserves
- Potential SPA
- Potential Ramsars



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 1:1,300,000
 Note: All locations are approximate
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 Internal project reference: Q:\Delivery\Projects\Cascade\ED62546 SWS WRMP19&DP1815. Data Management\1. GIS02_GIS_Task\Drought Plan\01_SEA_Scoping_Report\MXD

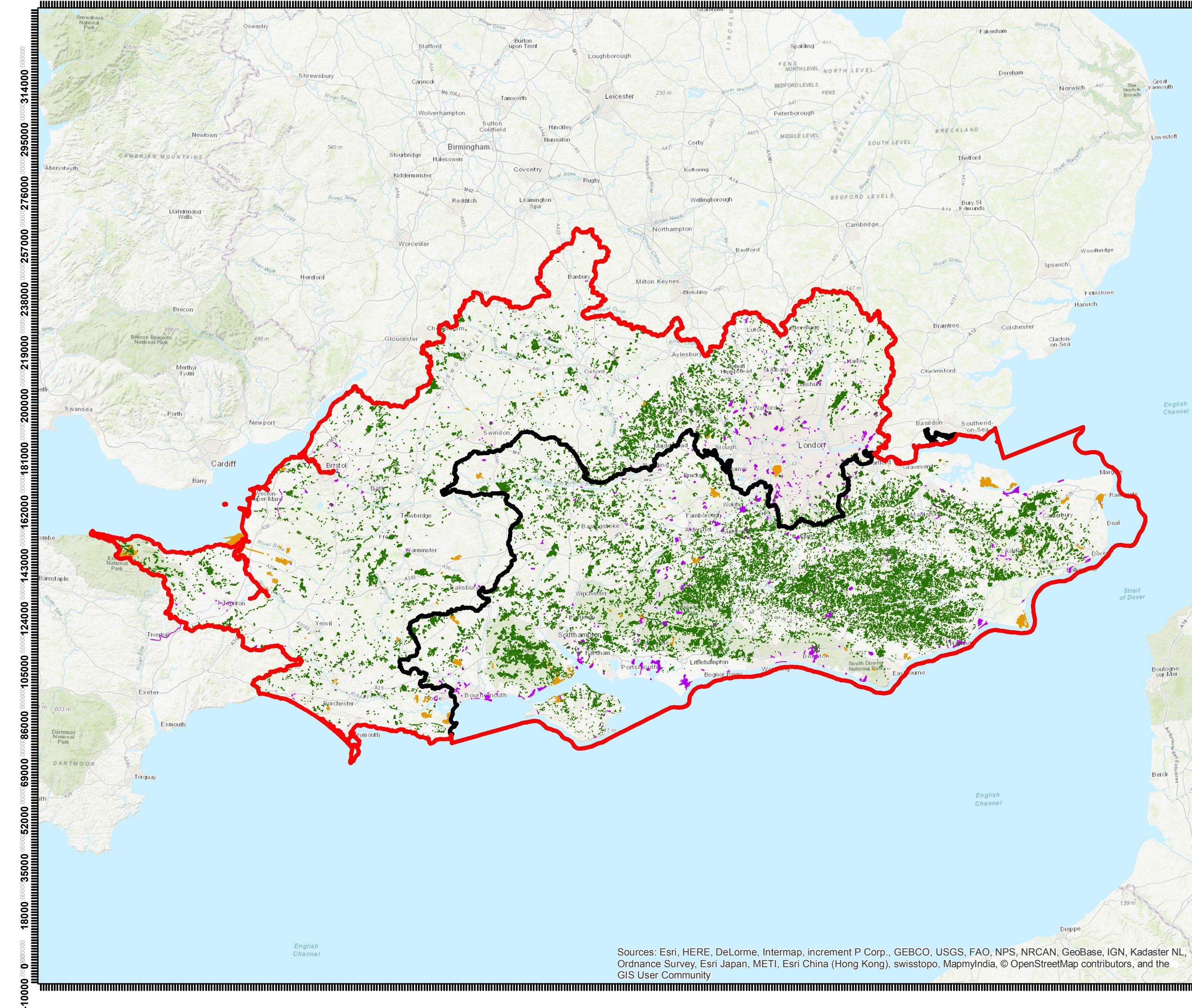
Project Title: Southern Water WRMP Strategic Environmental Assessment

Figure Title: European Ecologically Designated Sites

Figure Number: Figure 1	Date: November 2017
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Sources: Esri, HERE, DeLorme, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community

257000 276000 295000 314000 333000 352000 371000 390000 409000 428000 447000 466000 485000 504000 523000 542000 561000 580000 599000 618000 637000 656000



Legend

- Study Area
- Core Study Area
- Ancient Woodland
- LNR
- NNR



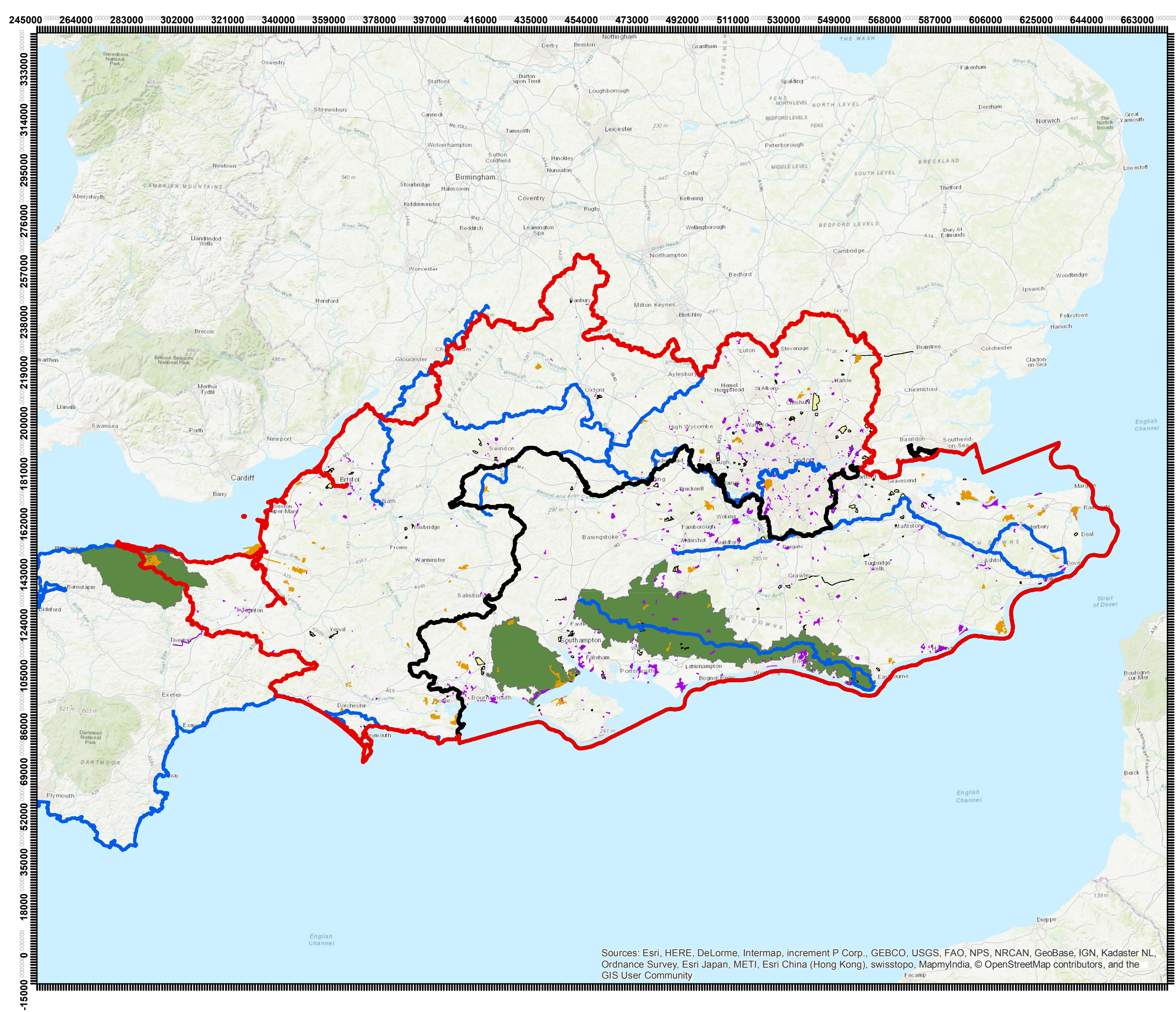
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Project Title: Southern Water WRMP Strategic Environmental Assessment

Figure Title: National Ecologically Designated Sites

Figure Number: Figure 2	Date: November 2017
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Sources: Esri, HERE, DeLorme, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community



Legend

- Study Area
- Core Study Area
- National Trails
- LNR
- NNR
- Country Parks
- National Park

Southern Water **ATKINS** **RICARDO**

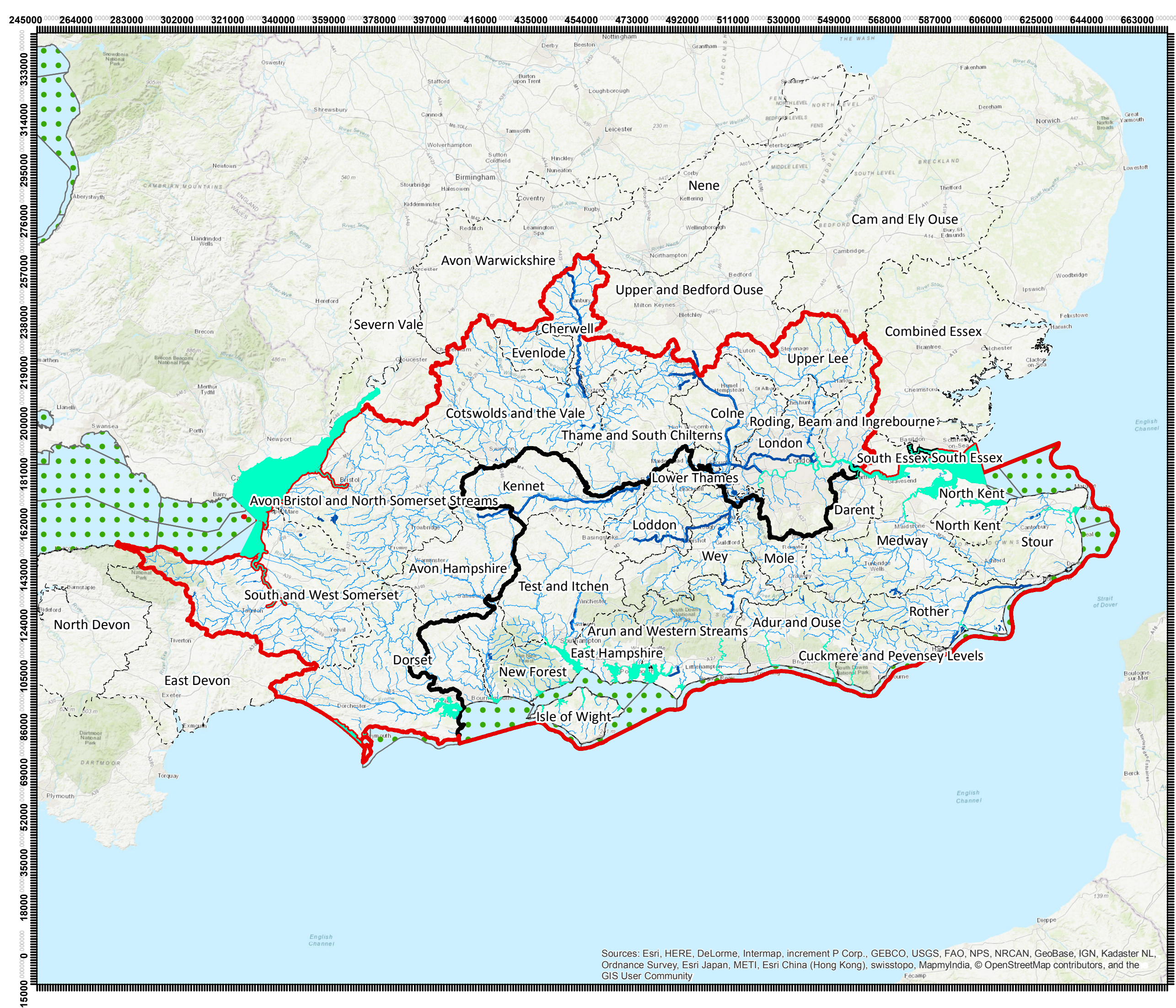
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Project Title: Southern Water WRMP Strategic Environmental Assessment

Figure Title: National and Local Conservation, Landscape and Recreational Features

Figure Number: Figure 3 Date: November 2017

Sources: Esri, HERE, DeLorme, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community



- ### Legend
- Study Area
 - Core Study Area
 - WFD Management Catchments
 - Transitional Water Bodies
 - Coastal Waterbodies
 - Lakes
 - Rivers
 - Canals



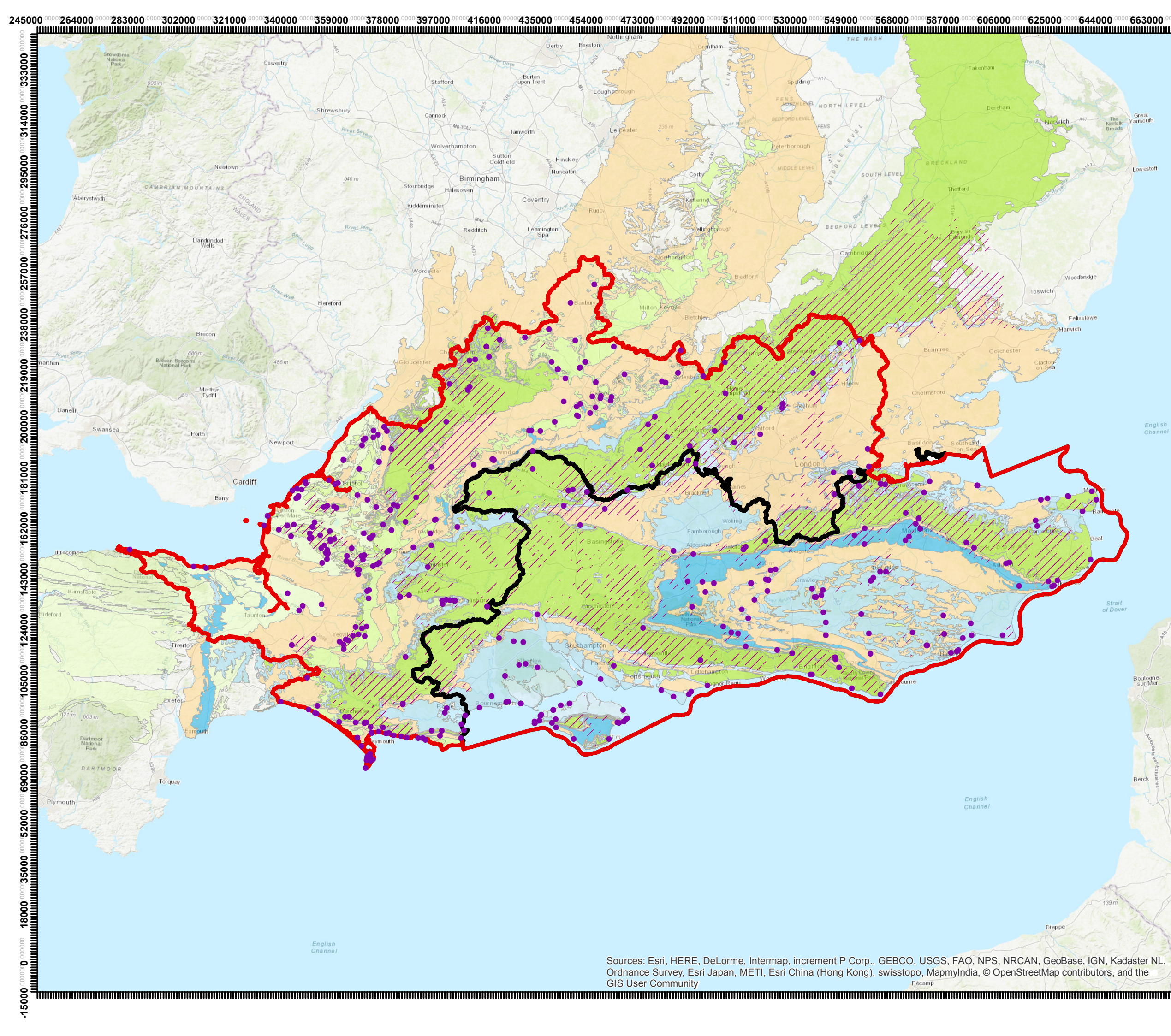
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Project Title: Southern Water WRMP
 Strategic Environmental Assessment

Figure Title: Surface Water Features

Figure Number: Figure 4	Date: November 2017
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Sources: Esri, HERE, DeLorme, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community



Legend

- Study Area
- Core Study Area
- Geological Conservation Review Sites
- Source Protection Zones

Aquifer Classification

- Aquifers with significant intergranular flow
- Highly productive aquifer
- Moderately productive aquifer
- Low productivity aquifer
- Aquifers in which flow is virtually all through fractures and other discontinuities
- Highly productive aquifer
- Moderately productive aquifer
- Low productivity aquifer
- Rocks with essentially no groundwater



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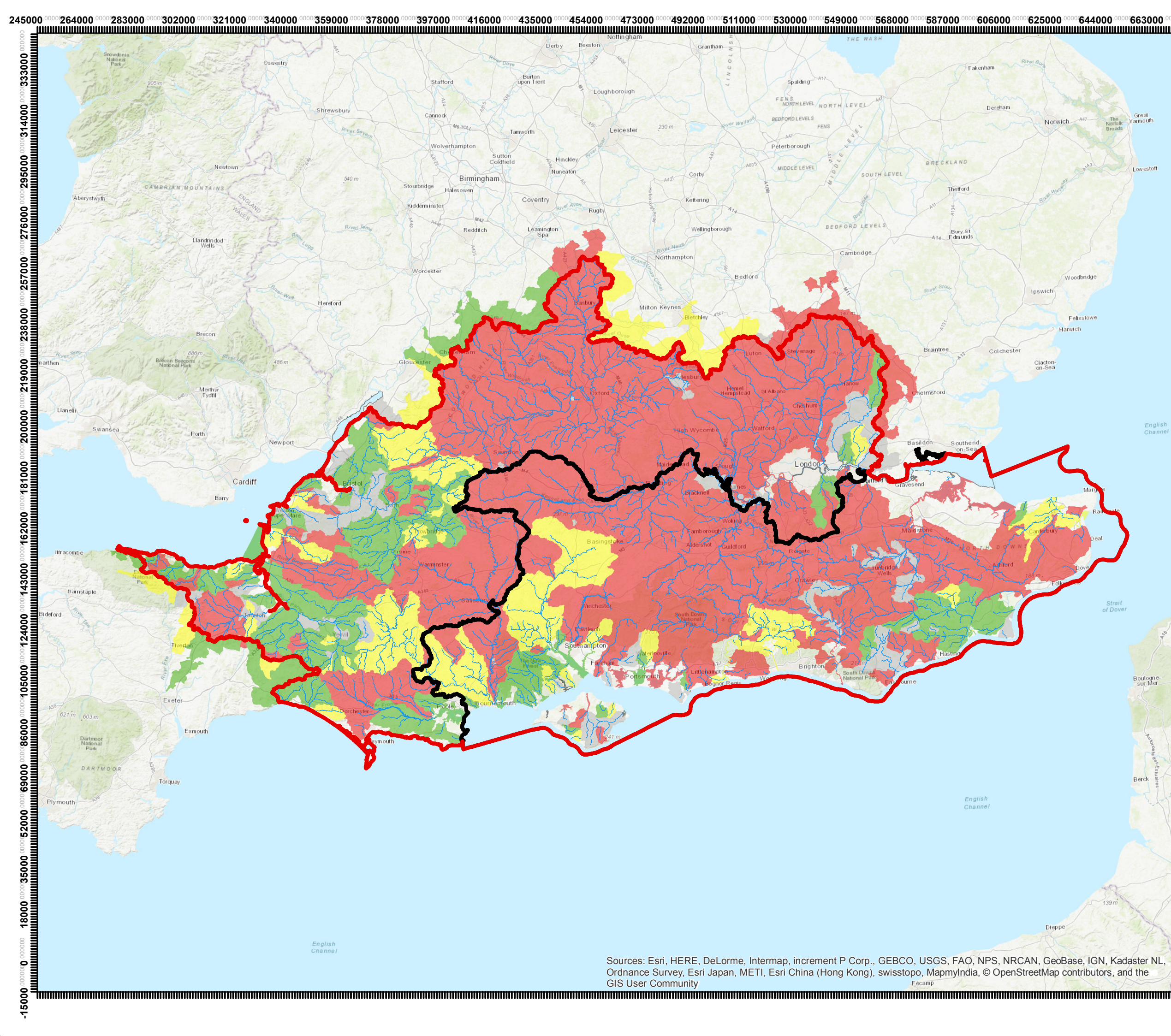
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Figure Title: Aquifers and Geological Features

Figure Number: Figure 5	Date: November 2017
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Sources: Esri, HERE, DeLorme, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community



Legend

- Study Area
- Core Study Area
- Rivers

Resource Availability

Water Resource Availability at Q95

- Water available for licensing
- Water not available for licensing
- Restricted water available for licensing
- HMWBs (and/or discharge rich catchments)
- Data Not Available



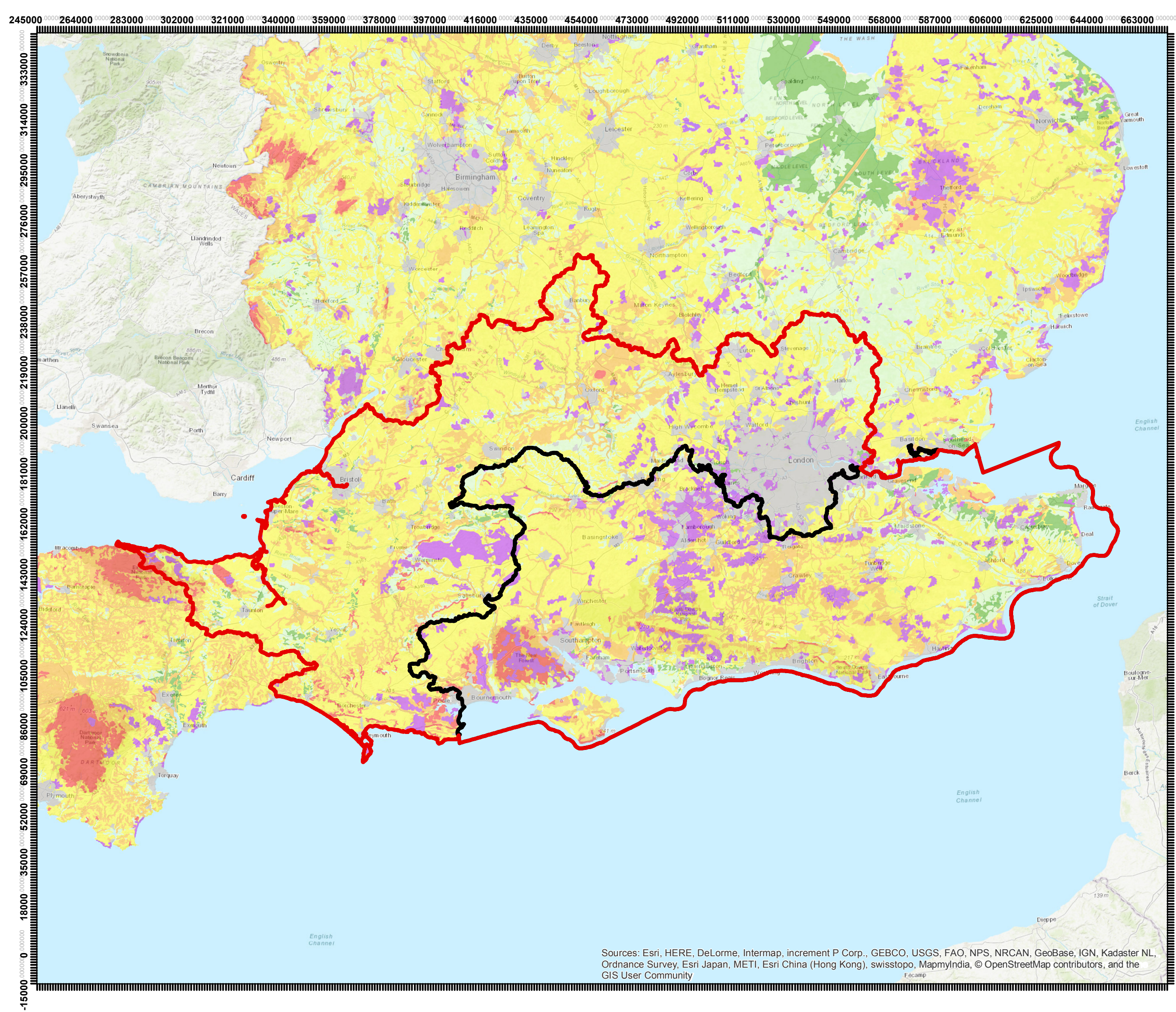
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Figure Title: Water Resource Availability at Low Flows (from Environment Agency assessments)

Figure Number: Figure 6 Date: November 2017

Sources: Esri, HERE, DeLorme, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community



Legend

- Study Area
- Core Study Area

Agricultural Land Classification

- GRADE 1
- GRADE 2
- GRADE 3
- GRADE 4
- GRADE 5
- NON AGRICULTURAL
- URBAN



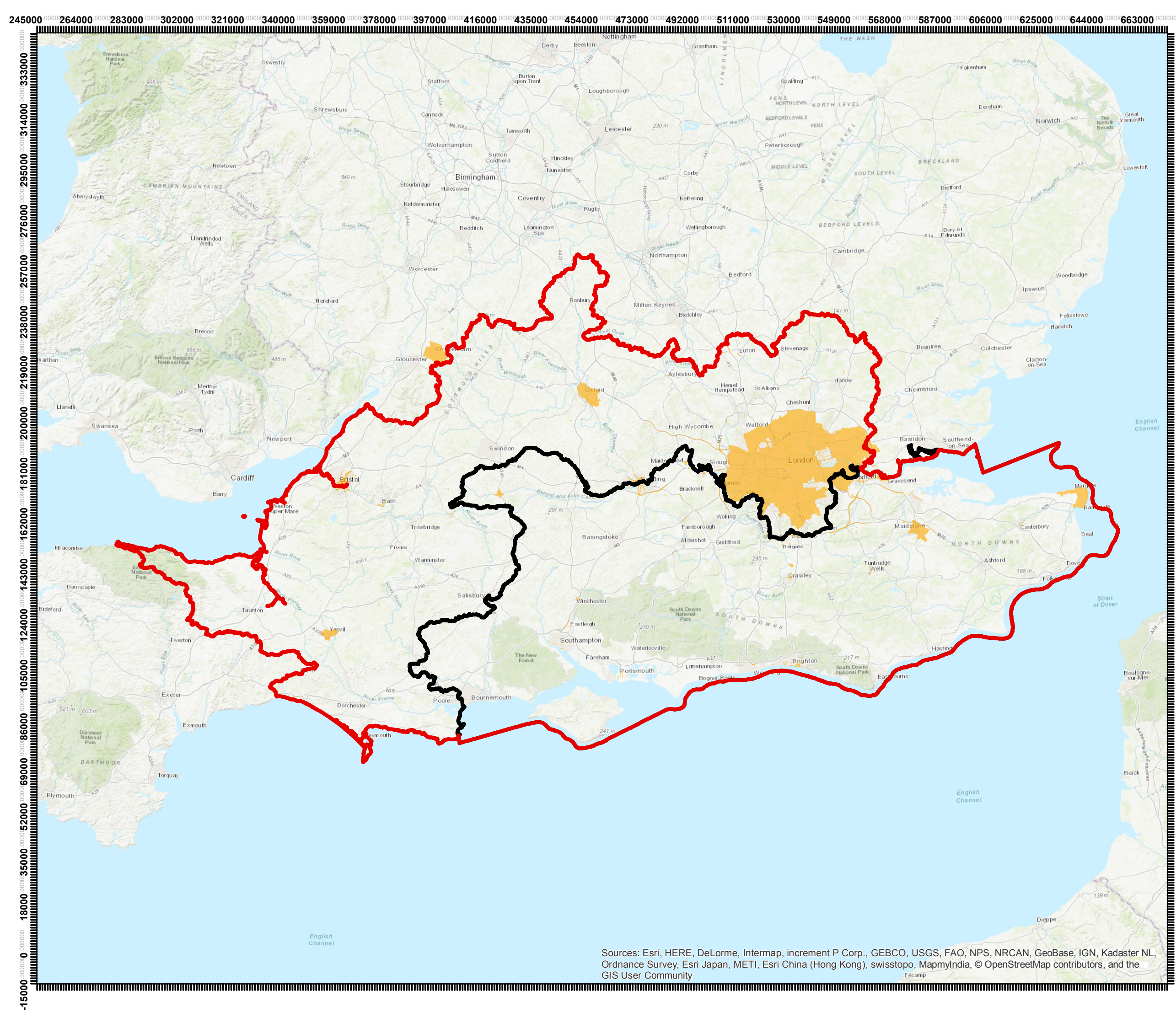
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Figure Title: Agricultural Land Classification

Figure Number: Figure 7	Date: November 2017
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Sources: Esri, HERE, DeLorme, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community



Legend

- Study Area
- Core Study Area
- AQMA



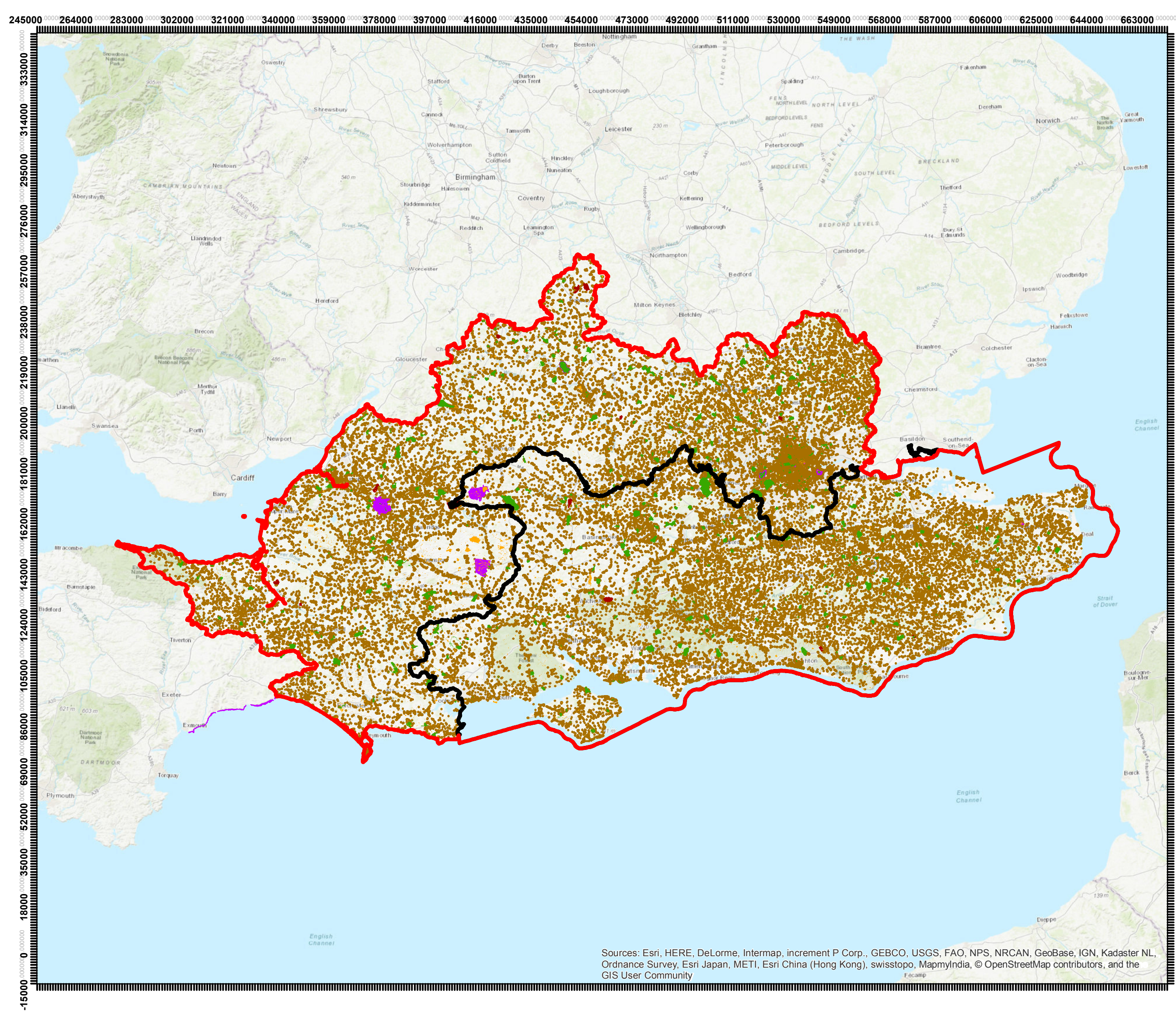
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 Note: All locations are approximate
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Figure Title: Air Quality Management Areas

Figure Number: Figure 8
 Date: November 2017

Sources: Esri, HERE, DeLorme, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community



- ### Legend
- Study Area
 - Core Study Area
 - Scheduled Monuments
 - Parks and Gardens
 - Battlefields
 - World Heritage Sites
 - Listed Buildings



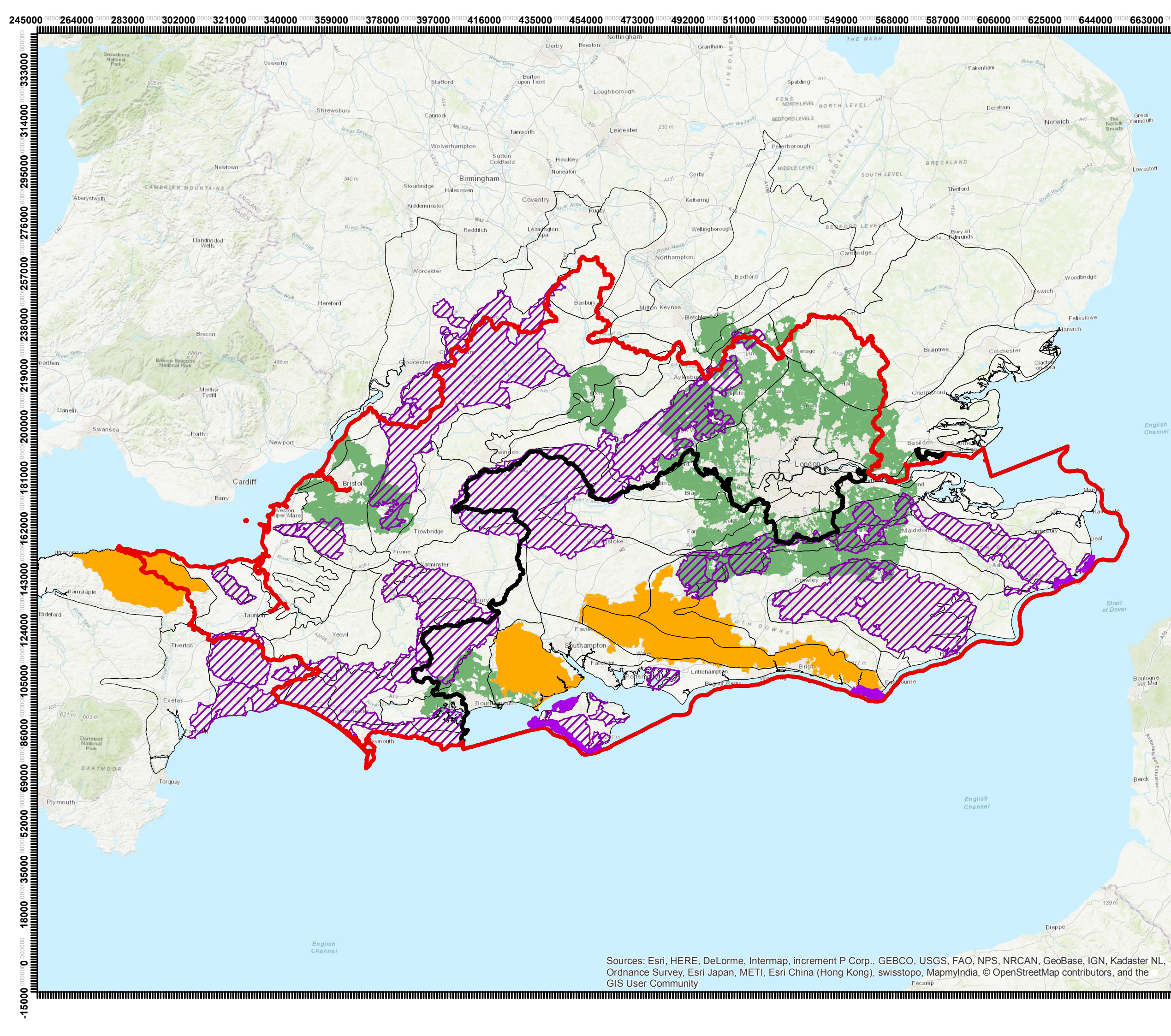
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Project Title: Southern Water WRMP Strategic Environmental Assessment

Figure Title: Heritage Designations and Features

Figure Number: Figure 9 Date: November 2017

Sources: Esri, HERE, DeLorme, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community



- ### Legend
- Study Area
 - Core Study Area
 - AONB
 - National Character Areas
 - Greenbelt
 - National Parks
 - Heritage Coasts



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Note: All locations are approximate

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Project Title: Southern Water WRMP Strategic Environmental Assessment

Figure Title: Landscape Designations and Features

Figure Number: Figure 10	Date: November 2017
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Sources: Esri, HERE, DeLorme, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community

Water Resources Management Plan 2019 Strategic Environmental Assessment

Appendix G: SSSI Assessment

December, 2019

Version 1



from
**Southern
Water** 

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