

Draft Water Resources Management Plan 2024

Technical Appendix B – Strategic Environmental Assessment

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Abbreviations

AA	(Habitats Regulations) Appropriate Assessment
AONB	Area of Outstanding Natural Beauty
AQMA	Air Quality Management Areas
ASR	Aquifer storage and recovery
BAP	Biodiversity Action Plan
BNG	Biodiversity Net Gain
CFMP	Catchment Flood Management Plans
CPRE	Campaign for Rural England
CROW	Countryside and Rights of Way
CO ₂	Carbon Dioxide
Defra	Department for Environment, Food and Rural Affairs
ET	Environmental Targets
EU	European Union
GHG	Greenhouse Gas
GIS	Geographic Information System
ha	Hectares
HER	Historic Environment Record
HRA	Habitats Regulations Assessment
IMD	Index of Multiple Deprivation
INNS	Invasive Non-Native Species
JNCC	Joint Nature Conservation Committee
ktCO ₂	Kilo Tonnes of Carbon Dioxide
LNR	Local Nature Reserve
LSOA	Lower Super Output Area
LWS	Local Wildlife Sites
LULUCF	Land Use, Land-use Change, and Forestry
MCZ	Marine Conservation Zone
MPA	Marine Protected Area
NCA	Natural Capital Assessment(s)
NERC	Natural Environment and Rural Communities
NFM	Natural Flood Management
NNR	National Nature Reserve
NO ₂	Nitrogen Dioxide
NPPF	National Planning Policy Framework
PM	Particulate Matter
RBD	River Basin District
RBMP	River Basin Management Plan
SAC	Special Areas of Conservation
SEA	Strategic Environmental Assessment
SPA	Special Protection Area
SRO	Strategic Resource Option
SSSI	Sites of Special Scientific Interest
SuDS	Sustainable Urban Drainage Systems
IOLS	Lest of Likely Significance
UK	United Kingdom
UKCP18	UK Climate Projections 2018
UN	United Nations

WFD	Water Framework Directive
WRE	Water Resources East
WRMP	Water Resource Management Plan
WRPG	Water Resources Planning Guidelines
WRSE	Water Resources South East
WRZ	Water Resource Zone
WTW	Water Treatment Works

Non-Technical Summary

Water Resource Management Plan

Thames Water is the UK's largest water and wastewater services company, it supplies 2.6 billion litres of drinking water per day and treats 4.7 billion litres of wastewater per day. It is responsible for the public water supply and wastewater treatment for most of Greater London, Luton, the Thames Valley, Surrey, Gloucestershire, north Wiltshire, and far west Kent. The area covered by Thames Water has a population of 15 million, that comprises 27% of the UK population.

Water companies have a statutory obligation to produce a Water Resources Management Plan (WRMP). The WRMP sets out how a company intends to achieve a secure supply of water for customers while protecting and enhancing the environment over a minimum 25-year period. The plans must be prepared every 5 years and reviewed annually. Thames Water's WRMP 2024 (WRMP24) renews the previous WRMP published in 2019.

The WRMP also informs the Thames Water business plan and forms a major part of the price review process undertaken by the water industry regulator, Ofwat. Price Review 2024 (PR19) is the eighth price review since the water industry was privatised in 1989. Engagement with regulators, licensed water suppliers, other water companies, customers and stakeholders is key to the WRMP development process, and extensive consultation on the development of the WRMP24 has been undertaken with these interested parties.

This iteration of the WRMP is for the "Draft Plan", the draft plan will be made available for consultation in November 2022 over a 13-week period. Stakeholders and the public will be given the opportunity to feedback on the Draft Plan, prior to its finalisation in July 2023.

Further information on the Thames Water's WRMP24 is presented in Section 1 and 2 of the Strategic Environmental Assessment Report.

Environmental Assessment of the WRMP24

Thames Water, as a responsible authority under the UK (Strategic Environmental Assessment (SEA)) Regulations, determined that its WRMP24 falls within the scope of the SEA Directive. Thames Water must also ensure the final WRMP24 meets the requirements of the Habitats Regulations and Water Framework Directive (WFD) and related national regulations before implementation.

This SEA Environmental Report is therefore supported by the findings of the Habitats Regulations Assessment (HRA) and WFD assessments carried out on the Draft WRMP. The detailed findings of these assessments are provided in accompanying HRA and WFD assessment reports.

In the context of water resources planning, SEA identifies the likely significant environmental effects of the various measures, both individually and in-combination, required to provide a reliable and resilient water supply service to Thames Water's customers. These effects can then be used to help define the preferred programme of schemes to meet this objective, and which together form the WRMP. Biodiversity Net Gain (BNG) and Natural Capital Assessments (NCAs) have also been undertaken.

The SEA process was used by Thames Water to help inform a final decision on the most appropriate programme of measures to include in the WRMP24.

A summary of this is outlined in Section 5 of the Strategic Environmental Assessment Report.

SEA Objectives

The key issues identified in the area were brought together to form a suite of SEA objectives under each of the SEA topics. A set of indicator questions was also developed for each objective to ensure that the assessments were comprehensive and consistent. The Water Resources South East (WRSE) SEA Scoping Report sought views on the proposed SEA objectives for the regional plan, with the view that this would be adopted by the water companies within the region. The WRSE SEA scoping report outlined how these objectives would be used to assess the environmental effects of the WRMP. The final SEA objectives have formed the basis for the assessment. It was not considered appropriate to scope any topics out of the SEA.

An assessment framework was developed and consulted upon as part of the SEA Scoping Report consultation. This included the proposed approach to the measurement of effect significance which assigns assessed effects according to a seven-point scale (from major beneficial to major adverse including a negligible effect category) which was considered to provide an appropriate level of distinction between effects, according to combinations of impact magnitude and receptor sensitivity. The assessment considered both adverse and beneficial effects, with the assessment findings for each kept separate throughout the SEA process in line with best practice to avoid adverse and beneficial effects being 'mixed' together. This approach provides a general indication of the significance of environmental and social effects of the WRMP24.

Comments received on the Scoping Report consultation were used to refine and finalise the SEA objectives and assessment approach. Responses to consultation on the SEA Scoping Report are included as Annex B to this report.

The SEA assessment method is presented in detail in Section 4 of the Strategic Environmental Assessment Report.

Environmental baseline

Determining which SEA topics are relevant to the Thames Water WRMP and which should be scoped out (if any) is a key stage in the SEA process. The SEA topics and the scoping determination for each is presented in Table 3.1 of the Environmental Report.

The key present and future baseline environmental information is presented in Annex D of the Environmental Report. Topics were scoped in based on the baseline situation and the potential impact of the Thames Water WRMP on them. This was assessed by reviewing baseline conditions, current environmental issues for the Thames and wider WRSE region area and an assessment of the likelihood of potential impacts occurring.

SEA of constrained list option elements

The final conceptual designs for each option element were then assessed through the SEA, HRA, WFD, Invasive and Non-Native Species (INNS), BNG and NCA processes based on their residual effects after application of the mitigation measures. The SEA findings were set out in assessment tables as presented in this Strategic Environmental Assessment Report.

The SEA findings of the different types of options considered for inclusion in the WRMP24 can be summarised as follows, please note each option has been assessed individually, see Annex F&G for summaries of the SEA scoring:

- Aquifer storage and recovery Common considerations include abstraction licensing requirements for source water and/or Aquifer Storage and Recovery (ASR) hub. The impact of water level changes on stream-flow and wetlands (HRA and WFD Risk). Impact of new intake structures on the water bodies, if required and water quality impact of reinjection regime on the aquifer.
- Demand Management Options Generally cause few significant adverse effects. The main adverse effects relate mainly to disruption during the construction/implementation phase (e.g., for water pipe repair or replacement activities or equipment installation). These measures provide benefits by reducing the volume of water that needs to be abstracted, treated, and put into supply. The magnitude of the benefit varies widely from depending on the implementation scale of the measure and consequent volume of water savings delivered.
- Desalination Impacts typically associated with construction of the marine intake and outfall including temporary disruption to the local habitat and disposal of drilling mud, if used. Discharge of the waste stream which will have a higher density than the surrounding water body has the potential for HRA and WFD impacts. Operational power consumption and related carbon are also typically high, although this may be offset if a low carbon power source becomes available.
- Distribution capacity expansion Typically few negative environmental impacts due to expansion of existing assets, with benefits derived from the additional water resource.
- Drought intervention Similar to other Demand Management Options generally cause few significant adverse effects. The main adverse effects relate mainly to disruption during the construction/implementation phase (e.g., for water pipe repair or replacement activities or equipment installation). These measures provide benefits by reducing the volume of water that needs to be abstracted, treated, and put into supply. The magnitude of the benefit varies widely from depending on the implementation scale of the measure and consequent volume of water savings delivered.
- Groundwater sources Similar to ASRs, The impact of water level changes on streamflow and wetlands (HRA and WFD Risk) is present.
- Increase water treatment works (WTW) capacity and efficiency Typically few negative environmental impacts due to expansion of existing assets, with benefits derived from the additional water resource.
- Effluent reuse The schemes have a high energy demand arising from intensive water treatment processes, with adverse effects on carbon emissions. For some of the schemes, construction of the water conveyance pipelines, or tunnels may temporarily adversely affect natural, built, or human receptors, with associated HRA and WFD risks.
- Reservoirs Can have significant adverse effects during a prolonged construction period. Both adverse and beneficial effects can arise during operation: from potential adverse effects on visual amenity in the medium to long-term before the reservoir

landscaping is fully established, to beneficial effects from the recreational resources and compensatory habitat provision.

- Redevelopment of existing resources with increased yields Typically few negative environmental impacts due to use of existing assets, with benefits derived from the additional water resource.
- Tankering Typically high Invasive and non-native Species Risk and carbon impacts. Associated transfers have likely effects as outlined for that option type.
- Transfers Treated water transfers generally have fewer environmental effects, but this is dependent on the precise location of the construction activities relative to natural, built, and human receptors. Effects from water transfers vary considerably according to the scale of the scheme and the associated transfer and water treatment infrastructure required.
- Trading Involves an agreement with another water company to trade water where there is a surplus. Few environmental effects for these specific options, however depending on how the water is transferred the transfer itself may have potential environmental consequences.

Programme Appraisal

Thames Water has adopted a planning approach that uses least-cost optimisation as well as broader criteria to develop a Best Value Plan (Preferred Plan) which takes account of 'best value' decision making criteria:

- Cost to build and operate the plan
- Adaptability and flexibility of the plan to cope with uncertain future needs
- Alignment to the Water Resource East regional strategy
- Resilience of the plan to severe and extreme drought and other hazards, and the residual risks
- Deliverability of the plan with timescales needed to manage risks
- Alignment to customer preferences
- Environmental and social impacts of the plan, including net environmental benefit

Through the WRSE regional planning process, environmental metrics (translated from the assessment results) were included in the investment modelling to influence the selection of options within the WRSE Draft Regional Plan and correspondingly Thames Water's WRMP. The environmental metrics were used as part of the development of the draft WRMP as one of the 'best value' criteria, which was used to generate the list of BVP options.

Demand management is a priority for Thames Water. In developing the WRMP, Thames Water has first considered what risk could be offset from demand management, before seeking to develop supply-side options. Although the demand management strategy is ambitious it must also be deliverable, and therefore carefully targeted investment in supply-side capacity was still required. The supply-side options considered for inclusion in the WRMP24 have been developed following industry and regulator guidance.

The Preferred Plan provides the best value for customers in the long-term whilst considering environmental and social metrics such as SEA performance, embodied carbon, biodiversity net gain, and others. The strategy:

- Prioritises demand management, which aligns with customers' expectations
- Recognises the environmental benefits of demand management, such as offsetting treatment and pumping costs and carbon

- Challenges Thames Water and its customers to push the boundaries of what is achievable, with respect to levels of future consumption
- Maximises the use of existing resources before developing new ones
- Provides future flexibility over the location and type of new resource inputs
- Delivers significant additional resilience across the region both to drought and nondrought events (e.g., freeze-thaw)
- Delivers environmental benefits, by reducing abstraction from the environment and ensuring no deterioration in the ecological status of water bodies in the region

Cumulative Effects of the Best Value Plan and Alternative Plans

The Thames Water WRMP24 and its options have been assessed at a high strategic level. The options that form the WRMP24 (the Best Value Plan (BVP)) will be subject to the formal planning process when implemented and may require an Environmental Impact Assessment under the Town and Country Planning (Environmental Impact Assessment) Regulations 2017 (as amended). Requirements for environmental impact assessment will be determined on an option-by-option basis. As part of this process more detailed option-specific mitigation measures will be developed.

The large supply options proposed under the adaptive strategy (e.g., new reservoirs and desalination plants) may be classified as 'Nationally Significant Infrastructure' and would therefore be required to go through the Development Consent Order planning route. As mentioned previously the strategy has been identified to enable 'pre-planning' activities for these options so that they are available for delivery if they are selected in Thames Water's WRMP24.

The WRMP24 supports several local, regional, and national plans and programmes. It will have a direct link to water resources and water supply plans and policies, for example in Local Plans. The development of WRMP has taken future population growth into account and as such will support Local Plan policies on housing and development. The WRMP will also have indirect links to plans that relate to health and well-being, housing, and the environment.

The WRMP24 will also have direct links to other Thames Water plans such as the Drought Management Plan and other water company's plans. The WRMP24 will interact with and support the Thames Water Drought Plan. The Drought Plan looks at demand-side management actions and supply-side management actions for ensuring water supply during drought conditions, set out in Section 4. Demand management options in the Drought Plan such as leakage reduction are also contained in the WRMP24 but for the Drought Plan leakage reduction works would be increased during periods of potential or actual drought. The Drought Plan also includes measures such as temporary use bans and non-essential use bans, which are similarly set out in Section 4.

Links are possible with other water company's plans and strategies, particularly where water trading and transfers cross water company boundaries, for example through the Strategic Resource Options (SROs). The Water Resources South East regional plan assessment has highlighted the potential for in-combination effects for the construction and operational phases of a number of water company options therefore major negative effects have been identified. There is also potential for cumulative effects on aquatic ecology during the construction phases. Priority habitats, woodland and Ancient Woodland may also be impacted directly, indirectly, or cumulatively. The catchment management schemes within the Best Value Plan are not

specifically within the water company boundary buffers, however they may result in positive cumulative effects as they include schemes such as river restoration, terrestrial habitat / management, and wetland creation, amongst others.

Mitigation

Mitigation measures have been suggested as part of the SEA options assessment process. Where possible mitigation measures have been incorporated into the options development process. This has included pipeline re-routing and directional drilling to avoid significant effects on designated sites and heritage assets. Incorporation of these measures at this early strategic stage will help deliver a WRMP that benefits the environment and reduces the risk of significant negative effects and cost-prohibitive mitigation measures further down the line during detailed design of specific options. Thames Water is committed to delivering all mitigation measures identified by the SEA and HRA. The bullet point list below outlines which construction best practice measures are considered across all options. The purpose of these is to minimise the effects of construction activity on people, recreation, and the environment:

- General: A Construction Environmental Management Plan (CEMP) will be produced for each development, detailing the general and specific mitigation measures required to avoid and/or minimise impacts. The CEMP will detail the control measures, thresholds, and necessary feedback mechanisms.
- General: Construction compounds will be located to avoid the need for the removal of trees, hedgerows, or other important vegetation, where possible.
- Air Best practice construction methods for dust suppression, and measures to reduce construction related transport emissions and emissions from plant machinery. Measures to be outlined in a CEMP such as bulk deliveries, transport by rail if feasible, turning off idling equipment and engines, using alternatives to diesel generators.
- Biodiversity: During construction, appropriate biosecurity mitigation measures will be put in place to avoid the spread of any INNS that may be present in the construction areas. Invasive species on site are to be identified and removed or treated in advance of construction works, in line with national INNS protocols and guidance. Tunnel commissioning will be undertaken with treated water.
- Biodiversity: Habitat and protected species surveys will be undertaken for each development to determine whether further site and species/habitat specific mitigation measures are required.
- Biodiversity: Where trees need removal, or works are in proximity, an Arboricultural Implications Assessment will be completed to minimise impacts and identify root protection zones that should be observed.
- Health and wellbeing: Trenchless pipeline construction techniques will be used where appropriate to mitigate impacts on health and wellbeing.
- Health and wellbeing: Operational noise impacts should be effectively mitigated using noise insulation and enclosing such plant within buildings as part of their design.
- Recreation and access: During construction all, reasonable effort will be made to avoid temporary closure of Public Rights of Way (PRoW) and if these are required diversions will be provided instead. Public Rights of Way will be reinstated following construction completion. Careful siting and use of screening where work locations are in proximity to Public Rights of Way will be undertaken.
- Soils Reinstatement of land to the same or better-quality following pipeline construction.

- Material assets Excavated material will be reused on site.
- Archaeology: Archaeological desk-based studies, written schemes of investigation and watching briefs will be required where options are near heritage sites or where there is the potential for archaeological finds to be uncovered as part of excavation works.
- Water: Potential construction impacts on surface and groundwater quality will be minimised using pipejacking, and any chemical/oil storage will be fully bunded to prevent accidental pollution.
- Water: Drainage water from operational sites will be disposed of appropriately to avoid pollution (e.g., road drainage).
- Water: Adherence to Environment Agency Pollution Prevention Guidelines (although now formally withdrawn they are a useful source of information).

Enhancement Opportunities

The SEA identified numerous enhancement measures across the option assessments, these include:

- Enhance Public Rights of Way networks.
- Incorporate education and information resources in option design to enhance operational benefits.
- Enhance the reservoirs through incorporating recreational activities into the design process.
- Development of tourism and recreational assets on site, this also has potential to add economic value to the area.
- Opportunities to create new habitats alongside the reservoir.
- Opportunities to improve existing habitats during post-construction remediation. Options are suitable for planting high value habitats.
- Opportunities to use sustainable materials and implement sustainable design measures.

Further mitigation and enhancement measures have been collated and presented in Section 8 of the Strategic Environmental Assessment Report.

Monitoring

Monitoring the negative effects of implementing the WRMP is an essential ongoing element of the SEA process. Monitoring helps ensure that the identified SEA objectives are being achieved and allows for early identification of unforeseen adverse effects and thus appropriate remedial action can be taken. Monitoring will be an important requirement to measure performance and ensure the WRMP is being successfully implemented.

The SEA Regulations expect that monitoring should focus on the significant negative effects identified through the assessment. The UKWIR guidance recommends that existing arrangements for monitoring should be used where possible to avoid duplication of effort.

SEA Objective	Indicator	Timescale
Protect and enhance biodiversity,	Area (ha) and number of statutory and	Every five
priority species, vulnerable habitats,	non-statutory ecological sites what will be	years
and habitat connectivity (no loss and	harmed or lost to WRMP options	
	SSSI monitoring	

SEA Objective	Indicator	Timescale
improve connectivity where possible).	Area of blue and green infrastructure created % Of habitat creation or existing habitat enhancement	Every five years
	% Of INNS risks mitigated	During construction
	Ecological status of water bodies	Annually
To protect and enhance the functionality and quality of soils, including the protection of high-grade agricultural land, and geodiversity.	Area of agricultural land (by grade) lost to WRMP options	Every five years
Increase resilience and reduce flood risk.	% Of flood risks noted in Flood Risk Assessment (FRA) for projects mitigated	During construction
Protect and enhance the quality of the water environment and water resources.	Chemical status of water bodies	Annually
	Number of geological sites affected Groundwater quality testing	Annually
	Achievements against WFD objectives	Annually
Deliver reliable and resilient water supplies.	Number of supply disruptions per annum	Annually
	% Of people with deficits for each WRMP	Annually
To reduce and minimise air emissions during construction and operation.	Local air quality monitoring	During construction
To minimise/reduce embodied and operational carbon emissions.	Reduction of greenhouse gas emissions perMI/d Energy use from new operations and change in energy use perMI/d % Energy supplied by renewable sources	Annually

SEA Objective	Indicator	Timescale
	Reduction of operational and capital carbon emissions Number of options that utilise existing infrastructure Volume of waste generated Waste disposal method by %	
Reduce vulnerability to climate change risks and hazards.	% Of climate risks mitigated	Every five years
To conserve, protect and enhance landscape and townscape character and visual amenity.	Number of WRMP options including additional landscaping	Every five years
Conserve, protect and enhance the historic environment, including archaeology.	Number of historic assets damaged by a WRMP option Number of historic assets enhanced by options	Every five years
To maintain and enhance the health and wellbeing of the local community, including economic and social wellbeing.	Number of complaints	During construction phases
	Number of PRoW closures or diversions Number, type, and area of community assets created Km of new footpath/cycleway created	During construction phases Every five years
Maintain and enhance tourism and recreation.	Number of tourism assets created	Every five years
Minimise resource use and waste production.	% Of A-Rated, recycled, reused material used in infrastructure options Number of options that utilise existing infrastructure Volume of waste generated Waste disposal method by %	Annually
Avoid negative effects on built assets and infrastructure.	Number of complaints Number of road closures or diversions	During construction

Section 9 of the Strategic Environmental Assessment Report presents the SEA monitoring proposals for the WRMP.

1 Introduction

1.1 Background and Context

Thames Water is the UK's largest water and wastewater services company, and it supplies 2.6 billion litres of drinking water per day and treats 4.7 billion litres of wastewater per day. It is responsible for the public water supply and wastewater treatment for most of Greater London, Luton, the Thames Valley, Surrey, Gloucestershire, north Wiltshire, and far west Kent. The area covered by Thames Water has a population of 15 million, that comprises 27% of the UK population.

Water companies have a statutory obligation to produce a Water Resources Management Plan (WRMP). The WRMP sets out how a company intends to achieve a secure supply of water for customers while protecting and enhancing the environment over a minimum 25-year period. The plans must be prepared every 5 years and reviewed annually. Thames Water's WRMP 2024 (WRMP24) renews the previous WRMP published in 2019.

In the development of a WRMP, companies in England and Wales must follow the Environment Agency Water Resources Planning Guideline and consider broader government policy objectives. The guideline highlights that where required companies must carry out a Strategic Environmental Assessment (SEA) for their WRMP.

The objective of a SEA, in accordance with Article I of the SEA Directive (European Directive 2001/42/EC)¹ from which the 2004 SEA Regulations are derived, is *'to provide for a high level of protection of the environment and to contribute to the integration of environmental considerations into the preparation and adoption of plans and programmes with a view to promoting sustainable development...'*.

To achieve this, the SEA Directive requires that plans and programmes undergo environmental assessment. It suggests that among other factors biodiversity, human health, population, and water should be included.

Water Resource Planning Guidelines

The Water Resource Planning Guidelines (WRPG) set out the framework and requirements for developing a WRMP with the objective 'to efficiently deliver resilient, sustainable water resources for your customers and the environment, both now and in the long term'.

The WRPG highlights the following key environmental considerations:

- Reflect the government's 25-year Environment Plan including:
 - Setting out ambitions for environmental sustainability and resilience
 - Supporting nature recovery
 - Using natural capital in decision-making
 - Using a catchment approach

¹ The European Parliament and the Council of the European Union (2001). Directive 2001/42/EC of the European Parliament and of the Council of 27 June 2001 on the assessment of the effects of certain plans and programmes on the environment. *Official Journal of the European Communities*. Available at: <u>EUR-Lex - 32001L0042 - EN - EUR-Lex (europa.eu)</u>.

- Delivering net gain for the environment
- Considering the impact of climate change regarding river flows and groundwater recharge, and any future supply options.
- Considering the issue of the spread of invasive non-native species (INNS) and proposed measures to mitigate that risk.
- Enhancing the natural resilience of catchments by effective catchment management planning, to increase the amount and/or quality of water available for abstraction without posing unacceptable pressures on the environment.
- Considering whether abstractions are truly sustainable, looking across a catchment.
- Considering the requirement to demonstrate Biodiversity Net Gain (BNG) for options and the plan.
- A stronger focus and detailed guidance on natural capital including the five minimum ecosystem services to be considered and natural capital metrics.
- Improved guidance on approaches to integrate environmental outputs into options decision-making and programme appraisal.

The draft supplementary guidance note 'Environment and society in decision-making'² provides additional detail on how to integrate environmental and social considerations into decision-making in the WRMP process through SEA, BNG and Natural Capital Assessment (NCA).

The Guidelines state there is a need to comply with environmental legislation, SEA, and Habitats Regulations Assessments (HRA). The results of the SEA and other environmental assessments aids decision-making on mitigation requirements, options development, and selection of preferred options for the WRMP, with the aim of developing a WRMP that meets legislative environmental requirements and provides environmental net gain.

WRMP and the Regional Planning process

Water Resources South East (WRSE) is made up of an alliance of the six water companies that cover the South East region of England, these are:

- Affinity Water
- Portsmouth Water
- SES Water (Sutton & East Surrey)
- Southern Water
- South East Water
- Thames Water

WRSE's aim is to secure the water supply for future generations through a collaborative, regional approach to managing water resources. To meet this aim, WRSE is producing a multi-sector, regional resilience plan in order to secure reliable and resilient water supplies for the south east of England. The WRSE regional plan will take a long-term view to 2100 and will also provide a consistent framework for the development of the member water companies WRMP 2024.

The main objectives, as presented in the WRSE regional plans, are to:

- Ensure there is enough water for a growing population and to support economic growth.
- Improve the environment by leaving more water in the region's rivers, streams, and underground sources.

² 'Environment and society in decision-making' available from: water-company-plan@environment-agency.gov.uk

- Increase the region's resilience to severe drought and other extreme shocks and stresses.
- Address the impacts of climate change on demand for water and how much is available.

The ambition is that water companies in the region will collaborate with others and agree a longterm water resource strategy which will then be used to guide the development of the draft 2024 WRMPs. WRSE's overall aim is to deliver a reliable, sustainable, and affordable system of water supply to meet multi-sector requirements (including the environment) across the South East of England for the next 50 years and beyond towards the end of the century.

In support of the National Framework, WRSE is developing the Regional Plan in parallel to the water company WRMP24 development process.

The WRSE regional plan suggests the environmental assessments, including the SEA, can be used as a framework for the WRSE member water companies such as Thames Water when undertaking their WRMP24 statutory environmental assessments.

To support the development of the regional plan an environmental assessment process is being undertaken that includes:

- Strategic Environmental Assessment
- Habitats Regulations Assessment
- Water Framework Directive Assessment
- Biodiversity Net Gain Assessment
- Natural Capital Assessment
- Invasive Non-Native Species Risk Assessment

SEA option assessments carried out for the regional plan were used for the WRMP24 SEA assessment. The regional SEA results were reviewed and where relevant local information was included in the assessments as part of WRMP24. The regional SEA results may also flag where mitigation is needed, which would help inform further options development by Thames Water for the WRMP24.

The regional plans will undergo in-combination effects assessment. To meet legislative requirements, an in-combination effects assessment, specific to Thames Water WRMP24, will also take place, the results from which are included in this report. The Thames Water WRMP24 in-combination effects assessment will consider transfers which are outside the Thames Water area or in close proximity to the plan boundary with potential pathways affecting receptors outside the plan area.

The SEA Process

Strategic Environmental Assessment is required for the Thames Water WRMP24 under the European Directive 2001/42/EC, more commonly known as the SEA directive. The Directive was transposed into United Kingdom (UK) law via the Environmental Assessment of Plans and Programmes Regulations 2004, which requires an assessment of the effects of certain plans and programmes on the environment. While Directive 2001/42/EC originated from the European Union (EU), it continues to apply after the EU (Withdrawal) Act 2018 came into force as one of the preserved laws made in the UK to implement EU obligations. Article 3 of the Directive requires that SEA shall be carried out for plans and programmes which are prepared for water management, set the framework for development consents, and are likely to have a significant environmental impact.

The SEA also works to inform the plan-making process through the identification and assessment of effects a plan or programme may have on the environment, including cumulative and in-combination effects. The SEA process is conducted at a strategic level and enables consultation on the potential effects of a plan with a wide range of stakeholders. Figure 1.1 presents the different stages in the SEA process.

The Thames Water WRMP24 SEA was carried out in accordance with the following guidance:

- Water Resources Planning Guideline (WRPG): Working version for WRMP24 (version 4.2) (Environment Agency, Natural Resources Wales, Ofwat).
- Environment Agency (2020) Water resources planning guideline supplementary guidance Environment and society in decision-making.
- UK Water Industry Research (UKWIR) (2012) Strategic Environmental Assessment and Habitats Regulations Assessment Guidance for Water Resources Management Plans and Drought Plans (ref. 12/WR/02/7).
- Environmental Assessment Guidance for Water Resources Management Plans and Drought Plans (UKWIR 2021, re. 21/WR/02/15).
- Office of the Deputy Prime Minister (ODPM) (now the Department for Levelling Up, Housing and Communities (DLUHC)) (2005). A Practical Guide to the Strategic Environmental Assessment Directive.
- Defra (2018) A Green Future: Our 25 Year Plan to Improve the Environment.
- Environment Agency (2011) Strategic environmental assessment and climate change: guidance for practitioners.
- Historic England (2016) Sustainability Appraisal and Strategic Environmental Assessment Historic England Advice Note 8.
- Strategic Environmental Assessment: Core Objective Identification, 2020, All Company Working Group.
- Water Resource Planning Guidelines, 2021, Environment Agency, Ofwat, Natural Resources Wales.

Defra consulted on draft Environmental Targets (ETs)in March 2022. The consultation period opened on 16 March 2022 and closed on the 27 June 2022. Legally binding environmental targets are a key commitment in the Environment Act 2021 and will help deliver the government's vision of leaving the environment in a better state than it was found and will drive forward ambitious environmental improvements by successive governments that protect and enhance our natural world.

The 2021 Environment Act requires the government to set at least one long-term target in each of the following areas: air quality; water; biodiversity; and resource efficiency and waste reduction. It also requires targets to be set for fine particulate matter (PM2.5) and species abundance (i.e., six categories of ET in total). Defra is proposing targets in these six categories that will deliver environmental outcomes in the areas where there are some of the greatest problems. This is why the draft ETs go beyond the legal minimum that Defra is required to set, with additional proposals on: biodiversity; water; marine; and woodland cover.

Step 4 of the process towards setting ETs is the drafting of target legislation, to be laid before Parliament by 31 October 2022; the Target Statutory Instruments will come into force once approved by Parliament. Once these Target Statutory Instruments come into force, it appears that they will be highly influential on environmental policy and may well provide a basis for SEA Objectives in SEAs. However, since these ETs are currently in draft, not drafted as Statutory Instruments, and the consultation responses to the March consultation are unknown, they have not been considered further in the current WRMP SEA process, including with regard to setting SEA Objectives for this WRMP. The SEA involved a fully integrated environmental assessment approach, with multiple sub-assessments. While each sub-assessment fed into the SEA, they were also detailed enough to form standalone assessments. The sub-assessments included a Habitats Regulations Assessment (HRA), Water Framework Directive (WFD) assessment, Natural Capital (NCA) assessment, Biodiversity Net Gain (BNG) assessment, and Invasive Non-Native Species (INNS) risk assessment.





Source: Adapted by Mott MacDonald from the DLUHC SEA Guidance 'A Practical Guide to the Strategic Environmental Assessment Directive'.

Purpose and Structure of the Environmental Report

Water companies have a statutory obligation to produce a WRMP. The WRMP sets out how a company intends to achieve a secure supply of water for customers while protecting and enhancing the environment over a minimum 25-year period. The plans must be prepared every 5 years and reviewed annually. Thames Water's WRMP24 renews the previous WRMP published in 2019.

In the development of a WRMP, companies in England and Wales must follow the Environment Agency (EA) Water Resources Planning Guideline and consider broader government policy objectives. The guideline highlights that where required companies must carry out a SEA for their WRMP.

The objective of a SEA, in accordance with Article I of the SEA Directive (European Directive 2001/42/EC)4, is 'to provide for a high level of protection of the environment and to contribute to the integration of environmental considerations into the preparation and adoption of plans and programmes with a view to promoting sustainable development...'.

In order to achieve this, the SEA Directive requires that plans and programmes undergo environmental assessment. It suggests that among other factors biodiversity, human health, population, and water should be included.

Article 5 (1) of the SEA Directive requires that an environmental report is prepared as part of the assessment (Stage C in Figure 1.1). The environmental report should address 'the likely significant effects on the environment of implementing the plan or programme, and reasonable alternatives...'. This environmental report has been prepared in accordance with the requirements of the SEA Directive.

The purpose of this environmental report is to review the feasible options for the WRMP and reasonable alternatives, to identify any potential effects (positive and negative). This has been enabled through the following Environmental Assessment process:

- A high-level environmental screening assessment.
- Detailed options-level assessments (including SEA, HRA, WFD, NCA, BNG, and INNS assessments).
- Programme Appraisal, including cumulative and in-combination effects for SEA, HRA, WFD, NCA, BNG (note, natural capital will assess cumulative only).

The draft WRMP and Environmental Report will be issued for formal consultation to Defra in October 2022, and to the public in November 2022. Following such consultation, responses will be reviewed, and the Environmental Report updated as appropriate. A log of consultation comments will be provided as an annex in the final Environmental Report.

To produce this Environmental Report, Mott MacDonald has relied on published data and information provided by WRSE, and from third party organisations. The baseline information collected is the most up-to-date available at the time of writing, however it is possible that conditions described in this report may have changed or will change over the plan period.

1.2 Compliance with the SEA Directive

The Environmental Report has been prepared in accordance with the requirements of the SEA Directive. Table 1.1 indicates where the specific requirements in the SEA Directive relating to the Environmental Report (SEA Directive Annex I) can be found within this report.

SEA Directive Environmental Report Requirements	Section of Environmental Report
	where Requirement is Found
An outline of the contents, main objectives of the plan or	Section 1 sets out the purpose and
programme and relationship with other relevant plans and	objectives of the regional plans and
programmes.	WRMP, Section 3 and Annex C outline
	the relationship of the SEA with other
	polices, plans and programmes.
The relevant aspects of the current state of the environment	Annex B sets out both the existing
and the likely evolution thereof without implementation of	environmental baseline and future
the plan or programme.	baseline.
The environmental characteristics of areas likely to be	Annex B sets out the existing
significantly affected.	environmental baseline, Section 4
	explains how options were developed,

Table 1-1: SEA Directive Requirement Signposting Table

SEA Directive Environmental Report Requirements	Section of Environmental Report where Requirement is Found
	presents the method and findings of the environmental assessment.
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 and 92/43/EEC.	Section 4 explains how options were developed, presents the method and findings of the environmental assessment, Section 5 sets out the programme appraisal stage, including the identification of reasonable alternative programmes, and the findings of the environmental assessment.
The environmental protection objectives, established at International, 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.	Annex C outlines the relationship of the SEA with other polices, plans and programmes
The likely significant effects on the environment, including on issues such as biodiversity, population, human health, fauna, flora, soil, water, air, climatic factors, material assets, historic environment, landscape and the interrelationship between the above factors.	Section 4 explains how options were developed, presents the method and findings of the environmental assessment, Section 5 sets out the programme appraisal stage, including the identification of reasonable alternative programmes, and the findings of the environmental assessment, including the cumulative effects assessment, Section 6 sets out the WRMP24 best value plan, including findings of the cumulative effects assessment. Summary of findings from environmental assessments (HRA, WFD, NCA, BNG, INNS) is in Section 7.
The measures envisaged to prevent, reduce and as fully as possible offset any significant adverse effects on the environment of implementing the plan or programme.	Section 8 sets out the mitigation identified for the WRMP24 best value plan, including opportunities for enhancements and areas for further investigation.
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.	Section 5 explains the programme appraisal stage, identifies reasonable alternative programmes, sets out the findings of the environmental assessment, and outlines reasons for the selection of the preferred programme and adaptive futures, Section 6 sets out the WRMP24 best value plan, including findings of the cumulative effects assessment.

SEA Directive Environmental Report Requirements	Section of Environmental Report where Requirement is Found
	Section 7 outlines environmental assessment (including HRA, WFD, NCA, BNG, INNS).
A description of the measures envisaged concerning monitoring in accordance with Article 10.	Section 9 sets out proposals for monitoring.
A non-technical summary of the information provided under the above headings.	The Non-Technical Summary has been provided.

1.3 Environmental Report Structure

The SEA Environmental Report is structured as follows:

- Non-Technical Summary
- Section 1 Introduction to the WRMP and SEA process and requirements
- Section 2 Description and context of the WRMP
- Section 3 Scoping Summary
- Section 4 Assessment of the emerging WRMP and feasible options
- Section 5 Assessment of alternative programmes and WRMP24 decision making
- Section 6 Preferred best value plan (WRMP24)
- Section 7 Summary of HRA, INNS, WFD, BNG and NCA
- Section 8 Mitigation measures and enhancement opportunities
- Section 9 Monitoring proposals
- Section 10 Consultation and next steps
- Annex A. SEA Process Tasks
- Annex B. Scoping Report Consultation Log
- Annex C. Policies, Plans and Programmes Review
- Annex D. Baseline Review
- Annex E. SEA Scoring Criteria
- Annex F. SEA Option Assessments
- Annex G. SEA Options Assessments (WRMP19 Options)
- Annex H. WRMP19 Mitigation Register

The following reports (Figure 1.2) will be delivered for consultation supporting the draft Thames WRMP24.

Figure 1-2: Reports submitted in support of the Thames Water draft WRMP24



2 Description and Context of the Thames WRMP24

2.1 Background and purpose

As outlined within Section 1, water companies have a statutory obligation to produce a WRMP, which sets out how a company intends to maintain the balance between supply and demand for water over a minimum 25-year period. New WRMPs are prepared every five years and Thames Water is due to publish its next WRMP in 2024, which is the subject of this Environmental Report.

As said in the introduction Thames Water is the UK's largest water and wastewater services company and it supplies 2.6 billion litres of drinking water per day and treats 4.7 billion litres of wastewater per day. The area covered by Thames Water has a population of 15 million, that comprises 27% of the UK population.

2.2 Thames Water WRMP24

Thames Water has adopted a planning approach that uses least-cost optimisation as well as broader criteria to develop a Best Value Plan (Preferred Plan) which takes account of 'best value' decision making criteria including:

- Cost to build and operate the plan
- Adaptability and flexibility of the plan to cope with uncertain future needs
- Alignment to the Water Resource East regional strategy
- Resilience of the plan to severe and extreme drought, other hazards, and their residual risks
- Deliverability of the plan with timescales needed to manage risks
- Alignment to customer preferences
- Environmental and social impacts of the plan, including net environmental benefit

The SEA and other environmental studies undertaken were used as part of the decision-making criteria on the environmental and social impacts of the plan to develop the Preferred Plan.

Demand management is a priority for Thames Water. In developing the WRMP, Thames Water has first considered what risk could be offset from demand management, before seeking to develop supply-side options. Although the demand management strategy is ambitious it must also be deliverable, and therefore carefully targeted investment in supply-side capacity would still be required. The supply-side options considered for inclusion in the WRMP24 have been developed following industry and regulator guidance.

The Preferred Plan provides the best value for customers in the long-term whilst considering environmental and social metrics such as SEA performance, embodied carbon, BNG, and others. The plan:

- Prioritises demand management, which aligns with customers' expectations
- Recognises the environmental benefits of demand management, such as offsetting treatment and pumping costs and carbon
- Challenges Thames Water and its customers to push the boundaries of what is achievable, with respect to levels of future consumption
- Maximises the use of existing resources before developing new ones
- Provides future flexibility over the location and type of new resource inputs

- Delivers significant additional resilience across the region both to drought and nondrought events (e.g., freeze-thaw)
- Delivers environmental benefits, by reducing abstraction from the environment and ensuring no deterioration in the ecological status of water bodies in the region

The WRMP includes an adaptive strategy to deal with uncertainties and future scenarios that will mean further investment is required (e.g., further future sustainability reductions). In some cases, there may not be a long lead time to implement schemes and therefore Thames Water need to develop a plan which identifies thresholds beyond which they need to take further action. The potential options identified as part of the adaptive strategy have been assessed as part of the SEA. It should be noted that at this stage these are strategic supply-side options that may be required in the future. They do not form a definitive list of options.

The Draft WRMP will be published for consultation in November 2022, allowing interested stakeholders and customers to review and comment upon the proposals. The feedback received from the consultation process to date has played a significant role in shaping the WRMP.

3 Scoping Summary

3.1 Introduction

The scoping stage of the SEA process (Stage A in Figure 1.1) sets the context and scope for the SEA and Environmental Report. During scoping key plans and programmes are reviewed, baseline conditions, and key issues and opportunities are identified, and the SEA Framework is developed. This section summarises the outcomes of the scoping stage. Further detail on the relationship with other policies, plans, and programmes, as well as the scoping baseline review and future baseline are provided in Annex C and D respectively.

3.2 Scoping Consultation

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

Following the Scoping Report consultation period, all consultation responses were reviewed and considered as appropriate. Comments were received, encompassing agreement with aspects of the proposed approach, methodological questions and clarifications, along with suggested modifications and enhancements to the proposed approach and SEA Framework.

Where changes to the approach were suggested, these were considered in detail by the Water Resources Management Plan (WRMP24) project team. Recommendations were incorporated based on factors such as:

- the extent to which they were already addressed by the SEA Framework
- their specific applicability and relevance (including level of detail) to the purpose and scope of the WRMP
- the feasibility of carrying out realistic and informative assessments
- proportionality in the context of the existing SEA Framework for water resources planning
- the significance of the expected effects on assessment results

The full SEA Framework, with changes from the Scoping Report consultation incorporated, is shown in Table 3.1. Note the purpose of the assessment questions is to prompt consideration of specific issues when assessing effects related to each SEA topic and objective.

SEA Topic	SEA Objective(s)	Assessment Questions /
		Sub-Themes
Biodiversity, flora, and fauna	 Protect and enhance biodiversity, priority species, vulnerable habitats and habitat connectivity (no loss and improve 	 Is the option likely to affect the conservation status of any Special Protection Area (SPAs), Special Area of Conservation (SACs), Ramsar sites, and Marine Conservation Zones (MCZ), undermine or prevent

Table 3-1 : Post-consultation SEA Methodology Assessment Framework

SEA Topic	SEA Objective(s)	Assessment Questions / Sub-Themes
	connectivity where possible).	restoration of Sites of Special Scientific Interest (SSSI) condition or affect the condition of locally designated sites?
		 Will the option protect and enhance aquatic habitats and species, including freshwater fisheries and chalk rivers?
		 Will the option affect the marine environment, habitats, and species (including MCZs and Marine Protected Areas (MPAs))?
		 Is the option likely to affect ancient woodland, Section 41 of the NERC (The Natural Environment and Rural Communities) act habitats and species of principal importance for the purpose of conserving biodiversity?
		 Will the option affect any habitats that support legally protected species or species of conservation concern?
		 Is there potential for contribution to achieving 'favourable' conservation status or for creation of new Section 41 of the NERC act habitats?
		 Is the option likely to have an impact on current or future Nature Recovery Network?
		 Are there any opportunities for habitat creation or restoration?
		 Will the option contribute to the loss or gain in habitat connectivity?
		 Is there a possibility for Invasive and Non-Native Species (INNS) to be spread/introduced or for algal blooms to occur?
		 Is there an opportunity to improve biodiversity value through removal of INNS?
		 Will the option affect the capacity for priority habitats and species to move or adapt in response to climate change?
Soil	2. To protect and enhance the functionality and quality of soils, including the protection of high-grade agricultural land, and	 Will the option affect high grade agricultural land?
th		 Will the option promote the efficient use of land?
		 Will the option prevent soil erosion and retain soil stocks as a natural resource?
geodiversity.	geodiversity.	 Will the option promote soil health?
		• Will the option involve use of brownfield or greenfield land?
		 Will the option prevent mineral sterilisation?
		 Will the option affect soil contamination or involve remediation?
		 Is the option likely to affect geodiversity, including SSSIs of geological importance?

SEA Topic	SEA Objective(s)	Assessment Questions / Sub-Themes
Water	 Increase resilience and reduce flood risk. 	Is the option vulnerable to flood risk?Will the option contribute to, or reduce the risk of flooding?
	4. Protect and enhance the quality of the water environment and water resources.5. Deliver reliable and resilient water supplies.	 Will the option affect surface water quality or quantity?
		 Will the option affect ground water quality or quantity?
		 Is the option likely to contribute to or conflict with the achievement of Water Framework Directive (WFD) objectives?
		 Will the option affect bathing waters?
		 Will the option affect protected waters for shellfish?
		 Will the option affect chalk rivers and streams?
		 Will the option affect raw water quality?
		 Will the option reduce the flashy nature of surface waters?
		 Will the option slow the flow in upper catchments and reduce soil losses to river systems?
		 Does the option provide a reliable and sustainable water supply which meets changing demand?
		 Will the option protect and enhance the environmental resilience of the water environment to climate change, flood risk and drought?
Air	6. To reduce and minimise	 Is the option in an air quality management area (AQMA)?
	air emissions during construction and operation.	 Will the option affect local air quality?
Climatic Factors	7. To minimise/reduce embodied and operational carbon emissions	 Will the option affect carbon or other greenhouse gas (GHG) emissions?
	8. Reduce vulnerability to climate change risks and hazards.	 Is there potential for the option to incorporate climate mitigation measures to reduce its carbon footprint, such as lower embodied carbon or incorporating renewable energy?
		 Will the option affect carbon sequestration?
		 Is the option vulnerable to climate change effects?
		 Does the option include climate resilience measures?
		 Will the option create catchment resilience to drought? Does the option enable or reduce the potential of water dependent wildlife to adapt to climate change?
Landscape	 To conserve, protect and enhance landscape and townscape character and visual amenity. 	 Will the option have an effect on the character of the landscape or townscape including tranquillity and views?
		 Will the option improve access to the countryside?
		 Will the option create or improve green infrastructure which contributes to access to the landscape?

SEA Topic	SEA Objective(s)	Assessment Questions / Sub-Themes
		 Will the option protect and enhance designated landscapes and features?
Historic Environment	10. Conserve, protect and enhance the historic environment, including archaeology.	• Will the option affect designated or non-designated historic assets, sites and features?
		 Will the option affect the setting and/or significance of a historic asset?
		 Will the option affect archaeology (including unknown archaeology)?
		 Will the option affect heritage assets at risk?
		 Will the option affect conservation areas or historic landscape/townscape areas?
Population and Human Health	 11. To maintain and enhance the health and wellbeing of the local community, including economic and social wellbeing. 12. To maintain and enhance tourism and recreation. 	• Does the option promote water efficiency and encourage a reduction in water consumption?
		• Will the option secure resilient water supplies for the health and wellbeing of customers?
		 Will the option allow for economic development?
		 Will the option allow for economic diversity?
		 Will the option have an effect on active lifestyles, such as impacts on active travel through disruption to pedestrian and cycle routes?
		 Will the option affect Public Rights of Way?
		 Will the option affect road or rail infrastructure? Will the option minimise disturbance from noise, light, visual, and transport?
		• Will the local communities have been actively engaged to foster an inclusive environment and participate in decision making?
		Will the option maintain or enhance tourism?
		 Does the option improve access to the natural environment for recreation, including those living within deprived areas?
		Will the option have an effect on freshwater fisheries for recreational purposes?Will the option have an effect on marine fisheries for
Material Assets		recreational purposes?
	 To minimise resource use and waste production. To avoid negative effects on built assets and infrastructure. 	 Will the option reuse existing infrastructure? Will the option minimise the use of resources? Will the option reduce the production of waste?

SEA Topic	SEA Objective(s)	Assessment Questions / Sub-Themes
		 Will the option affect built assets and infrastructure, including transport infrastructure?
		 Will the option avoid negative effects on existing green infrastructure?
		 Will the option create opportunities for enhancing existing green infrastructure?

3.3 Scoping BaselinePlease see Environmental Baseline provided for scoping in Annex D.

4 Assessment of Feasible Options

4.1 Introduction

As part of the regional planning and WRMP development process, Thames Water undertook modelling to identify areas with a surplus or deficit of water supply. Thames Water developed a range of options for maintaining the supply demand balance, and these options were then fed into the regional planning process. Through the WRSE regional planning process, environmental metrics (translated from the assessment results) were included in the investment modelling to influence the selection of options within the WRSE Draft Regional Plan and correspondingly Thames Water's WRMP. The environmental metrics were used as part of the development of the draft WRMP as one of the 'best value' criteria (see Section 2.2), which was used to generate the list of BVP options. The derivation of alternative programmes and role of WRSE is outlined in Sections 5.1, 5.2 and 5.3.

These options fall into the following broad categories:

- Supply options options that will provide a water supply to customers including transfers, maximising existing resources, trading, tankering, and new resources.
- Demand management options options that will reduce the demand for water including metering, water efficiency, and leakage reduction.
- Catchment management options include flow augmentation and licencing; integrated catchment management; knowledge exchange, education, and agricultural activity; natural water retention measures (including natural flood management and wetland creation); nutrient and sediment reduction; pesticide reduction; river restoration; Sustainable Urban Drainage Systems (SuDS); and terrestrial habitat creation/management.

The WRMP process involved Thames Water working with several regional stakeholders and neighbouring water companies to identify the best options to include as part of the WRSE Regional Plan, and the company's WRMP24.

To determine the environmental effects of the options and emerging WRMP24, the following staged assessment process was undertaken:

- Options-level assessment including SEA, HRA Test of Likely Significance (ToLS), WFD Level 1 assessments, NCA, BNG, and INNS assessments, set out within this Section of the report.
- Programme Appraisal including cumulative and in-combination effects for the programmes emerging from the regional planning process, set out within Section 5.

4.2 WRMP Option Types

The WRMP planning process produces a portfolio of options, which include supply-side options and those which also focus on demand and catchment management. The portfolio of options also includes a number used for the purpose of modelling only, which have not been assessed under this framework. For a full list of the options which comprise the Best Value, Least Cost and Best Environmental and Societal Plans and their SEA findings please see Annex F. A summary of how the planning process determined these options is provided in Section 5.

The supply-side option types considered include:

- Aquifer storage and recovery aquifer storage options involve abstracting water from a river or reservoir, treating and injecting it underground to be stored in natural aquifers.
- Desalination desalination options involve pumping sea water or brackish water (from an estuary) for treatment and release into supply. The water will be blended before putting into supply, with the brine typically piped out to sea for disposal (in the case of sea desalination) or to a sewer (in the case of brackish water desalination).
- Distribution capacity expansion Intra-zonal network enhancements (increased pipeline capacity or booster pumping capacity) to enable water to be transferred from new sources to demand centres within the water resource zone.
- Drought intervention drought intervention options include drought order; drought permit (discussed in more detail in Section 4.12 below); recommission abandoned sources; and temporary transfer.
- Groundwater sources Usually a borehole which abstracts water from an aquifer which then goes to a treatment works.
- Increase water treatment works (WTW) capacity and efficiency Increase deployable output by removing constraints within the treatment works.
- Effluent reuse effluent is treated and discharged into rivers or piped into supply.
- Reservoirs reservoir options include dam raising (increasing the capacity of existing reservoirs), or creation of new reservoirs. It is likely that most of these will be bunded reservoirs (i.e., not within a valley) with piped transfers in and out of supply.
- Redevelopment of existing resources with increased yields Increase the potential yield of an existing water resource asset to increase deployable output.
- Tankering sea and road tankering options have been considered. In the case of sea tankering storage and offloading, facilities will be required in the UK with water piped or tankered to WTWs or reservoirs.
- Transfers transfers include asset transfers, and bulk transfers within/into region, either of raw or treated water.
- Trading involves an agreement with another water company to trade water where there is a surplus.

Within the regional plans there are Strategic Resource Options (SROs) which are significant strategic options spanning across water companies. The Thames Water area includes SROs that have been selected in the associated regional plan, and therefore these SROs form part of the WRMP24. The environmental assessments undertaken for the SROs as part of the Regulators' Alliance for Progressing Infrastructure Development (RAPID) gated process, including SEA, HRA (Screening and Appropriate Assessment), WFD (Level 1 and Level 2) and INNS will be used to inform the Thames Water WRMP24.

The list of SROs that have informed the Thames Water WRMP24 considered different supply option types:

- London Reuse
- Thames to Affinity Transfer (T2AT)
- Thames to Southern Transfer (T2ST)
- South East Strategic Reservoir Option (SESRO)
- Severn to Thames Transfer (STT)

The demand option types considered include:

- Metering involves measuring water consumption and can include compulsory metering for household and non-household uses, smart metering, and other metering such as optant metering and metering of sewage flow.
- Consumption reduction involves measuring non-metering savings. It can include tariffs/fees (introduction of special fees, changes to existing measured tariffs, introduction of special tariffs for specific users) and water recycling (rainwater harvesting / grey water reuse for new or existing household and non-household). It can also include water efficiency measures such as the provision of advice and information on direct abstraction and irrigation techniques or leakage detection and fixing techniques, water use audit and inspection, awareness campaigns, sponsoring water efficiency enabling activities by others, home visits to reduce plumbing losses, and the promotion of water saving devices.
- Loss reduction involves measuring non-metering savings from leakages, either from network level/company side (capital works, operational) or customer side. Network level/company side leakages can include leakage reduction from trunk mains and service reservoir, pressure reduction programmes, or asset renewal, and leakage enabling schemes. Customer side leakages can include customer supply pipe leakage reduction and customer engagement/education/incentives. Another loss reduction option includes diagnostic studies for production losses.

Catchment management options were also considered. These options include:

- Flow augmentation and licencing
- Integrated catchment management
- Knowledge exchange, education, and agricultural activity
- Natural water retention measures (including natural flood management and wetland creation)
- Nutrient and sediment reduction
- Pesticide reduction
- River restoration
- Sustainable Urban Drainage Systems (SuDS)
- Terrestrial habitat creation/management

Alternative sources of water via proposed Strategic Resources Options (SROs) have been identified as potential solutions to some of the key supply demand balance issues.

4.3 Option Assessment Methodology

Thames Water's detailed options-level assessment approach was aligned with WRSE's Environmental Assessment process for their regional plan. This is aligned with regulator expectations around regional and water company planning.

Each option was assessed using agreed frameworks and methodologies and professional judgement, based on a description of the infrastructure required and a GIS map of its location / routing. The construction and operation of each option was considered against the SEA objectives set out in Table 4.1, using the assessment criteria in the final column of the table and the evaluation criteria set out in Table 4.4, below. The assessment indicated whether the proposed option would help meet or prevent achievement of the SEA objectives. If it contributed to the SEA objectives, then it was considered a positive effect. If the option prevents the SEA

objective being met, then it was considered a negative effect. The assessment against the SEA objectives was strategic in nature, being based on the early-stage design of each option; as such, it is not undertaken to the level of detail expected in a project-level Environmental Impact Assessment (EIA).

The assessment was split into construction effects and operational effects. An option may have both positive and negative effects under a SEA objective for both construction and operation, which were reported separately to provide more clarity for decision making on the timing and nature of each of the effects identified.

The level of effect was assigned using a qualitative scale ranging from positive effects (minor, moderate, major) to negative effects (minor, moderate, major), with neutral used for no or negligible effects. A narrative justification was provided to support the assessment using this scale. The datasets used and descriptions of scale of effect are presented in Table 4.1.

Other assessments and studies being undertaken as part of the wider WRMP24 were also used to inform the SEA options assessment. The results of the HRA and WFD assessments fed into the SEA objectives on biodiversity and water. The HRA and WFD assessments can be found in Appendix C and Appendix D respectively. The BNG and NCAs are presented Appendix AA. A high-level INNS risk screening exercise was undertaken based on options type to identify those options with potential for INNS risks. The results were reported as part of the SEA under the biodiversity objective. The INNS risk assessment is presented in Appendix BB. These environmental assessments are further outlined in Section 4.7. Note that for Demand Management and Catchment Options, SEA assessments were conducted only.

Where there were several variations of an individual option, e.g., different transfer capacity, the assessment considered these variations and assessed them as part of the one whole option with the level of effect given for the highest capacity. Aspects of the option that may cause environmental harm were noted (e.g., if a particular variation might be more harmful).

A variable zone of influence was determined (ZoI) for each topic. Some key receptors and assets were only considered if there was a direct intersection (such as allotments and woodland), other key receptors and assets were considered within 500m of the option (works) location in the assessment. The exception to this was European and National ecological designated sites such as Special Protection Areas (SPAs), Special Areas of Conservation (SACs), Ramsar sites, and Sites of Special Scientific Interest (SSSIs), which were considered by identification of potential pathways from the option to the receptor, based on qualifying species and habitats.

The temporal scale of effects was considered based on whether it would be permanent or temporary, and the duration of the effect. Permanent changes were considered as those which are irreversible (e.g., land use change from woodland to development) or will last for the near future (e.g., noise from operational road traffic). Temporary effects were considered as those which are reversible and are generally related to construction (e.g., construction traffic).

Where potential negative effects were identified, mitigation measures (measures to avoid, reduce or offset negative effects) were identified as part of the assessment process and fed back into iterative option development. Options with major and moderate negative effects were

required to include appropriate mitigation to reduce effects or be flagged for rejection. Enhancement opportunities were also identified where the option could be used for the benefits of people and/or wildlife, e.g., reservoirs provide an opportunity to establish wetland habitats, or for recreational benefits.

The effects of each option were assessed pre-mitigation and post-mitigation (residual effects). In determining the residual effects for the SEA, it was assumed that all options would include standard environmental controls including:

- No surface water (river) abstractions will be able to reduce the water levels below the minimum flow levels agreed for that river.
- Construction works will be undertaken according to existing good practice to manage impacts on site, such as dust creation, noise and vibration, and disturbance.
- Environment Agency Pollution Prevention Guidance will be followed during construction.
- Good practice construction management includes using construction environment management plans (CEMPs), construction and logistics plans (including constructions traffic management plans (CTMPs), waste management plans, etc.
- Sites would be surveyed for species/habitats prior to construction. Non-native species would be identified, and methods/works put in place to avoid spreading them during construction.
- Construction sites situated in a flood zone will have appropriate plans in place to manage the site in the event of flooding, e.g., management of materials and/or equipment likely to cause pollution.
- Construction health of workers would be managed on site using good practice such as avoidance, or personal protective equipment. Where in-river working is proposed, the potential for the transmission of waterborne infectious diseases (e.g., Leptospirosis, Cyanobacteria, Gastro-intestinal illness, and Hepatitis A) during construction of the new infrastructure would be managed appropriately.
- Construction sites will be in adherence to the Considerate Contractor Scheme, including engagement with the local community.
- Construction methods to be used are sympathetic and reduce effects on the surrounding landscape e.g., suitable hoardings.
- Any required consents will be obtained prior to undertaking works, e.g., tree preservation orders, listed building consent.
- Safe access will be available for pedestrians, vehicles, bicycles, horses, etc during construction. Any roads, footpaths, cycleways that are consented to be closed during construction will be re-instated to their original or better condition following completion of the works.
- The WFD assessment assumes that standard best practice construction measures and operational procedures are employed, meaning that some options are assumed to be compliant with the objectives of the WFD and require no further assessment.
- Where options involve disturbance of land for pipeline laying, the land will be restored to its original or better condition on completion of the works.
- Where options involve works crossing roads or public rights of way, appropriate diversions and signage will be implemented, and roads/paths will be restored to their original or better conditions following completion of the works.
- Where options involve loss of agricultural land, Thames Water policy on compensation, land requisition will be followed.
• Options that use energy, either during construction and/or operation, will use the energy mix available at the time from the UK energy grid.

The SEA process produced a series of four metrics for each option to summarise the output information. These were used to help determine the programmes Thames Water identified through its WRMP process. The four metrics were positive construction, negative construction, positive operation, and negative operation. Further details are set out in Section 5.

Please note that where options undergo further development between the draft and final plan, the assessments will be updated if there is a requirement for this.

Table 4-1 : SEA Framework

SEA Objective	Datasets/Key Themes	Effect		Description
 Biodiversity, Flora, Fauna: Protect and enhance biodiversity, priority species, vulnerable habitats and habitat connectivity (no loss and improve connectivity where possible) Marine Protected Area (MPA) Marine Conservation Zone (MCZ) National Nature Reserves (NNR) Local Nature Reserve (LNR) Priority habitats and species Non-designated sites Terrestrial, aquatic and marine habitats, species and protected sites Green networks and corridors (e.g., foraging areas and commuting routes, migration routes, hibernation areas etc. at all scales) 	+++	Major Positive	The option would result in a major enhancement on the quality of designated sites/habitats due to changes in flow or groundwater levels, water quality or habitat quality and availability. The option would result in a major increase in the population of a priority species. Effects could be caused by beneficial changes in water flows/water quality, or large amounts of creation or enhancement of habitat, promoting a major increase in ecosystem structure and function. The option would result in a major reduction or management of INNS.	
	Zone (MCZ) National Nature Reserves (NNR) Local Nature Reserve (LNR) Priority habitats and species Non-designated sites Terrestrial, aquatic and marine habitats, species and protected sites Green networks and corridors (e.g., foraging areas and commuting routes, migration routes, hibernation areas etc. at all scales) 0	++	Moderate Positive	The option would result in a moderate enhancement on the quality of designated and/or non- designated sites/habitats due to changes in flow or groundwater levels, water quality or habitat creation and enhancement measures. The option would result in a moderate increase in the population of a priority species. Effects could be caused by beneficial changes in water flows/water quality, or moderate amounts of creation or enhancement of habitat, promoting a moderate increase in ecosystem structure and function. The option would result in a moderate reduction or management of INNS.
		+	Minor Positive	The option would result in a minor enhancement of the quality of designated and/or non-designated sites/habitats due to changes in flow or groundwater levels, water quality or habitat creation and enhancement measures. The option would result in a minor increase in the population of a priority species. Effects could be caused by beneficial changes in water flows/water quality, or small amounts of creation or enhancement of habitat, promoting a minor increase in ecosystem structure and function. The option would result in a minor reduction or management of INNS.
		0	Neutral	The option would not result in any effects on designated or non-designated sites including habitats and/or species). It will not have an effect on INNS.
		-	Minor Negative	The option would result in a minor negative effect on the quality of designated and/or non- designated sites/habitats due to changes in flow or groundwater levels, water quality or habitat loss or degradation. The option would result in a minor decrease in the population of a priority species. Effects could be caused by detrimental changes in flows/water quality, or small losses or degradation of habitat leading to a minor loss of ecosystem structure and function. The option would result in a minor increase or spread of INNS.

SEA Objective	Datasets/Key Themes	Effect		Description
Soil: • Protect and enhance the functionality, quantity and quality of soils	 Agricultural Land Classification Landfill sites – authorised and historic 		Moderate Negative	The option would result in a moderate negative effect on the quality of designated and/or non- designated sites/habitats due to changes in flow or groundwater levels, water quality or habitat loss or degradation. The option would result in a moderate decrease in the population of a priority species. Effects could be caused by detrimental changes in flows/water quality, or moderate loss or degradation of habitat leading to a moderate loss of ecosystem structure and function. The options would result in a moderate increase or spread of INNS.
			Major Negative	The option would result in a major negative effect on the quality of designated and/or non- designated sites/habitats due to changes in flow or groundwater levels, water quality or habitat loss or degradation. HRA results indicate potential for Likely Significance Effects. The option would result in a major decrease in the population of a priority species. Effects could be caused by detrimental changes in flows/water quality, or large losses or degradation of habitat leading to a major loss of ecosystem structure and function. The option would result in a major increase or spread of INNS.
		?	Uncertain	From the level of information available the effect that the option would have on this objective is uncertain.
		+++	Major Positive	The option would result in a major enhancement on the quality of soils through the implementation of catchment approaches, remediation or other measures.
		++	Moderate Positive	The option would result in a moderate enhancement on the quality of soils through the implementation of catchment approaches, remediation or other measures.
		+	Minor Positive	The option is located on a brownfield site and has no effect on soils or existing land use. The option results in the remediation of contaminated land.
		0	Neutral	The option would not result in any effects on soils or land use.
		-	Minor Negative	The option is not located on a brownfield site and/or results in a minor loss of best and most versatile agricultural land or is in conflict with existing land use. The option results in land contamination.
		-	Moderate Negative	The option will result in a moderate loss of best and most versatile agricultural land or is in substantial conflict with existing land use. The option is partially overlying mineral resources leading to partial mineral sterilisation.

SEA Objective	Datasets/Key Themes	Effect		Description
		-	Major Negative	The option will result in a major loss of best and most versatile agricultural land or is in substantial conflict with existing land use. The option results in land contamination. The option is directly overlying mineral resources leading to mineral sterilisation.
		?	Uncertain	From the level of information available the effect that the option would have on this objective is uncertain.
 Water: Increase resilience and reduce flood risk Protect and enhance the quality of the water environment and water resources Deliver reliable and resilient water supplies Flood Zones 2 and 3 Surface Water Features WFD River Waterbody Catchments WFD River Waterbodies Cycle 2 Bathing Waters (for desal options) Shellfish Waters (desal options) Source Protection Zones WFD Groundwater bodies 	+++	Major Positive	The option results in addressing failure of WFD Good Ecological Status / Good Ecological Potential. The option would result in a major improvement to flood risk. The option would result in a major improvement(s) in water efficiency, reduces demand and improves resilience. Additional MI/d capacity over 50MI/d.	
	++	Moderate Positive	The option achieves savings through demand management and does not require abstraction to achieve yield. The option contributes to addressing failure of WFD Good Ecological Status / Good Ecological Potential. The option would result in a moderate improvement to flood risk. The option would result in a moderate improvement in water efficiency, reduces demand and improves resilience. Additional MI/d capacity between 25.1 and 50MI/d.	
	 Source Protection Zones WFD Groundwater bodies 	+	Minor Positive	The option achieves savings through demand management and does not require abstraction to achieve yield. The option would result in a minor improvement to flood risk. The option would result in minor improvements in water efficiency, reduces demand and improves resilience. Additional MI/d capacity between 0.1 and 25MI/d.
		0	Neutral	The option would have no discernible effect on river flows or surface/coastal water quality or on groundwater quality or levels. The option would not have an effect on or be affected by flood risk.
	-	-	Minor Negative	The option would result in minor decreases in river flows. River and/or coastal water quality may be affected and lead to short-term or intermittent effects on receptors (e.g., designated habitats, protected species or recreational users of rivers and the coastline) that could not be avoided but could be mitigated. The option would result in minor decreases in groundwater quality or levels. The option is located in Flood Zone 2. The option would result in minor decreases in water efficiency, increases demand and reduces resilience.

SEA Objective	Datasets/Key Themes	Effect		Description
		_	Moderate Negative	The option would result in moderate decreases in river flows. River and/or coastal water quality may be affected and lead to long-term or continuous effects on receptors (e.g., designated habitats, protected species or recreational users of rivers and the coastline) that could not reasonably be mitigated. The option results in the likely deterioration of WFD classification. The option would result in moderate decreases in groundwater quality or levels. The option is located in Flood Zone 3. The option would result in moderate decreases in water efficiency, increases demand and reduces resilience.
			Major Negative	The option would result in major decreases in river flows. River and/or coastal water quality may be affected and lead to long-term or continuous effects on receptors (e.g., designated habitats, protected species or recreational users of rivers and the coastline) that could not reasonably be mitigated. The option results in the deterioration of WFD classification. The option would result in major decreases in groundwater quality or levels. The option is located in Flood Zone 3 and further contributes to flood risk. The option would result in major decreases in water efficiency, increases demand and reduces resilience.
		?	Uncertain	From the level of information available the effect that the option would have on this objective is uncertain.
Air: • Reduce and minimise air emissions • Air Quality Management Zones (AQMAs) • Air quality monitoring sites	+++	Major Positive	The option would result in a major enhancement of the air quality within one or more AQMAs.	
	 Air quality monitoring sites 	++	Moderate Positive	The option would result in a moderate enhancement of the air quality within one or more AQMAs.
		+	Minor Positive	The option would result in an enhancement of the air quality.
		0	Neutral	The option would not result in any effects on air quality and AQMAs.
		-	Minor Negative	The option would result in a decrease of the air quality.
		-	Moderate Negative	The option would result in a decrease of the air quality within one or more AQMAs.
			Major Negative	The option would result in a major decrease in the air quality within one or more AQMAs.
		?	Uncertain	From the level of information available the effect that the option would have on this objective is uncertain.

SEA Objective	Datasets/Key Themes	Effect		Description	
Climate Factors: Option (Reduce embodied and operational carbon emissions Reduce vulnerability to climate change risks and hazards	Option Carbon data UKCP18 climate data Sea level rise projections	+++	Major Positive	The option will generate significant additional zero carbon energy that can be fed back into the grid/reduce carbon emissions (see carbon scale). The option will result in a major increase in carbon sequestration. The option will increase resilience/decrease vulnerability to climate change effects.	
		++	Moderate Positive	The option will increase resilience/decrease vulnerability to climate change effects. The option will result in a moderate increase in carbon sequestration. The option will generate moderate additional zero carbon energy that can be fed back into the grid/reduce carbon emissions (see carbon scale).	
		+	Minor Positive	The option will increase resilience/decrease vulnerability to climate change effects. The option will result in a minor increase in carbon sequestration. The option will generate minor additional zero carbon energy that can be fed back into the grid/reduce carbon emissions (see carbon scale).	
		0	Neutral	The option would have no discernible effect on greenhouse gas emissions, nor would the option increase resilience/decrease vulnerability to climate change effects.	
		-	Minor Negative	The option will have a minor impact on resilience/decrease vulnerability to climate change effects. The option will generate minor construction and/or operational carbon emissions (see carbon scale).	
	 Areas of Outstanding Natural Beauty (AONB) National Character Areas Green Belt land National Park 	-	-	Moderate Negative	The option will have a moderate impact on resilience/significantly decrease vulnerability to climate change effects. The option will generate moderate construction and/or operational carbon emissions (see carbon scale). The option will result in a moderate release of previously sequestered carbon.
			Major Negative	The option will have a major impact on resilience/significantly decrease vulnerability to climate change effects. The option will generate significant construction and/or operational carbon emissions (see carbon scale). The option will result in a major release of previously sequestered carbon.	
		?	Uncertain	From the level of information available the effect that the option would have on this objective is uncertain.	
 Landscape: Conserve, protect and enhance landscape, townscape and seascape character and visual amenity 		+++	Major Positive	The option would have a major positive contribution to designated landscape (AONB or National Park) management plan objectives. The option results in new, above ground infrastructure that significantly enhances the local landscape, townscape or seascape.	
		++	Moderate Positive	The option would have a moderate positive contribution to designated landscape management plan objectives.	

SEA Objective	Datasets/Key Themes	Effect		Description
				The option results in new, above ground infrastructure that has a moderate positive effect on the local landscape, townscape or seascape.
		+	Minor Positive	The option results in new, above ground infrastructure that has a minor positive effect on the local landscape, townscape or seascape.
		0	Neutral	The option would not result in any effects on the local landscape, townscape or seascape.
		-	Minor Negative	The option results in new, above ground infrastructure that has a minor negative effect on the local landscape, townscape or seascape.
Historic Environment • Listed buildings: • Conserve, protect and enhance the historic environment, including archaeology • Grade I listed structures • Grade II * listed structures • Grade II structures	_	Moderate Negative	The option would have a moderate negative effect on a designated landscape or feature (i.e., significant visually intrusive infrastructure) whose effects could not be reasonably mitigated. The option results in new, above ground infrastructure that has a moderate negative effect on the local landscape, townscape or seascape.	
	-	Major Negative	The option would have a negative effect on a designated landscape or feature (i.e., significant visually intrusive infrastructure) whose effects could not be reasonably mitigated. The option results in new, above ground infrastructure that has a major negative effect on the local landscape, townscape or seascape.	
		?	Uncertain	From the level of information available the effect that the option would have on this objective is uncertain.
	+++	Major Positive	 The option will result in enhancements to designated heritage assets and/or their setting, fully realising the significance and value of the asset, such as: Securing repairs or improvements to heritage assets, especially those identified in the Historic England Buildings/Monuments at Risk Register. Improving interpretation and public access to important heritage assets. 	
	Gardens: - Grade I Registered Parks and Cardens	++	Moderate Positive	The option will result in enhancements to designated heritage assets and/or their setting. Improving interpretation and public access to important heritage assets.
	- Grade II* Registered Parks	+	Minor Positive	The option will result in enhancements to non-designated heritage assets and/or their setting.
-	and Gardens - Grade II Registered Parks	0	Neutral	The option will have no effect on cultural heritage assets or archaeology.
	 and Gardens Protected Wreck Registered Battlefields Scheduled Monuments Conservation Areas World Heritage Sites 	-	Minor Negative	The option will result in the loss of significance of undesignated heritage assets and/or their setting, notwithstanding remedial recording of any elements affected. There will be limited damage to known, undesignated archaeology important sites with a consequent loss of significance only partly mitigated by archaeological investigation.
			Moderate Negative	The option will result in the loss of significance of undesignated heritage assets and/or their setting, notwithstanding remedial recording of any elements affected.

SEA Objective	Datasets/Key Themes	Effect		Description
				The option will diminish the significance of designated heritage assets and/or their setting, notwithstanding remedial recording of any elements affected.
		-	Major Negative	 The option will diminish the significance of designated heritage assets and/or their setting such as: Demolition or further deterioration in the condition of designated heritage assets especially those identified in the Historic England Buildings/Monuments at Risk Register. Loss of public access to important heritage assets and lack of appropriate interpretation. There will be major damage to known, designated archaeology important sites with a consequent loss of significance only partly mitigated by archaeological investigation.
		?	Uncertain	From the level of information available the effect that the option would have on this objective is uncertain.
 Population, Human Health Maintain and enhance the health and wellbeing of the local community, including economic and social wellbeing Maintain and enhance tourism and recreation Maintain and enhance tourism and recreation Maintain and enhance tourism and recreation Gol Greenspace dataset: Allotments Bowling green Cemetery Golf course Sports facility Play space Playing field Public park or garden Religious grounds Tennis courts Natural England - Country Parks National Parks Section 15 open access areas CRoW S4 Conclusive Registered Common Land 	 Noise action important area Indices of Multiple Deprivation 2015 	+++	Major Positive	The option leads to major positive effect on the health of local communities and will ensure that surface water and bathing water quality is maintained within statutory limits. The option creates new, and significantly enhances existing, recreational facilities, publicly accessible greenspace and/or tourism within the operational area.
	 Functional site: Schools Medical facilities OS Greenspace dataset: 	++	Moderate Positive	The option leads to a positive effect on the health of local communities and will ensure that surface water and bathing water quality is maintained within statutory limits. The option enhances existing, recreational facilities, publicly accessible greenspace and/or tourism within the operational area.
	 Allotments Bowling green Cemetery 	+	Minor Positive	The option has a temporary positive effect on the health of local communities and will ensure that surface water and bathing water quality is maintained within statutory limits.
	 Golf course Sports facility 	0	Neutral	The option would not result in any effects on human health and existing recreational facilities and/or tourism.
	 Play space Playing field Public park or garden 	-	Minor Negative	The option has a temporary effect on human health (e.g., noise or air quality). The option reduces the availability and quality of existing recreational facilities and/or tourism within the operational area.
	 Religious grounds Tennis courts 		Moderate Negative	The option results in the permanent removal of existing recreational facilities, publicly accessible greenspace and/or tourism within the operational area.
	 Natural England - Country Parks National Parks Section 15 open access areas CRoW S4 Conclusive Registered Common Land 	_	Major Negative	The option has a significant long-term effect on human health (e.g., noise or air quality). The option results in the removal of existing recreational facilities, publicly accessible greenspace and/or tourism within the operational area.
		?	Uncertain	From the level of information available the effect that the option would have on this objective is uncertain.

SEA Objective	Datasets/Key Themes	Effect		Description
 Material Assets Minimise resource use and waste production Avoid negative effects on built assets and infrastructure Transport: Major roads – A roads Major roads motorway Railway line National cycle route National trails 	 Transport: Major roads – A roads Major roads motorway Railway line 	+++	Major Positive	The option will reuse or recycle substantial quantities of waste materials and any new infrastructure will incorporate substantial sustainable design measures and materials. There will be no increase in energy consumption or energy will be from 100% renewable sources. The option improves national cycle routes or national trails.
	++	Moderate Positive	The option will reuse or recycle moderate quantities of waste materials and any new infrastructure will incorporate some sustainable design measures and materials. There will be no increase in energy consumption or energy will be from 90% renewable sources. The option improves national cycle routes or national trails.	
		+	Minor Positive	The option will reuse or recycle a limited quantity of waste materials and any new infrastructure will incorporate some limited sustainable design measures and materials. There will be no increase in energy consumption or energy will be from 80% renewable sources. The option improves national cycle routes or national trails.
		0	Neutral	The option would not result in any effects on material assets.
	-	Minor Negative	The option will require new infrastructure with only limited opportunities for the reuse or recycling of waste materials. There are limited opportunities for sustainable design or the use of sustainable materials. The option results in a minor increase in energy consumption with no renewable energy options. The option results in a minor disruption on built assets and infrastructure, including transport.	
			Moderate Negative	The option will require new infrastructure with only limited opportunities for the reuse or recycling of waste materials. The option results in a moderate increase in energy consumption with no renewable energy options. The option results in a moderate disruption on built assets and infrastructure, including transport links.
			Major Negative	The option will require significant new infrastructure that cannot be provided through the reuse or recycling of waste materials. There are no opportunities for sustainable design or the use of sustainable materials. The option results in a major increase in energy consumption with no renewable energy options. The option results in a major distribution on built assets and infrastructure, including transport links.
		?	Uncertain	From the level of information available the effect that the option would have on this objective is uncertain.

4.4 Other Environmental Assessments (WFD, HRA, NCA, BNG, INNS)

The option development and selection process were informed by several other environmental assessments as part of the WRMP24 development. These processes helped inform the SEA findings, as set out in Section 1. This section summarises each assessment, with further methodological details available in Appendices I to L.

Habitat Regulations Assessment

The results of the Habitat Regulations Assessment (HRA) fed into the SEA objective on biodiversity (Objective 1, see Table 4.1). HRA results fed iteratively into the option development process, eliminating those options for which Appropriate Assessment could not rule out adverse impacts on the conservation objectives of Natura 2000 sites, or for which alternative design could not be considered. Alongside the SEA cumulative effects assessment of the WRMP24, a HRA in-combination effects assessment of the plan as a whole was undertaken. The HRA methodology, including Test of Likely Significance and Appropriate Assessment can be found in the HRA Report - Appendix C.

Water Framework Directive Assessment

The results of the WFD assessment fed into the SEA objectives on biodiversity and water (Objectives 1, 3, 4 and 5, see Table 4.1). The WFD assessments were undertaken following the All Companies Working Group (ACWG) WFD Assessment Guidelines and using the ACWG Assessment Spreadsheet. The first stage of the process (Level 1 – Basic Screening) identified any water bodies which needed to be 'screened in' and taken forward to the second stage of the process (Level 2 – Detailed Impact Screening). Mitigation and monitoring recommendations supported option development, and WFD results were used as part of the final assessment of the WRMP24 and its cumulative effects. The WFD Assessment and full method statement can be found in the WFD Report - Appendix D.

Natural Capital Assessment via assessment of selected Ecosystem Services

The results of the NCA fed into the SEA objective on biodiversity (Objective 1, see Table 4.1). The outputs of the NCA were used to inform option selection and feed into decision-making as part of the Best Value Planning process. Expected changes in natural capital stocks were assessed for each option, along with implications for four ecosystem services outlined in the supplementary guidance note 'Environment and Society in decision-making'– biodiversity and habitat, climate regulation, natural hazard regulation, and water purification. Note that biodiversity and habitat services were assessed using the BNG methodology outlined below. Water regulation has not been included for assessment to avoid the potential double accounting of benefits with capacity-based and financial assessment. The full NCAs for the options are outlined within the Natural Capital and Biodiversity Net Gain Assessment Report - Appendix AA.

Biodiversity Net Gain Assessment

The results of the BNG assessment fed into the SEA objective on biodiversity (Objective 1, see Table 4.1). BNG was considered at both the option and programme level, with biodiversity-optimised programmes suggested. Each option looked to maximise BNG, and any required biodiversity impact mitigation was included in the option cost. A biodiversity baseline was developed from spatial datasets of habitat inventories and assessed in line with the Department for Environment Food and Rural Affairs (Defra's) BNG 2.0 metric, which assesses BNG based on land use change associated with each option. By quantifying the spatial extents of habitats and applying habitat-specific metrics, the approach aligned with the methodology of the WRPG

Environment and Society guidance. In this way, the approach also allowed consideration of biodiversity and habitat as an ecosystem service in the NCAs. Anticipated changes in land use as a result of option construction were used to assess change in the BNG scores. The full BNG assessments for the options are outlined within the Natural Capital and Biodiversity Net Gain Assessment Report - Appendix AA.

Invasive Non-Native Species

The results of the Invasive Non-Native Species (INNS) assessment fed into the SEA objectives on biodiversity and water (Objectives 1 and 4, see Table 4.1). INNS information sheets were used to inform option development. Mitigation options appraisals were conducted for those options determined as of high risk for the potential spread of INNS. This involved reviewing known mitigation technologies and determining their effectiveness with regard to species type, transmission pathway and feasibility. Further information about the INNS Risk Assessment methodology and full assessments can be found in the INNS Risk Assessment - Appendix BB.

4.5 Changes to the SEA Framework as a result of Scoping Consultation

Since the scoping consultation was submitted there have been changes to the government guidance underpinning the NCA and BNG assessment methodologies. The approaches used for the WRMP24 options assessments were updated accordingly. The changes were as follows:

- Natural Capital The approach for this assessment was informed by Defra's Enabling a Natural Capital Approach (ENCA) guidance. In mid-2021 the valuations and calculation factors related to valuation of carbon in ENCA were updated.
- BNG In mid-2021 Defra and Natural England issued an updated version, BNG 3.0 metric.

For the Draft WRMP Environmental Report, natural capital and BNG Assessments will be presented in the version that was used for the purpose of the plan modelling, this will assist stakeholders and consultees in understanding how the metrics were applied at that point in time. For the Final Plan Environmental Report, Thames Water will update the Final Plan option assessments to the newest ENCA guidance and Defra BNG Metric.

The SEA process is a core component of considering the wider Environmental Net Gain (ENG) of the WRMP24, in line with WRPG expectations. The UK government is developing a tool ('Ecometric') to assess quantifiable ENG benefits; however, this was not ready for use on the water resources plans at the time of their development. Therefore, the findings across the SEA, NCA and BNG assessments are considered across the draft Plan to ensure the WRMP24 would leave the natural environment in a measurably better state than it is currently. Demonstrating achievement of BNG was a key requirement, and in addition the ENG approach included consideration of wider environmental gains such as improvements in air and water quality identified by the SEA and NCA. This allowed the benefits of the plan to customers, society, and the environment to be measured, understood, and clearly explained as part of the WRMP24.

4.6 SEA Summary Tables

Please refer to Annex F for SEA Summary Tables of options within the Best Value Plan (BVP), Least Cost (LC) and Best Environmental and Societal (BES) plans, as well as those options not included within these plans. Chapter 5 presents further information on the alternatives (LC and BES) and Chapter 6 describes the BVP. Further summary tables are provided hereon for the Demand and Catchment Management Options.

4.7 Summary of Environmental Assessments of Non-SRO BVP Supply-Side Options

This section summarises the environmental assessments for the supply-side options within the BVP. Chapter 6 discusses the BVP in further detail.

South East Water to Guildford (ID: TWU_GUI_HI-TFR_RZ5_ALL_sewtogui) The option consists of the creation of a new 10MI/d transfer from South East Water (Hogsback) to Mount SR Guildford.

The SEA identified that this option could have moderate negative residual construction effects for biodiversity, flora and fauna. This option has potential for direct impacts on Ancient Woodland, good quality semi-improved grassland, calcareous grassland, and deciduous woodland Priority Habitat associated with construction of the pipeline. There is also a moderate INNS risk during the construction phase, as the route passes through woodland and close to an area of heathland on the Thursley, Ash and Chobham SAC. After mitigation, uncertain effects remain due to the unknown impact of groundwater movement on qualifying features.

The Level 1 WFD assessment covered 11 water bodies for this option. The outcomes indicated further assessment would be necessary for three waterbodies: GB40602G601300: Farnborough Bagshot Beds groundwater body, GB40602G601400: Chobham Bagshot Beds groundwater body and GB70610019: Basingstoke Canal water body. The L2 WFD assessment for the Basingstoke Canal identified potential deterioration of the physico-chemical quality elements due to potential construction impacts from below ground works on the canal which is also a SSSI and Groundwater Dependant Terrestrial Ecosystem (GWDTE). This is primarily due to the increased in groundwater abstraction. The Level 2 WFD assessment for the groundwater body and the physico construction activities.

The HRA screening (Test of Likely Significance) assessment identified likely significant effects to the Thames Basin Heaths SPA (UK9012141) (unknown distance but assessed as in proximity to the Designated Site boundaries) and Thursley, Ash, Pirbright and Chobham SAC (UK0012793) (approximately 0.05km). As a result, a HRA Appropriate Assessment was undertaken, which concluded that impacts include physical loss and damage to habitat, non-physical disturbance (air and light), toxic contamination (such as air pollution from vehicle emissions), the creation of a pathway for the spread of INNS, and biological disturbances (such as changes to habitat availability, displacement, and changes in species abundance and distribution). No adverse effects concluded with mitigation applied (low and localised impacts).

River Thames to Fobney Transfer Option (ID: TWU_KVZ_HI-TFR_UTC_ALL_thamestofobney) This option proposes to transfer water from the River Thames to Fobney, to supply 40MI/d to Kennet Valley. Existing treatment facilities are available at Fobney, but a new pipeline and associated structures are proposed to support this transfer.

The SEA identified that this option could have major negative residual operational effects for biodiversity, flora and fauna and moderate negative residual operational effects on water quality. The option is within an SSSI Impact Zone and Lousehill Copse LNR and McIlroy Park LNR are within 2km. The option passes through areas of woodland and priority habitat therefore potential for direct effects during the construction phase. There will be a new intake on the River Thames and therefore, there is potential for disturbance of aquatic ecology during construction of the

intake and potential effects on aquatic ecology from abstraction during operation. The HRA ToLS (2022) did not identify potential for likely significant effects. The option crosses main rivers and there is potential that the construction phase could lead to contamination of the water environment. The option also involves direct abstraction from the River Thames which could affect water quality, flows and levels.

The Level 1 WFD assessment covered four waterbodies for this option. The outcomes indicated further assessment would be necessary for two waterbodies: GB106039030331: Thames Wallingford to Caversham river water body and GB40601G600900: Berkshire Downs Chalk groundwater body. The Level 2 WFD assessment for Thames Wallingford to Caversham identified deterioration risks to the biological quality elements, hydrological supporting elements and physico-chemical quality elements. This is primarily due to the increased surface water abstraction. The groundwater body Level 2 WFD assessment identified minor localised impacts on surface water dependent status element and water balance, due to construction of below ground works.

This option is scoped out for HRA Appropriate Assessment, as no likely significant effects identified.

TWRM Extension – Hampton to Battersea Option (ID: TWU_LON_HI-ROC_NET_CNO_hampton-battersea)

This option proposes a new ring main tunnel from Hampton to Battersea. The Hampton Battersea TWRM extension will be required when additional resources from the west and/or east of the London water resource zone (WRZ) are increased and reach a trigger value. The extension tunnel will be 20km long and connect to the existing shafts at Hampton WTW and Battersea. There is a permanent land requirement of 2,000m² for shafts and a temporary land requirement 30,000m².

The SEA identified that this option could have moderate negative residual construction effects on biodiversity, flora and fauna, and moderate negative residual operational effects on embodied and operational carbon. The tunnel intersects SSSI/SAC/NNR Richmond Park with potential to result in loss of habitat or disturbance to designation interest features during construction. The tunnel also has direct impact on Groundwater Dependant Terrestrial Ecosystem (GWDTE) and Priority Habitat. HRA ToLS suggests likely significant impact on Richmond Park SSSI/SAC/NNR and Wimbledon Common SAC. A majority of the tunnel will be underground so effects will be localised to areas of above ground construction. There is a risk of INNS transfer during construction of the option as the tunnel route passes over water courses, which could lead to INNS spread.

The Level 1 WFD assessment covered six waterbodies for this option. The outcomes indicated no further assessment would be necessary for the option because the types of activities do not present a risk to WFD status or objectives for any waterbodies.

The HRA screening (Test of Likely Significance) assessment identified likely significant effects to Richmond Park SAC (UK0030246) (0km) and Wimbledon Common SAC (UK0030301) (0km). As a result, an HRA Appropriate Assessment was undertaken, which concluded that, with adherence to the proposed mitigation, the proposed works associated with the option are not

expected to have any significant adverse effects on the overall integrity of the Designated Sites and their features during the construction and operation phases of the proposed option.

Kempton 150 Construction Option -SRO (ID: TWU_LON_HI-

ROC_WT1_CNO_kemptonwtw150)

The SEA identified that this option could have moderate negative residual construction effects on biodiversity, flora and fauna, and moderate negative residual operational effects on embodied and operation carbon. This option intersects with the Kempton Park Reservoirs SSSI (100% unfavourable - recovering) and Kempton Nature Reserves LNR, and the South West London Waterbodies SPA / RAMSAR, as identified within the HRA ToLS. There is potential for direct effects including on noise, air pollution and vibration, depending on the location of the treatment works and indirect effects. Other designated sites within 500m and 2,000m which may be indirectly affected. The option is entirely located within SSSI Impact Risk Zones. Depending on the location of the treatment works, there is potential for loss of deciduous woodland Priority Habitat. The relative carbon scale identified that the option has moderate operational carbon emissions (relative to other WRSE Regional Plan options). However, the option also has potential for major positive effects due to the addition of the new water resource.

The Level 1 WFD assessment covered two waterbodies for this option. The outcomes indicated no further assessment would be necessary for the option because the types of activities do not present a risk to WFD status or objectives for any waterbodies.

The HRA screening (Test of Likely Significance) assessment identified likely significant effects to South West London Waterbodies Ramsar Site (UK11065) (approximately 0.5km) and South West London Waterbodies SPA (UK9012171) (approximately 0.5km). As a result, a HRA Appropriate Assessment was undertaken, which concluded that, with appropriate mitigation measures in place, this option is not expected to affect the integrity of these Designated Sites, as well as their qualifying features.

Datchet Increase DO Option (ID: TWU_SWA_HI-GRW_ALL_ALL_datchet do)

This option involves the replacement of submersible pumps, lowering of intake levels in two boreholes (two pumps) and increasing the capacity of the contact tank. The DO benefit is 5.4Ml/d (peak) and 1.6Ml/d (average).

The SEA identified that there are no major or moderate negative effects found for this option.

The Level 1 WFD assessment covered two waterbodies for this option. The outcomes indicated further assessment would be necessary for one waterbody: GB40603G000300: Lower Thames Gravel. The Level 2 WFD assessment identified potential risk of deterioration to the quantitative dependent surface water and water balance status due to the increased groundwater abstraction lowering for groundwater levels and therefore potentially reducing baseflow to the local surface watercourses and changing water balance.

This option is scoped out for HRA Appropriate Assessment.

SWOX to SWA Option (ID: TWU_SWA_HI-TFR_SWX_ALL_swoxswa48)

This option is Abingdon WTW to Long Crendon to supply SWA.

The SEA identified that this option could have moderate negative residual construction effects on biodiversity, flora and fauna. The option infrastructure intersects with 0.04% Brasenose Wood and Shotover Hill SSSI (46.61% Favourable and 57.33% Unfavourable recovering), and Wytham Woods SSSI (3.5% Favourable, 95.5% Unfavourable recovering) is immediately adjacent to the option. There are a further seven SSSIs within 500m of the option (Sidling's Copse and College Pond; Wytham Ditches and Flushes; Holton Wood, Lyehill Quarry; Cassington Meadows; Cothil Fen; Fritlford Heath, Ponds and Fens). Also, within 500m of the option are Cothill NNR and Oxford Meadows SAC, Cothil Fen SAC and Ancient Woodland (including Wytham Great Wood, which is adjacent to the option). The option is entirely located within SSSI Impact Risk Zones. The pipeline option intersects with approx. 70,469m² Priority Habitat (including coastal and floodplain grazing marsh, deciduous woodland, good quality semi-improved grassland and lowland meadows) and 122km² woodland.

A cut and fill mechanism of construction for the option would result in habitat loss and a decrease in priority species during construction, with potential for long-term negative impacts. Significant impacts on Cothill Fen SAC and Oxford Meadows SAC are not considered to be fully mitigatable due to the proximity of the scheme to sites. The option also poses a moderate INNS construction risk through the use of plant and movement of site personnel within or close to sensitive habitats. However, the option also has potential for moderate positive effects, due to the increased water supply to Slough, Wycombe and Aylesbury, which will increase resilience.

The Level 1 WFD assessment covered 16 waterbodies for this option. The outcomes indicated further assessment would be necessary for five waterbodies: GB106039030210: Filchhampstead Brook at Farmoor, GB106039029780: Bayswater Brook, GB106039030180: Northfield Brook (Source to Thames) at Sandford and GB106039030240: Thame (Scotsgrove Brook to Thames) river water bodies, GB40602G600700: Headington Corallian. The Level 2 WFD assessments for the five river water bodies identified minor deterioration risks to the biological quality elements, hydrological supporting elements and physico-chemical quality elements. This is primarily due to the potential dewatering as a result of below ground structures. Minor localised impacts were also identified for surface water dependent status elements and GWDTE status elements in the groundwater body due to temporary construction impacts.

The HRA screening (Test of Likely Significance) assessment identified likely significant effects to Cothill Fens SAC (UK0012889) (approximately 0.05km) and Oxford Meadows SAC (UK0012845) (approximately 0.2km). As a result, a HRA Appropriate Assessment was undertaken, which concluded that, with adherence to the proposed mitigation measures, the works associated with the option are not expected to have any significant adverse effects on the overall integrity of the Designated Sites and their features during the construction and operation phases.

Moulsford Option (ID: TWU_SWX_HI-GRW_ALL_ALL_moulsford gw)

This option proposes the construction of an abstraction borehole in the unconfined Chalk north of Streatley on the west bank of the River Thames. Water abstracted from the borehole will be treated at the existing Cleeve water treatment works (WTW) located on the eastern side of the River Thames. The DO benefit is 3.5MI/d peak and 2MI/d average.

The SEA identified no major or moderate negative effects for this option.

The Level 1 WFD assessment covered three water bodies for this option. The outcomes indicated further assessment would be necessary for all three waterbodies: GB106039030331: Thames Wallingford to Caversham river water body, GB40601G600900: Berkshire Downs Chalk groundwater body and GB40601G601400: Chilterns Chalk Scarp groundwater body. The Level 2 WFD assessment for the river water body identified minor localised impacts to the biological quality elements, hydrological supporting elements and physico-chemical quality elements and for the Berkshire Downs Chalk identified minor localised impacts on quantitative surface water dependent status and water balance elements. The impacts on both water bodies are primarily due to the increased in groundwater abstraction. No impacts are identified in the Chilterns Chalk Scarp groundwater body.

The HRA screening (Test of Likely Significance) assessment identified likely significant effects to Hartslock Wood SAC (UK0030164) (approximately 2.3km). As a result, a HRA Appropriate Assessment was undertaken, which concluded that, with adherence to the proposed mitigation measures, the works associated with the option are not expected to have any significant adverse effects on the overall integrity of the Designated Sites and their features during the construction and operation phases.

Abingdon to Farmoor Reservoir Pipeline (ID: TWU_SWX_HI-TFR_STR_ALL_abing-farmoor pipe) This option is the construction of a transfer pipeline to convey 24MI/d of raw water between a proposed reservoir at Abingdon (SESRO, see Section 4.8) and the existing Farmoor reservoir, in the SWOX WRZ. (Note: Abingdon reservoir creation is not part of this option). The engineering scope includes the provision of a booster pump station at the proposed Abingdon Reservoir site to facilitate the transfer. Treatment would be provided at the existing WTW.

The SEA identified no major or moderate negative effects for this option.

The Level 1 WFD assessment covered nine waterbodies for this option. The outcomes indicated further assessment would be necessary for one waterbody: GB106039030334: Thames (Evenlode to Thame) river water body. The Level 2 WFD assessment identified a risk of deterioration to the biological quality elements, hydromorphological supporting elements and physico-chemicals. This is primarily due to a potential risk of new / increased surface water abstractions and new intake structure.

The HRA screening (Test of Likely Significance) assessment identified likely significant effects to Cothill Fen SAC (UK0012889) (approximately 0.1km). As a result, a HRA Appropriate Assessment was undertaken, which concluded that, with adherence to the proposed mitigation measures, the works associated with the option are not expected to have any significant adverse effects on the overall integrity of the Designated Sites and their features during the construction and operation phases.

The Abingdon to Farmoor pipeline option was assessed as having a risk score of 38.63%. The principal risk relating to this option is the creation of a pathway between reservoir waterbodies, which could facilitate the movement of INNS between these waterbodies and potentially increase the rate of INNS spread within the wider environment.

Wessex Water to SWOX (Flaxlands) (ID: TWU_SWX_HI-IMP_SWX_ALL_wessextoswoxflax)

The SEA identified no major or moderate negative effects for this option.

The Level 1 WFD assessment covered seven waterbodies for this option. The outcomes indicated no further assessment would be necessary for the option because the types of activities do not present a risk to WFD status or objectives for any waterbodies.

This option is scoped out for HRA Appropriate Assessment.

Henley to SWOX – 5MI/d (ID: TWU_SWX_HI-TFR_HEN_ALL_henley-swox5)

The option is for one new main from New Farm service reservoir (Henley) to Nettlebed service reservoir (SWOX). This will require a new 5.9km, 350mm diameter main from New Farm to Nettlebed and a new pumping station at New Farm. 5Ml/d capacity.

The SEA identified that this option could have moderate negative residual construction effects on material assets. Road closures or diversions may be necessary during construction, causing disruption to users. However, the pipeline will be buried, and the road will be reinstated, meaning the effects are temporary.

The Level 1 WFD assessment covered two waterbodies for this option. The outcomes indicated no further assessment would be necessary for the option because the types of activities do not present a risk to WFD status or objectives for any waterbodies.

This option is scoped out for HRA Appropriate Assessment.

Thames Water (SWA) to Thames Water (SWOX) Conveyance (ID: TWU_SWX_HI-TFR_SWA_ALL_tw(swa)to(swx)con)

This option is a potable water transfer, from Thames Water (SWA) to Thames Water (SWOX).

The SEA identified no major or moderate negative effects for this option.

This option makes use of existing assets and continues a current option. Therefore, no WFD assessment is required.

This option is scoped out for HRA Appropriate Assessment.

Thames Water (Kennet Valley) to Thames Water (Henley) Conveyance (ID: TWU_HEN_HI-TFR_KVZ_ALL_tw(kv)to(hen)con)

This option is a potable water transfer, from Thames Water (Kennet Valley) to Thames Water (Henley) Conveyance.

The SEA identified no major or moderate negative effects for this option.

This option makes use of existing assets and continues a current option. Therefore, no WFD assessment is required.

This option is scoped out for HRA Appropriate Assessment.

TLT extension from Lockwood PS to King George V Reservoir intake (ID: TWU_KGV_HI-TFR_KGV_ALL_lockwood ps-kgv res)

This option proposes a new connection from Lockwood PS to the intake of KGV reservoir, to increase capacity of KGV intake from the PS site.

It is likely during the construction phase for disturbance to occur that may affect nearby species such as birds. Uncertain effects remain during operation phase for each of the three sites, as the option could impact upon designated features of the site including bird assemblage. During the construction phase, works are in close proximity to a watercourse, meaning a pathway is available to contaminate water supplies if a pollution event were to occur. During the operational phase there will be new above-ground infrastructure that will increase raw water abstraction rates to infill King George V reservoir. This will likely have an associated level of maintenance activity throughout the operational phase.

The Level 1 WFD assessment covered seven waterbodies for this option. The outcomes indicated no further assessment would be necessary for the option because the types of activities do not present a risk to WFD status or objectives for any waterbodies.

This option is scoped out for HRA Appropriate Assessment.

Groundwater Addington (ID: TWU_LON_HI-GRW_ALL_ALL_addington gw)

This option is the construction of a new abstraction borehole at an existing operational groundwater abstraction source, and upgrade to WTW. The DO benefit is 1MI/d average, and 1.5MI/d peak.

The SEA identified no major or moderate negative effects for this option.

The Level 1 WFD assessment covered two waterbodies for this option. The outcomes indicated further assessment would be necessary for one waterbody: GB40601G602200: Epsom North Downs Chalk groundwater body. The Level 2 WFD assessment identified potential risk of deterioration to the quantitative dependent surface water and water balance status due to the increased groundwater abstraction lowering for groundwater levels and therefore potentially reducing baseflow to the local surface watercourses and changing water balance.

This option is scoped out for HRA Appropriate Assessment.

Southfleet/Greenhithe (new WTW) (ID: TWU_LON_HI-GRW_ALL_ALL_s'fleet lic disagg)

This option is the Southfleet-Greenhithe licence disaggregation, new headworks and pumping station at borehole sites, and a new 3km main from Greenhithe to a new WTW. The DO benefit is 8MI/d average, and 9MI/d peak.

The SEA identified no major or moderate negative effects for this option.

The Level 1 WFD assessment covered four waterbodies for this option. The outcomes indicated further assessment would be necessary for two waterbodies: GB40601G500300: North Kent Medway Chalk and GB40601G501800: West Kent Darent and Cray Chalk groundwater bodies. The Level 2 WFD assessment for both water bodies identified potential risk of deterioration to surface water and water balance status due to the increased groundwater abstraction lowering

for groundwater levels and therefore potentially reducing baseflow to the local surface watercourses and changing water balance.

This option is scoped out for HRA Appropriate Assessment.

ASR Horton Kirby (ID: TWU_LON_HI-GRW_RE1_ALL_asrhortonkirby)

This option comprises the construction of pipelines between two existing ASR boreholes in the Lower Greensand aquifer, to an existing WTW at Horton Kirby in Kent. Water abstracted from existing Chalk aquifer boreholes (via the mains supply) will be recharged in the two ASR boreholes during periods of water surplus, and abstracted when needed and treated at the WTW.

The SEA identified no major or moderate negative effects for this option.

The Level 1 WFD assessment covered two waterbodies for this option. The outcomes indicated further assessment would be necessary for one waterbody: GB40601G604100 Chiltern Chalk Scarp groundwater body. The Level 2 WFD assessment identified potential risk of deterioration risks to the quantitative dependent surface water body status as a result of the increased groundwater being abstracted from the existing on site Chalk boreholes during wetter periods, to supply water to be injected into the ASR borehole. Impact of additional abstraction from Chalk could lead to reduction in surface water flows.

This option is scoped out for HRA Appropriate Assessment.

Woods Farm Increase DO (ID: TWU_SWX_HI-GRW_ALL_ALL_woods farm do)

This option is the construction of a new borehole on site to bring DO up to licence (this is an additional 2.4MI/d to average licence of 4.99MI/d and additional 2.91MI/d to peak licence of 5.5MI/d). The option includes a new borehole and a 1.4km raw water pipeline from the new satellite borehole to Woods Farm WTW. Currently the site is only able to produce up to 2.59MI/d, as it is constrained by turbidity. Woods Farm WRMP24 option comprises the retention of the current abstraction licence with the construction of a new abstraction borehole in the unconfined Chalk, east of the existing Woods Farm boreholes. It also includes a new 1.4 km raw water pipeline from the new satellite borehole to Woods Farm WTW.

The SEA identified no major or moderate negative effects for this option.

The Level 1 WFD assessment covered two waterbodies for this option. The outcomes indicated further assessment would be necessary for one waterbody: GB40601G600900: Berkshire Downs Chalk groundwater body. The Level 2 WFD assessment identified minor localised risks to the biological quality elements, hydrological supporting elements and physico-chemical quality elements and quantitative status elements. This is primarily due to the increase in groundwater abstraction.

This option is scoped out for HRA Appropriate Assessment.

Dapdune Licence Disaggregation (ID: TWU_GUI_HI-GRW_ALL_ALL_dapdune lic disagg) Licence disaggregation. DO benefit 0MI/d average, and 2.2MI/d peak.

The SEA identified no major or moderate negative effects for this option.

The Level 1 WFD assessment covered two waterbodies for this option. The outcomes indicated no further assessment would be necessary for the option because the types of activities do not present a risk to WFD status or objectives for any waterbodies.

This option is scoped out for HRA Appropriate Assessment.

Mortimer Disused Source (Recommission) (ID: TWU_KVZ_HI-GRW_ALL_ALL_mortimer recomm)

This option is the refurbishment of two disused abstraction boreholes located on-site at the existing, but disused, Mortimer (WTW). Water abstracted from the boreholes will be treated at the disused WTW which will be upgraded for ammonia and iron removal and recommissioned. DO benefit 4.5MI/d average and peak.

The SEA identified no major or moderate negative effects for this option.

The Level 1 WFD assessment covered one waterbody for this option. The outcomes indicated no further assessment would be necessary for the option because the types of activities do not present a risk to WFD status or objectives for any waterbodies.

This option is scoped out for HRA Appropriate Assessment.

Britwell Removal of Constraints (ID: TWU_SWX_HI-GRW_RE1_ALL_britwell roc)

This option is the construction of a new run to waste facility to allow operation of existing borehole.

The SEA identified no major or moderate negative effects for this option.

The Level 1 WFD assessment covered two water bodies for this option. The outcomes indicated further assessment would be necessary for one waterbody: GB40601G604100 Chiltern Chalk Scarp (GW). The Level 2 WFD assessment identified potential risk of deterioration to the quantitative dependent surface water status due to the increased groundwater abstraction lowering for groundwater levels and therefore reducing baseflow to the local surface watercourses.

This option is scoped out for HRA Appropriate Assessment.

Merton Recommissioning (ID: TWU_LON_HI-GRW_ALL_ALL_merton recommission)

This option comprises the recommissioning and upgrade of the Merton Abbey WTW in order to treat the maximum peak DO of 8MI/d from the Merton Abbey Well. DO benefit 7.86MI/d peak 2MI/d average.

The SEA identified no major or moderate negative effects for this option.

The Level 1 WFD assessment covered one water body for this option. The outcomes indicated further assessment would be necessary for this waterbody: GB106039023460 Wandle (Croydon to Wandsworth) and the R. Graveney. Merton recommissioning is an option selected

in the plan post-2050 (see Section 4.9) and therefore Level 2 assessment will be undertaken for the final plan.

This option is scoped out for HRA Appropriate Assessment.

Kempton – 100 Phase 1 – Construction (ID: TWU_LON_HI-ROC_WT1_CNO_kemptonwtw100 p1)

This option includes Phase 1 Construction of new water treatment capacity of 100MI/d capacity within the Kempton WTW land boundary on land owned by Thames Water. The new treatment capacity will be used to supply the London water resource zone.

The SEA identified that this option could have moderate negative residual construction effects on biodiversity, flora and fauna, and moderate negative residual operational effects on embodied and operational carbon. This option intersects the Kempton Park Reservoirs SSSI (100% unfavourable - recovering) and Kempton Nature Reserves LNR, and the South West London Waterbodies SPA / RAMSAR, as identified within the HRA ToLS. Potential for direct effects including noise, air pollution and vibration, depending on the location of the treatment works and indirect effects. The option is entirely located within SSSI Impact Risk Zones. Depending on the location of the treatment works, there is potential for loss of deciduous woodland Priority Habitat. Carbon will be generated from materials used to construct the new infrastructure (embodied carbon), construction activities and from operation. The relative carbon scale identified that the option has minor construction and moderate operation carbon emissions (relative to other WRSE Regional Plan options).

4.8 SROs

As outlined in Section 4.2 the environmental assessments undertaken for the SROs as part of the Regulators' Alliance for Progressing Infrastructure Development (RAPID) gated process, including SEA, HRA (Screening and Appropriate Assessment), WFD (Level 1 and Level 2) and INNS have been used to inform the Thames Water WRMP24 further assessments. A summary of the findings of the RAPID Gate 2 assessments is provided hereon. For full outputs of the summaries below, please see the RAPID Gate 2 submission documents provided for the SROs, once these have been made publicly available.

London Reuse

The Gate 2 assessment considered the following four sources as part of London Reuse, each with various sizes: Beckton Reuse; Mogden Reuse; Mogden South Sewer; and Teddington Direct River Abstraction. At the time of writing, SEA results for the Mogden South Sewer aspect were not available owing to development work on this option being paused as described in the Gate 2 reports. An SEA has been carried out for this option within the environmental assessments carried out for the options as part of regional planning. It should also be noted that the London Reuse Scheme has been assessed against additional SEA objectives, as outlined in the All Company Working Group SEA Guidance for Gate 2.

Major positive residual effects have been identified for all of the options for the SEA objective on delivering reliable and resilient water supplies given the options improve the transfer of water across regions. Major positive residual effects are also identified for the objective on climate resilience given the options are identified to increase resilience to drought during operation. This

also ties in with objectives on population and human health where major positive residual effects were identified for the operational phase.

For the Mogden Reuse option, moderate negative residual effects are identified for the biodiversity, flora and fauna during the construction phase as there will be a permanent reduction in the natural capital value of this site where the new WTW is to be located. All options are identified to have moderate negative residual effects on air during the construction phase due to emissions from construction related activities.

Teddington DRA scheme involves the re-routing of a part of treated effluent flow from Mogden STW, further treating it and then discharging it upstream of Teddington Weir. This would allow us to abstract water from the River Thames, through a new intake, a short distance upstream of the discharge location, with the increased abstraction replaced by the re-routed Mogden flow.

The scheme needs to be considered in two parts: 1) The new abstraction from the River Thames and 2) The partial re-routing of treated effluent from Mogden STW to upstream of Teddington Weir. The scheme will improve water transfer across regions, improving water resource management and resilience of supply. The SEA identified no major or moderate negative effects for this option (both parts), and both are scoped out for HRA Appropriate Assessment.

Part 1 involves a new abstraction from the River Thames, upstream of the new effluent transfer discharge location, and would pump water into the nearby existing Thames Lee Tunnel for transfer to the existing Lee Valley Reservoirs in East London.

The Level 1 WFD assessment for Part 1 covered two water bodies for this option. The outcomes indicated no further assessment would be necessary for the option because the types of activities do not present a risk to WFD status or objectives for any waterbodies.

Part 2 is the conveyance from Mogden to the River Thames at Teddington (Teddington DRA) A portion of Mogden STW effluent would be subject to tertiary treatment at the existing Mogden STW. The treated water would be transferred to a discharge location upstream of Teddington Weir. The Level 1 WFD assessment for Part 2 covered four waterbodies for this option. The outcomes indicated further assessment would be necessary for one waterbody: GB106039023030: Crane river water body. The Level 2 WFD assessment identified a risk of deterioration to the biological quality elements, hydrological supporting elements and physico-chemical quality elements. This is primarily due to the cessation of existing discharge to a watercourse.

For the London Reuse SRO, only the Teddington DRA scheme was subject to a Level 2 INNS assessment – this option assessment resulted in a risk score of 56.88%. The risk level is slightly lower than the current abstraction on the Thames (Hampton intake) via the TLT, which has the same source and destination as the transfer proposed for Teddington DRA. The risk is higher for the existing abstraction because it is in continuous operation and has a higher average volume than the 150MI/d Teddington DRA option (though the 75 is what is reported in the dWRMP24 report).

Thames to Affinity Transfer (T2AT)

The Gate 2 assessment considered the following two options for T2AT, Lower Thames Reservoir and Beckton Reuse Indirect.

Major positive residual effects have been identified for both options for the SEA objective on delivering reliable and resilient water supplies given the options improve the transfer of water across regions. The WFD Level 2 assessments for both options identified that the options are WFD compliant. Carbon would be generated as a result of construction as well as during operation as a result of both options. The SEA identified minor negative residual effects associated with carbon emissions during the construction phase and moderate residual negative effects during the operational phase for both options.

Moderate negative residual effects were identified for biodiversity, flora and fauna for the construction and operation of the Beckton Reuse Indirect Option given the new intake is located within the Chingford Reservoir SSSI. There is potential for effects on internationally and nationally designated sites, and potential impacts on priority habitat and woodland for both options. The HRA ToLS for the Lower Thames Reservoir Option identified likely significant effects on South West London Waterbodies SPA and Ramsar. Likely significant effects were identified for Lee Valley SPA and Ramsar site and Wormley Hoddesdonpark Woods SAC as a result of the Beckton Reuse Indirect Option. HRA AA was therefore undertaken and identified no adverse effects on the integrity of the sites where appropriate mitigation is implemented.

Thames to Southern Transfer (T2ST)

The Gate 2 assessment considered the following two options for T2ST, Option B – Central route via Newbury (West of Newbury and remaining west of the A34, to Winchester); and Option C – Central route via Newbury (West of Newbury and then crossing to the east of the A34, to Winchester).

Given both options follow a very similar route, the SEA identified similar effects for each of the SEA objectives with both options scoring the same against each objective. Major positive residual effects have been identified for both options for the SEA objective on delivering reliable and resilient water supplies given the options improve the transfer of water across regions. The WFD Level 2 assessments for both options identified that the options are WFD compliant with appropriate mitigation. Carbon would be generated as a result of construction as well as during operation as a result of both options. The SEA identified minor negative residual effects associated with carbon emissions during the construction phase and major residual negative effects during the operational phase for both options.

Moderate negative residual effects were identified for biodiversity, flora and fauna as a result of both of the options intersecting international (Natura 2000 sites) and nationally designated sites, priority habitats and Ancient Woodland. A HRA ToLS identified potential for likely significant effects on four Natura 2000 sites and uncertain effects for six sites as a result of both options. HRA AA was therefore undertaken and identified no adverse effects on the integrity of the sites where appropriate mitigation is implemented.

The Culham to Speen transfer option was assessed as part of the T2ST SRO. As this transfer is a spur from the main pipeline and involves the transfer of treated water over a very short distance, it was not assessed as a separate component as the risk of INNS transfer from this individual section was deemed negligible. The transfer components resulted in risk scores of

35.73%, and risk scores of 10.94% for the WTW asset component. As water transfer Option B and Option C do not differ significantly in their conceptual design. The data and information input to the EA INNS risk assessment tool were identical for the two options and as such there was no difference in the resulting risk scores. The Medium risk score of 35.73% is considered to be an overestimate of the INNS risk as treatment of raw water at the new WTW at the intake location prior to transfer will eliminate any INNS at source, which is not accounted for within the SAI-RAT. Additionally, transfer via a pipeline rather than an open water course will prevent the introduction of INNS along the transfer route. At no point during the normal operation of the T2ST transfer will raw or treated water be discharged to an open waterbody. Treated water may occasionally be discharged to nearby water courses or waterbodies from washout or maintenance points along the pipeline route which could facilitate the spread of existing INNS downstream and consideration should be given to the incorporation of INNS mitigation measures in the design and operation of washout and maintenance points along the pipeline route.

South East Strategic Reservoir Option

This option is the provision of a new fully bunded reservoir at Abingdon with an associated conveyance tunnel and intake / discharge structure at Culham on the River Thames to (1) fill the reservoir by abstracting raw water from the River Thames, and (2) to support flows in the River Thames by discharging water stored within the reservoir. Moderate negative effects were identified for biodiversity (impacts on protected sites), soil (agricultural land), landscape, historic environment, and population (due to potential for disturbance). Major beneficial effects were identified for biodiversity, water and population due to the additional resource availability and potential use of the reservoir as habitat and recreation. Moderate positive effects were identified for landscape and climate. Greater detail on the predicted impacts is highlighted below.

There may be negative effects during the construction phase on these sites from disturbance, and the sites overlapping or adjacent to rivers/streams could be affected by the reservoir (see water quality objective). There is Priority Habitat and woodland within the footprint of the reservoir, as well as Grade 2, 3 and 4 agricultural land, which will be permanently lost and will significantly change the landscape. The reservoir appears to directly impact allotments and sports facilities, which will likely result in their loss, and there are golf courses, schools, public parks and gardens, playfields, religious grounds, and play spaces within 500m of the option. Buildings, residential and commercial properties located within the reservoir boundary would be permanently lost and major negative effects are thus identified.

There would also likely be short-term negative effects resulting from the loss of top soil during the construction phase. However, the reservoir also has the potential to create a new habitat. This option will increase capacity, which improves the resilience for supply. It will also help reduce abstractions in more vulnerable areas and during times of low flow. This will increase the resilience of the water supply, as well as the environment, through having capacity to release water into the river during low flow and drought conditions and reducing abstraction in more vulnerable areas that would be exacerbated by drought conditions. Another positive effect has been identified as providing a new valued landscape that could be used by people. The SRO indicative Gate 2 Master Plan references the following possible recreational opportunities: controlled water-based recreation under managed conditions, possible boat access to the site from the River Thames, network of footpaths and cycle paths around the site including potential for bird hides and boardwalks in wetland area, all linking with wider Public Right of Way network

to facilitate local access, modest visitor centre, café and boat storage / clubhouse and a small education centre. These will be subject to change in the future, pending the outcomes of future consultation and engagement and will be investigated as the design progresses.

Please note that the updated SEA categorisation for SESRO, undertaken to provide information for Gate 2 has upgraded the impact on landscape from moderate negative to major negative, due to potential impacts on the North Wessex Downs AONB.

The SESRO SRO required the assessment of one BVP option (TWU_SWX_HI-ROC_WT2_ALL_abingdon wtw ph2), which resulted in an INNS risk score of 57.90% for the assets and 61.63% transfer components under most likely scenarios. Scenarios have taken into consideration different variations of INNS pathway-frequency to understand how this will alter risk. This included most likely (baseline) scenarios and a range of other scenarios; from no recreational activities at the site to 'worst-case scenarios' in which all INNS pathways are identified as present at maximum frequency.

Severn to Thames Transfer

Seven to Thames Transfer (STT) is a proposed new water transfer pipeline which enables the transfer of raw water from the River Severn to the River Thames. It is currently scheduled to have an earliest operational date of 2033. The SEA identified similar effects for many of the components. Major positive residual effects have been identified for both options for the SEA objective on delivering reliable and resilient water supplies given the options improve the transfer of water across regions. The SEA identified minor negative residual effects associated with carbon emissions during the construction phase and major residual negative effects during the operational phase for both options.

Moderate negative residual effects were identified for biodiversity, flora and fauna as a result of both of the options intersecting international (Natura 2000 sites) and nationally designated sites, priority habitats and Ancient Woodland. The HRA ToLS identified potential for likely significant effects on Dixton Wood SAC and Midland Meres and Mosses Phase 2 Ramsar from the construction phase; construction and operational effects on Severn Estuary SAC, Severn Estuary SPA and Severn Estuary Ramsar; and operational effects on River Wye SAC, River Usk SAC and River Clun SAC. HRA Appropriate Assessment was therefore undertaken and concluded no adverse effects from both construction and operation on the Designated Sites integrity, however further monitoring, modelling and assessment are required at Gate 3 due to uncertainties.

The Level 1 WFD assessment triggered the need for WFD Level 2. The Level 2 assessment identified that STT has the potential to not be compliant with WFD objectives, subject to further development of operating rules and treatment solutions, together with additional bespoke aquatic habitat assessment, water quality monitoring and water quality modelling planned in Gate 3.

For the Severn to Thames Transfer SRO, two of the six BVP options were subject to Level 2 INNS assessments: the Vyrnwy Reservoir river release (75 Mld) and 25 Mld of Bypass (105Mld), and the Deerhurst (River Severn) to Culham (River Thames) transfer. For the Vyrnwy Reservoir river release and bypass option, a Level 2 assessment was undertaken for the bypass element based on both 180Ml/d and 205Ml/d options – resulting in risk scores of 51.50% and 52.50%, respectively. The Deerhurst to Culham transfer option resulted in a risk score of 49.73%, scoring slightly lower than the Vyrnwy Bypass options.

4.9 Options post 2050

The summary of options above outlines the environmental findings for all supply-side options in the BVP (Demand and Catchment Options in Section 4.10 and 4.11 respectively). The SEA assessment and the assessment of cumulative effects considers options within the plan. Our HRA, WFD, INNS, BNG and NCAs focus on schemes up to 2050, with schemes post-2050 considered on a lighter touch. This is because post-2050 there is less certainty regarding the status/condition of environment and any assessments would be undertaken in an overly precautionary manner.

4.10 Demand Management Options

A description of each of the constrained demand management options subject to detailed assessment is provided in Table 4.2 below. The drought options include both actions to reduce demand, in the form of temporary use bans (TUBs) and non-essential use bans (NEUBs), as well as supply-side drought permits which are discussed further below.

ID	Option	Description
	Name	
DMO Guildford – High Plus	Demand	To determine the likelihood for significant
DMO Guildford - High	Management	effects of demand management
DMO Guildford – Deliverable	Strategy	strategies, groups or 'baskets' of
DMO Guildford – Government led b	(DMS)	strategies consisting of metering,
DMO Henley – High Plus		consumption reduction, and loss reduction
DIVIO Henley - High		techniques were developed and assessed
DIVIO Henley – Deliverable		based on three scenarios: Deliverable,
DIVIO Heniey – Government led b		High and High Plus. Each scenario aims to
DIVIO Kennet Valley – High Plus		achieve bigger water savings requiring
DIVIO Kennet Valley - High		greater inputs to achieve these savings.
DIVIO Kennet Valley - Deliverable		the Themes DMOs providing additional
DMO London High Plus		bonofit
DMO London - High		Derlent.
DMO London - Deliverable		
DMO London - Government led b		
DMO SWA – High Plus		
DMO SWA - High		
DMO SWA - Deliverable		
DMO SWA – Government led b		
DMO SWOX – High Plus		
DMO SWOX - High		
DMO SWOX – Deliverable		
DMO SWOX – Government led b		
Media – Guildford	Media	Media campaigns to reduce usage.
Media – Henley		·
Media – KV		
Media – London		
Media – SWA		
Media – SWOX		

Table 4-2 : Demand Management Options

ID	Option	Description
	Name	
TUB – Guildford TUB – Henley TUB – KV TUB – London TUB – SWA TUB – SWOX	Temporary Use Bans (TUBs)	During a period of drought, powers can be granted to water companies to allow them to impose TUBs restrictions on customer' water use to help to reduce demand. Measures under TUBS can include: Watering a garden using a hosepipe Cleaning a private motor-vehicle using a hosepipe Watering plants on domestic or other non- commercial premises using a hosepipe Cleaning a private leisure boat using a hosepipe Filling or maintaining a domestic swimming or paddling pool Drawing water, using a hosepipe, for domestic recreational use Filling or maintaining a domestic pond using a hosepipe Filling or maintaining an ornamental fountain Cleaning walls, or windows, of domestic premises using a hosepipe Cleaning paths or patios using a hosepipe Cleaning other artificial outdoor surfaces using a hosepipe
Thames Water: NEUB – Guildford NEUB – Henley NEUB – KV NEUB – London NEUB – SWA NEUB – SWOX	Non-Essential Use Bans (NEUBs)	During periods of exceptional / sustained drought, water companies can further increase water restrictions past the TUBs described above. Measures under NEUBs can include: Watering outdoor plants on commercial premises Filling or maintaining a non-domestic swimming or paddling pool Filling or maintaining a pond Cleaning non-domestic premises Cleaning a window of a non-domestic building Operating a mechanical vehicle-washer Cleaning any vehicle, boat, aircraft, or railway rolling stock Cleaning industrial plant Suppressing dust Operating cisterns in any building that is unoccupied or closed

The summary findings of the SEA for these demand options are presented in Table 4.5 below.

As illustrated in Table 4.5, there are no significant differences between the demand management and media strategies set out for each Thames Water Region. No major negative effects are predicted and there are positive effects for operation, ranging from minor to major depending on the extent of implementation, these are for both biodiversity and water objectives resulting from water being retained within the environment.

The TUBs and NEUBs options resulted in a mix of minor positive operational effects for the biodiversity, water and climatic objectives by retaining water within the environment, while also resulting in minor negative operational effects for the landscape, historic environment, population and human health objectives by reducing water used to maintain landscape and heritage assets, and reducing water use across the community for commercial and tourism purposes.

The SEA results for the demand management options have fed into the regional planning process and informed the development of the alternative programmes and best value plan for the Thames Water WRMP24. The demand options selected across the BVP, LC and BES are the same. Annex F presents the list of demand options selected in these three plans and also summaries the SEA findings for each option. However, these options have not been presented in the assessment of alternative programmes set out in Section 5, nor the assessment of the Best Value Plan set out in Section 6, because location specific information was not available.

4.11 Catchment Management Options

A small number of catchment management portfolios have also been assessed as part of the constrained feasible list of options. These portfolios contain a range of strategies to deliver catchment improvements and have been assessed under three separate implementation scenarios, which include 'standard', 'upscaled', and 'augmented' implementation.

Similar to the DMO options there are few differences between the catchment management schemes. No major negative effects are predicted and there are positive effects for operation, ranging from minor to moderate depending on the extent of implementation, these are for both biodiversity and water objectives resulting from water being retained within the environment. The 'upscaled' and 'augmented' schemes potentially realise greater environmental benefits to water and climate, again due to the retention of water in the environment.

The catchment management options that have been selected in the BVP, LC and BES are presented in Annex F alongside a summary of the SEA findings.

4.12 Drought Permits

Drought permits can be available to water companies during times of severe drought. Water companies can request drought permit authorisation from the EA to allow for an additional source of water outside the schedule of an existing licence on a temporary basis, as a last resort once available demand-side options have been exhausted.

Thames Water assessed the Environmental Impacts of their drought permits (Table 4.3) in the Thames Water Drought Permit SEA Report, with the impacts summarised in Table 4.6.

The drought permits that have been selected in the BVP, LC and BES are presented in Annex F alongside a summary of the SEA findings.

ID	Option Name	Description			
TWU_GUI_R	Shalford	Under normal conditions, the abstraction comprises 30MI/d from			
E-	Drought Permit	the River Wey (licence number 28/39/30/0066, aggregated with			
DRP_ALL_AL		abstraction from the Tillingbourne licence 28/39/30/319).			

Table 4-3 : Drought Permit Options

ID	Option Name	Description
L_dp- shalford-guild		Implementation of the drought permit would involve an increase to the existing surface water abstraction from the River Wey and removing the licence aggregates. The benefit would be 5MI/d. The drought permit may be implemented for up to 6 consecutive months between May and December inclusive, although it could be implemented any time of year. The River Wey is a mainly rural catchment of mixed geology, with baseflow originating from both the Chalk and Lower Greensand aquifers. Shalford Water Treatment Works (WTW) treats surface water abstracted from both the River Wey and River Tillingbourne just upstream of their confluence.
TWU_HEN_R E- DRP_ALL_AL L_dp- sheep/harp- hen	Harpsden / Sheeplands Drought Permit	The Harpsden abstraction consists of three boreholes abstracting from the unconfined chalk aquifer (that is overlain by superficial gravels). The River Thames is located about 750m east of the abstraction, with the settlement Lower Shiplake lying between the river and the abstraction. The abstraction is licenced in aggregate with the Sheeplands abstraction, a group of three boreholes, also abstracting from the Chalk. The Sheeplands boreholes are located 3km south east of Harpsden, on the other side of the River Thames to the Harpsden boreholes. The proposed drought option will be to relax the aggregate condition of the current abstraction licence and increase total abstraction from both locations to 27.9MI/d. Abstraction at Sheeplands will continue to be pumped at 11.4MI/d which is within the boundaries of the normal operating license. Typically, 10.5MI/d of water is abstracted from the Harpsden boreholes under the normal operating license therefore an increase of 6MI/d during drought would be taken, amounting to a total output of 16.5MI/d.
TWU_KVZ_R E- DRP_ALL_AL L_dp- playhatch-kv	Playhatch Drought Permit	The abstraction is located in the South-West Chilterns Chalk groundwater body. It consists of two boreholes abstracting from the Chalk. Normal abstraction is annual average abstraction 7.27Ml/d, peak abstraction 8.2Ml/d. Proposed abstraction is 2.8 - 4.1Ml/d - increase in peak abstraction of existing licence from 8.2Ml/d to 12.3Ml/d providing a benefit of 4.1Ml/d. The drought permit could be implemented at any time of year, however it is anticipated to be applied for up to 6 consecutive months between May and December inclusive. There is no construction phase associated with this drought permit.
TWU_SWX_R E- DRP_ALL_AL L_dp- gatehampton -swox	Gatehampton Drought Permit	Under normal license conditions water is abstracted from the Cretaceous Chalk aquifer at Gatehampton. The Gatehampton abstraction consists of seven boreholes (four boreholes are within 100m of the River Thames; the other three are approximately 250m from the river). Normal abstraction comprises: The existing abstraction licence (28/39/23/173) permits abstraction from the Chalk aquifer at Gatehampton at a peak day rate of 105Ml/d with an average rate per year and month of 95Ml/d and an annual maximum of 3,4770Ml/ year. The operation of the existing abstraction licence is limited by flow conditions in the River Thames at Caversham Gauging Station - when flows are less than 400Ml/d for 5 days, then abstraction must be maintained at or below 101.5Ml/d. Proposed comprises: 3.5Ml/d - continuation of abstraction from boreholes beyond licence conditions. This would provide a benefit of 3.5Ml/d. There is no construction phase associated with this drought option.

The significance key used to undertake the SEAs is provided in Table 4.4. The significance scores for each SEA objective have been converted to numerical scores to facilitate investment model for the regional plan, discussed further in Section 5 below. The SEA significance and the associated numerical score is summarised in Table 4.4.

It should be noted that Table 4-5 summaries the SEA findings for the all the options that were subject to detailed assessment. The options selected in the BVP, LC and BES are listed in Annex F alongside summaries of the SEA findings.

Qualitative Score	Description	Numerical Score
+++	Major Positive	8
++	Moderate Positive	4
+	Minor Positive	1
0	Neutral	0
-	Minor Negative	-1
	Moderate Negative	-4
	Major Negative	-8

Table 4-4 : S	SEA Significance	and Numerical	Score
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Please also note that the abbreviations "C" and "O" in the tables represent **C**onstruction effects and **O**perational effects.

	SEA Objectives and Assessment Questions																											
Options ID	Biodi∨	ersity	S	oil			Wa	iter			A	vir		Climatic	Factors	S	Land	scape	His ⁻ Enviro	toric onment	Рор	ulation Hea	and Hur alth	man		Materia	l Assets	2
		1	2	2	;	3	4	4	Į	5	(6	-	7	ł	8	ę	9	1	0	1	1	1	2	1	3	1	4
	С	0	С	0	С	0	С	0	С	0	С	0	С	0	С	0	С	0	С	0	С	0	С	0	С	0	С	0
Demand Mana	agemen	t Optior	IS																									
DMO Guildford - High Plus	0	8	0	0	0	0	0	8	0	8	0	0	-1	8	0	8	-1	8	-1	0	-1	8	0	0	-1	0	-1	0
DMO Guildford - High	0	4	0	0	0	0	0	4	0	4	0	0	-1	4	0	4	-1	4	-1	0	-1	4	0	0	-1	0	-1	0
DMO Guildford - Deliverable	0	1	0	0	0	0	0	1	0	1	0	0	-1	1	0	1	-1	1	-1	0	-1	1	0	0	-1	0	-1	0
DMO Guildford – Gov led b	0	8	0	0	0	0	0	8	0	8	0	0	-1	1	0	1	-1	1	-1	0	-1	1	0	0	-1	0	-1	0
DMO Henley – High Plus	0	4	0	0	0	0	0	4	0	4	0	0	-1	4	0	4	-1	4	-1	0	-1	4	0	0	-1	0	-1	0
DMO Henley - High	0	4	0	0	0	0	0	4	0	4	0	0	-1	4	0	4	-1	4	-1	0	-1	4	0	0	-1	0	-1	0
DMO Henley - Deliverable	0	1	0	0	0	0	0	1	0	1	0	0	-1	1	0	1	-1	1	-1	0	-1	1	0	0	-1	0	-1	0
DMO Henley – Gov led b	0	8	0	0	0	0	0	8	0	8	0	0	-1	1	0	1	-1	1	-1	0	-1	1	0	0	-1	0	-1	0
DMO KV - High Plus	0	4	0	0	0	0	0	4	0	4	0	0	-1	4	0	4	-1	4	-1	0	-1	4	0	0	-1	0	-1	0
DMO KV - High	0	1	0	0	0	0	0	1	0	1	0	0	-1	1	0	1	-1	1	-1	0	-1	1	0	0	-1	0	-1	0
DMO KV - Deliverable	0	1	0	0	0	0	0	1	0	1	0	0	-1	1	0	1	-1	1	-1	0	-1	1	0	0	-1	0	-1	0
DMO KV – Gov led b	0	8	0	0	0	0	0	8	0	8	0	0	-1	1	0	1	-1	1	-1	0	-1	1	0	0	-1	0	-1	0
DMO London - High Plus	0	8	0	0	0	0	0	8	0	8	0	0	-1	8	0	8	-1	8	-1	0	-1	8	0	0	-1	0	-1	0
DMO London - High	0	4	0	0	0	0	0	4	0	4	0	0	-1	4	0	4	-1	4	-1	0	-1	4	0	0	-1	0	-1	0
DMO London - Deliverable	0	1	0	0	0	0	0	1	0	1	0	0	-1	1	0	1	-1	1	-1	0	-1	1	0	0	-1	0	-1	0

Table 4-5 : Summary SEA Assessments for Demand Management, Media, NEUB, TUB and Catchment Options

	SEA C)bjective	s and A	ssessm	ent Que	estions																						
Options ID	Biodiv	ersity	S	oil			Wa	ater			A	Nir		Climatic	Factor	6	Land	scape	His [:] Enviro	toric onment	Рор	oulation He	and Hui alth	man		Materia	I Assets	
		1	4	2	;	3	4	4		5		6	-	7	1	8		9	1	0	1	1	1	2	1	3	1	4
	С	0	С	0	С	0	С	0	С	0	С	0	С	0	С	0	С	0	С	0	С	0	С	0	С	0	С	0
DMO London – Gov led b	0	8	0	0	0	0	0	8	0	8	0	0	-1	1	0	1	-1	1	-1	0	-1	1	0	0	-1	0	-1	0
DMO SWA - High Plus	0	4	0	0	0	0	0	4	0	4	0	0	-1	4	0	4	-1	4	-1	0	-1	4	0	0	-1	0	-1	0
DMO SWA - High	0	1	0	0	0	0	0	1	0	1	0	0	-1	1	0	1	-1	1	-1	0	-1	1	0	0	-1	0	-1	0
DMO SWA - Deliverable	0	1	0	0	0	0	0	1	0	1	0	0	-1	1	0	1	-1	1	-1	0	-1	1	0	0	-1	0	-1	0
DMO SWA – Gov led b	0	8	0	0	0	0	0	8	0	8	0	0	-1	1	0	1	-1	1	-1	0	-1	1	0	0	-1	0	-1	0
DMO SWOX - High Plus	0	4	0	0	0	0	0	4	0	4	0	0	-1	4	0	4	-1	4	-1	0	-1	4	0	0	-1	0	-1	0
DMO SWOX - High	0	1	0	0	0	0	0	1	0	1	0	0	-1	1	0	1	-1	1	-1	0	-1	1	0	0	-1	0	-1	0
DMO SWOX - Deliverable	0	1	0	0	0	0	0	1	0	1	0	0	-1	1	0	1	-1	1	-1	0	-1	1	0	0	-1	0	-1	0
DMO SWOX – Gov led b	0	8	0	0	0	0	0	8	0	8	0	0	-1	1	0	1	-1	1	-1	0	-1	1	0	0	-1	0	-1	0
													Media (Options														
Media – Guildford	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
Media - Henley	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
Media – KV	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
Media - London	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
Media – SWA	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
Media - SWOX	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
												Te	mporary	y Use Ba	ans													
TUB - Guilfd	0	1	0	1	0	0	0	1	0	1	0	0	0	0	0	1	0	-1	0	0	0	-1	0	-1	0	0	0	0
TUB - Henley	0	1	0	1	0	0	0	1	0	1	0	0	0	0	0	1	0	-1	0	0	0	-1	0	-1	0	0	0	0

	SEA C	Dbjective	es and A	ssessm	ent Que	estions																						
Options ID	Biodiv	ersity	S	oil			Wa	ater			A	\ir		Climatic	Factor	S	Land	scape	Hist Enviro	toric onment	Pop	oulation He	and Hu alth	man		Materia	l Assets	5
		1	:	2	;	3		4		5		6	-	7	1	8	9	9	10		1	1	1	2	1	3	1	4
	С	0	С	0	С	0	С	0	С	0	С	0	С	0	С	0	С	0	С	0	С	0	С	0	С	0	С	0
TUB - KV	0	1	0	1	0	0	0	1	0	1	0	0	0	0	0	1	0	-1	0	0	0	-1	0	-1	0	0	0	0
TUB - London	0	1	0	1	0	0	0	1	0	1	0	0	0	0	0	1	0	-1	0	0	0	-1	0	-1	0	0	0	0
TUB - SWA	0	1	0	1	0	0	0	1	0	1	0	0	0	0	0	1	0	-1	0	0	0	-1	0	-1	0	0	0	0
TUB - SWOX	0	1	0	1	0	0	0	1	0	1	0	0	0	0	0	1	0	-1	0	0	0	-1	0	-1	0	0	0	0
	1	•	•		•	•	•	•	•	•	•	Non	-essent	ial Use I	Bans	•	•	•		•	•		•		•			
NEUB - Guilfd	0	1	0	1	0	0	0	1	0	1	0	0	0	0	0	1	0	-1	0	0	0	-1	0	-1	0	0	0	0
NEUB - Henley	0	1	0	1	0	0	0	1	0	1	0	0	0	0	0	1	0	-1	0	0	0	-1	0	-1	0	0	0	0
NEUB - KV	0	1	0	1	0	0	0	1	0	1	0	0	0	0	0	1	0	-1	0	0	0	-1	0	-1	0	0	0	0
NEUB - London	0	1	0	1	0	0	0	1	0	1	0	0	0	0	0	1	0	-1	0	0	0	-1	0	-1	0	0	0	0
NEUB - SWA	0	1	0	1	0	0	0	1	0	1	0	0	0	0	0	1	0	-1	0	0	0	-1	0	-1	0	0	0	0
NEUB - SWOX	0	1	0	1	0	0	0	1	0	1	0	0	0	0	0	1	0	-1	0	0	0	-1	0	-1	0	0	0	0
		1	1	I		I	1	I	•	1	1	C	atchme	nt Optio	ns	1	1	•		I	1		•		•	I		
Portfolio 1 (Standard)	-4	4/-4*	-1	1	0	1	-1	4	0	1	0	0	0	0	0	1	-1	1	-1	0	-1	1	-1	1	-1	1	-1	0
Portfolio 2 (Upscaled)	-4	0	-1	1	0	4	-1	4	0	4	0	0	0	0	0	4	-1	1	-1	0	-1	1	-1	1	-1	1	-1	0
Portfolio 3 (Augmented)	-4	0	-1	1	-1	4	-1	4	0	4	0	0	0	0	0	4	-1	1	-1	0	-1	1	-1	1	-1	4	-1	0

*Options that result in both positive (beneficial) and negative (adverse) effects presented 'positive score/negative score'

	SEA C	Objective	es and A	ssessm	ent Que	estions																						
Options ID	Biodi	versity	S	oil	Water						A	Air	Climatic Factors				Land	scape	Hist Enviro	toric onment	Population and Human Health					Materia	l Assets	5
		1	:	2	;	3		4		5		6		7	1	8	ę	9	1	0	1	1	1	2	1	13	1	4
	С	0	С	0	С	0	С	0	С	0	С	0	С	0	С	0	С	0	С	0	С	0	С	0	С	0	С	0
Drought Pern	nit Opti	ons																										
Shalford Drought Permit	0	0	0	0	0	0	0	0	0	1	0	0	0	-1	0	-1	0	0	0	0	4	0	0	0	0	0	0	0
Harpsden / Sheeplands Drought Permit	0	0	0	0	0	0	0	0	0	1	0	0	0	-1	0	-1	0	0	0	0	4	0	0	0	0	0	0	0
Playhatch Drought Permit	0	0	0	0	0	0	0	0	0	1	0	-1	0	-1	0	-1	0	0	0	0	4	0	0	0	0	0	0	0
Gatehamton Drought Permit	0	0	0	0	0	0	0	0	0	1	0	-1	0	-1	0	-1	0	0	0	0	4	0	0	0	0	0	0	0

Table 4.6: Summary SEA Assessments for Drought Permit Options

5 Assessment of Alternative Programmes and WRMP24 Decision-Making

5.1 Role of SEA in programme appraisal and decision-making

The options developed by Thames Water have fed directly into the regional planning process for WRSE by providing opportunities to address strategic water resource management issues. WRSE have adopted a best value approach for the regional plans. In the context of water resources planning, this means seeking solutions that not only secure supplies for customers, but also increases the overall benefit to customers, the wider environment and society. An investment model has been used with information on options inputted and different scenarios run to select options based on programmed parameters.

The options selected by the investment modelling for the emerging regional plans have then been used to identify the options included in the emerging Water Resources Management Plan (WRMP24). In this way, the best value plan approach adopted for the regional planning process has fed directly into the best value plan approach adopted for the emerging WRMP24, as set out in Section 2.2. The collaborative interaction between the two processes has resulted in a streamlined approach to the environmental assessment process, as well as ensured consistency across water company assessments.

5.2 Establishing Alternative Programmes

All of Thames Water's operations sit within WRSE. In line with the Environment Agency's definition, WRSE's Best Value Planning approach considered other factors alongside economic cost to seek to achieve an outcome that increases the overall net benefit to customers, the wider environment and overall society.

There are three key points where the SEA process can influence the development of the Regional Plans and Thames Water's WRMP24:

- Individual scheme level all feasible demand and supply-side schemes (that would deliver an increased deployable output) were subject to an assessment against the full SEA Framework of objectives, set out in Section 4 above.
- Investment modelling the findings of the SEA assessments (informed by the Habitat HRA, WFD, NCA and BNG assessments were translated into metrics that were then fed into the multi-criteria optimisation for the options selection and the programme appraisal. When running the investment model, this allowed runs to be calibrated according to those options that provide the most benefits or to exclude options with the highest environmental risk. The approach undertaken by WRSE is set out below.
- Programme appraisal alternative programmes were identified and selected programmes were taken forward for assessment through the SEA process, set out for the Thames Water WRMP24 below.

The regional investment modelling incorporated four metrics generated across the environmental assessment process. These metrics enabled the environment to be directly considered in analysis and selection of programmes of options at an early stage in the planning process. For incorporation of the environmental assessments into modelling, it was assumed that recommended mitigation measures will be applied, e.g., the SEA metric findings were based on the predicted residual effects on the environment.

By its nature SEA does not include numerical values for scoring effects. However, to incorporate environmental considerations directly into the investment model, SEA metrics were developed to summarise the environmental performance of each option in numerical form. The environmental assessment metrics were:

- Two metrics derived from the SEAs (outlined in Section 4.3 above) 1) SEA Positive, 2) SEA Negative. For SEA there are three levels within the assessment related to these positive and negative effects – minor, moderate, and major.
- One metric derived from the natural capital and ecosystem services assessments (outlined in Section 4.3 above) – Change in monetary value (£/year) of ecosystem services (combining carbon sequestration, food production, air pollution, natural hazard management, and recreation and amenity).
- Total net change in habitat units derived from application of the BNG metric (outlined in Section 4.3 above).

5.3 WRSE Investment Modelling and Programme Development

An adaptive planning approach was used to take account of future uncertainties. WRSE selected a total of nine branches (hereafter referred to as 'situations') to cover these uncertainties, which were derived based on combinations of the three key drivers presented in the Table 5.1 below.

Driver	Forecast Change		
	High	Medium	Low
Population and Housing Growth	Housing Plan with Housing Need tested in the very	Housing Plan forecast	ONS18 forecast, with ONS18 low tested in the very lowest
Climate Change impacts on DO for existing systems	WRSE Scenario 6	Median	WRSE Scenario 7
Levels of abstraction reduction associated with delivering Environmental Destination ambitions	'Enhanced' scenario	'Business As Usual (BAU)' or 'BAU+' with lower groundwater/surface water interaction	'BAU' with lower groundwater/surface water interaction

Table 5-1 : Forecasts based on key drivers

The final nine situations were therefore made up of representative combinations of these driver specific forecasts within each plan. To make the plan 'adaptive' the forecasts were introduced in two stages over time, which are referred to as the 'branch points'. There were two main factors that were used when deriving the branch points:

- WRMPs run on five-year cycles, so branch points would typically occur at the start/end of an Asset Management Plan (AMP) period.
- For regional plans there are two options to set branch points:
 - Risk based trigger: When do the future uncertainties exceed target headroom?
• Policy decision-based trigger: When can a policy decision regarding the environmental destination be made?

Following consultation on the WRSE emerging regional plan in January 2022, the branch points were changed in response to stakeholder feedback and regulatory expectations, so that the branch points occur earlier in the planning horizon. Figure 5.1 illustrates the final set of situations and branch points that were used as the baseline for the investment model.





Population and housing growth were key drivers up to 2035 with climate change and environmental destination then being brought in from 2035 onwards. These forecast drivers are set out in Table 5.2 below.

2025 to 2030	2030 to 2035	2035 to 2075	
Medium	High Growth	Situation 1	High Growth (H-Max)
Growth			High Climate Change
			High Env Destination
		Situation 2	High Growth
			Medium Climate Change
			Medium Env Destination
		Situation 3	High Growth
			Low Climate Change
			Low Env Destination
		Situation 4	Medium Growth
	Medium		High Climate Change
	Growth		High Env Destination
		Situation 5	Medium Growth
			Medium Climate Change
			Medium Env Destination
		Situation 6	Medium Growth
			Low Climate Change
			Low Env Destination

Table 5-2 : Key forecast	drivers and	situations
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2025 to 2030	2030 to 2035	2035 to 2075	
	Low Growth	Situation 7	Low Growth
			High Climate Change
			High Env Destination
		Situation 8	Low Growth
			Medium Climate Change
			Medium Env Destination
		Situation 9	Low Growth (H-Min)
			Low Climate Change
			Low Env Destination

To support a robust evaluation of alternatives, WRSE ran the investment model multiple times to examine how the investment plan changed as the inputs to the values used in the adaptive framework changed. The alternatives assessment runs fell into the following broad categories:

- Specific sensitivity assessments e.g., certain large schemes removed, or costs altered for particular options.
- Best Value runs the trade-off between increasing cost and better performance against the optimisable Best Value metrics was investigated using 'Pareto runs' to determine how investment plans changed as the environmental and social metrics improved. This included SEA, Natural Capital, BNG and carbon footprint.
- Policy and global sensitivity assessments this involved testing the implications of timings around policies associated with drought resilience and environmental destination, as well as the sensitivity to key economic inputs such as discount factors. Success and government support on demand management is also a key uncertainty that was tested.

It is important to note that a significant number of investment model runs were carried out by WRSE and that there could be any number of different permutations of schemes that could form alternative plans. However, to be reasonable or realistic it is important that these alternative plans meet the objectives of the plans as well as all the legal / regulatory requirements and policy expectations.

At a WRSE level a Best Value Plan and two alternative programmes were selected for consideration / assessment through the SEA process. These programmes are set out below along with a justification for why they were progressed:

- Best Value Plan (BVP) The Guidelines state in Section 9.1 that:
 - 'The aim of the regional plan and the WRMP is to present a best value plan.'
 - This programme meets all the legal / regulatory requirements, policy expectations and objectives of the plan. It is therefore a reasonable plan and was progressed for consideration through the SEA process.
- Least Cost Plan (LC) The Guidelines state in Section 10.4 that:
 - 'You should produce a least cost programme as a benchmark to appraise your other programmes against. The least cost plan should meet your statutory requirements and be informed by your SEA and HRA. The least cost plan should include policy expectations around demand management.'

- This programme meets all of the legal / regulatory requirements, policy expectations and objectives of the plan. It is therefore a reasonable alternative and was progressed for consideration through the SEA process.
- Best Environmental and Societal Plan (BES) The Guidelines state in Section 10.3 that:
 - 'You should present in your WRMP a programme that represents a 'Best Environment and Society' programme in your programme appraisal. The 'best environment and society' programme should be one that is formed using this guidance and therefore takes into account the Strategic Environmental Assessment, Habitats Regulations Assessment, Biodiversity Net Gain and Natural Capital where appropriate...You should explain in your plan how you have considered your Best Environment programme, as part of your programme appraisal, and what influence it has had on your preferred programme.
 - This programme meets all the legal / regulatory requirements, policy expectations and objectives of the plan. It is therefore a reasonable alternative and was progressed for consideration through the SEA process.

The alternative programmes above have been considered by WRSE through the SEA cumulative effects assessment as follows:

- Focus on schemes up to 2050 (this period is being referred to as 'the plan'), schemes post-2050 considered on a lighter touch basis (this period is being referred to as 'the strategy').
- Considers interactions from schemes proposed within the WRSE regional plan and with other regional plans on environmental receptors located within 500m of water company boundaries. and where there may be interactions with receptors beyond this distance along functional pathways.

As stated earlier, it is important to remember that a significant number of investment model runs were carried out by WRSE as part of programme appraisal, as a result there could be any number of different permutations of schemes that could form alternative programmes. However, not all alternative programme runs will be 'reasonable alternatives' and therefore need to be considered within the SEA process. These programmes will not necessarily be deliverable or desirable across a number of factors including carbon impact, cost and customer acceptability, nor may they align with WRSE's policy positions. The alternative programmes outlined above are in line with the emerging regional context and address the key choices for Thames Water across the planning horizon.

It is worth noting that the cumulative assessment undertaken has been carried out for Situation 4 of each of the plans described above. As described in Figure 5.1 and Table 5.2, there are nine situations for each plan, with the same settings per plan. Following consultation, Thames Water will be undertaking cumulative effects assessments for further Situations as part of the final dWRMP24, as deemed necessary to determine the best value final plan.

5.4 Assessment of Reasonable Alternatives Programmes

Once alternative plan/portfolios of options were chosen, a cumulative effects assessment was undertaken to consider the intra-plan effects (that is, the effects of each selected plan as a whole), as well as its inter-plan effects (that is, the effects of the plan with other plans and programmes).

5.5 Least Cost Plan

The moderate/major negative and positive SEA findings for the Least Cost Plan supply-side options are summarised below. Full findings of the SEA can be found in Annex F and G. The SEA cumulative effects assessment is Table 5.5. Note that the Demand Management (DMO, Media, NEUB and TUB) and Catchment Management Options in the Least Cost are the same as within the BVP (see Section 4). The assessments undertaken assume construction best practice and topic-specific mitigation (both outlined in Section 8). Proposed mitigation is also presented within the HRA AA and the Level 2 WFD assessment.

Option ID	Option Description	Summary of Moderate/Major SEA
TWU_STT_HI - REU_RE1_AL L_p5-300- neth_p35	Netheridge pipeline 35MI/d - Difference between Element 5a and 5b relates to the length of discharge pipe only (Covered under STW Severn Trent Sources SBO developed by STW)	None identified.
TWU_U7T_HI - RAB_RE1_AL L_p1-300- unsupported	Please see STT SRO Summary in Se	ction 4.7
TWU_SWX_H I- TFR_STR_AL L_abing- farmoor pipe	Construction of a transfer pipeline to convey 24MI/d of raw water between a proposed reservoir at Abingdon and the existing Farmoor reservoir, in the SWOX WRZ.	None identified.
TWU_SWX_H I- ROC_WT1_C NO_abingdon wtw ph1	Please see SESRO SRO Summary in	Section 4.7
TWU_LON_HI - GRW_RE1_A LL_asrhorton kirby	Construction of pipelines between two existing Aquifer Storage and Recovery boreholes in the Lower Greensand aquifer to an existing WTW (water treatment works) at Horton Kirby in Kent. Water abstracted from existing Chalk aquifer boreholes (via the mains supply) will be recharged into the two ASR boreholes during periods of water surplus and abstracted when needed and treated at the WTW. A new licence and discharge consent will be required from the Environment Agency to	None identified.

Tabla	5_3	Summan	/ of	Loget	Cost	Plan	Supply	-Side	Ontions
Iaple	0-0	Summary	/ 01	Leasi	COSL	FIAII	Suppr	y-Siue	Options

Option ID	Option Description	Summary of Moderate/Major SEA Findings
	allow abstraction/recharge from the Lower Greensand aquifer.	
TWU_SWX_H I- GRW_RE1_A LL_britwell roc	Run to waste to allow operation of existing borehole.	None identified.
TWU_GUI_HI- GRW_ALL_A LL_dapdune lic disagg	Licence disaggregation. DO benefit 0MI/d average, 2.2MI/d peak.	None identified.
TWU_SWA_H I- GRW_ALL_A LL_datchet do	Replacement of submersible pumps and lower of intake levels in two boreholes (three pumps) and increasing the capacity of the contact tank. DO benefit 5.4MI/d (peak) and 1.6MI/d (average) there is an assumed increase in abstraction associated with this option.	None identified.
TWU_KGV_HI - TFR_TED_AL L_teddington drated/tlt	A portion of Mogden sewage treatment works (STW) effluent would be subject to tertiary treatment at the existing Mogden STW. The treated water would be transferred to a discharge location upstream of Teddington Weir. A new abstraction from the River Thames, upstream of the new effluent transfer discharge location, would pump water into the nearby existing Thames Lee Tunnel for transfer to the existing Lee Valley Reservoirs in East London.	None identified.
TWU_SWX_H I- TFR_SWX_AL L_dukescut- farmoor	15MI/d conveyance option from the Oxford Canal to Farmoor Reservoir, with abstraction from a point approximately 800m north of Dukes Cut on the Oxford Canal, discharging into the River Thames for subsequent re-abstraction at the existing Farmoor Reservoir intake. Resource to be provided by CRT - refer to separate F909 (RES- RWTS-OXC-DKC-15) for resource costs. This scheme has been developed with the following assumptions: It has been assumed that, as the transfer will only be	None identified.

Option ID	Option Description	Summary of Moderate/Major SEA Findings
	used in periods of low flow, no works will be required to upgrade the existing intake structure at Farmoor Reservoir. It has been assumed that, as the transfer will only be used in periods of low flow, no works will be required to upgrade the existing treatment facilities at Farmoor Reservoir.	
TWU_LON_HI - GRW_ALL_A LL_addington gw	New abstraction borehole at existing operational groundwater abstraction source & upgrade to WTW. DO benefit 1MI/d average, 1.5MI/d peak.	None identified.
TWU_SWA_H I- TFR_HEN_AL L_henley- swa5	Transfer 5MI/d from Sheeplands WTW to Hambledon WTW.	None identified.
TWU_LON_HI - ROC_WT1_C NO_kempton wtw150	150 MLD water treatment works at Kempton treating raw reservoir water in west London. Purpose is to accommodate additional future demand.	Construction: Potential for direct effects on the Kempton Park Reservoirs Sites of Special Scientific Interest (SSSI), Kempton Nature Reserves Local Nature Reserve (LNR), and the South West London Waterbodies Special Protection Area (SPA) / Ramsar including noise, air pollution and vibration, depending on the location of the treatment works and indirect effects. The option is entirely located within SSSI Impact Risk Zones. Depending on the location of the treatment works, there is potential for loss of deciduous woodland Priority Habitat. Operation: The relative carbon scale identified that the option has moderate operation carbon emissions (relative to other WRSE Regional Plan options).
TWU_TED_HI - TFR_TED_AL L_teddington dramog/ted	A portion of Mogden STW effluent would be subject to tertiary treatment at the existing Mogden STW. The treated water would be transferred to a discharge location upstream of Teddington Weir. A new abstraction from the River Thames, upstream of the new	None identified.

Option ID	Option Description	Summary of Moderate/Major SEA Findings
	effluent transfer discharge location, would pump water into the nearby existing Thames Lee Tunnel for transfer to the existing Lee Valley Reservoirs in East London.	
TWU_KVZ_HI - GRW_ALL_A LL_mortimer recomm	Refurbishment of two disused abstraction boreholes located on- site at the existing, but disused Mortimer water treatment works (WTW). Water abstracted from the boreholes will be treated at the disused WTW which will be upgraded for ammonia and iron removal and recommissioned. DO benefit 4.5MI/d average and peak.	None identified.
TWU_SWX_H I- GRW_ALL_A LL_moulsford gw	Construction of an abstraction borehole in the unconfined Chalk north of Streatley on the west bank of the River Thames. Water abstracted from the borehole will be treated at the existing Cleeve WTW located on the eastern side of the River Thames. The scheme also includes: Test pumping to support application for a new abstraction licence; 0.6km run to waste pipeline for clearance pumping of the boreholes to the River Thames; and 1.5km raw water pipeline between the boreholes and the WTW including a crossing under the River Thames and the Great Western Railway line. DO benefit is 3.5MI/d peak and 2MI/d average.	None identified.
TWU_STR_HI - RSR_RE1_CN O_abingdon1 50(lon)	Provision of a new fully bunded reservoir at Abingdon with live capacity of 150Mm3. Associated conveyance tunnel and intake / discharge structure at Culham on the River Thames to (i) fill reservoir by abstracting raw water from the River Thames, and (ii) support flows in River Thames by discharging water stored within the reservoir.	 Construction: There may be negative effects during the construction phase on the following sites from disturbance: Barrow Farm Fen SSSI / Groundwater Dependant Terrestrial Ecosystem (GWDTE) Frilford Heath, Ponds and Fens SSSI GWDTE Cothill Fen SSSI / GWDTE Culham Brake SSSI

Option ID	Option Description	Summary of Moderate/Major SEA
		There is priority habitat and woodland within the footprint of the reservoir which will be permanently lost.
		The HRA ToLS identified three Natura 2000 sites which could be affected: Cothill Fen SAC, Little Wittenham SAC, and Hackpen Hill SAC. Potential INNS risks.
		The reservoir would lead to the permanent loss of agricultural land and there would likely be short-term negative effects resulting from loss of topsoil during construction phase. There are historic and authorised landfills within 500m of the reservoir boundary with two historic landfills immediately adjacent.
		The reservoir is within close proximity to the Oxford Greenbelt and can be viewed from the North Wessex Downs Area of Outstanding Natural Beauty Area of Outstanding Natural Beauty (AONB). Moderate negative effects likely during construction phase.
		There are listed buildings and scheduled monuments within 500m of the reservoir. The reservoir boundary is also immediately adjacent to a listed building. There is potential for the setting of these historic assets to be affected during the construction phase.
		The reservoir appears to directly impact allotments and sports facilities that will likely be lost to this option. There are buildings, residential and commercial properties located within the reservoir boundary which would be permanently lost and therefore major negative effects are identified.
TWU_SWX_H I- IMP_SWX_C NO_oxc-	This element includes upgrades to the canal network to transfer 15Ml/d surplus from the Wolverhampton Levels to upstream of Duke's Cut. From that point, the water would be	Construction: There are five SSSIs within or adjacent to this option, and four LNRs within or adjacent to this option. There are an additional 10 SSSIs within 2,000m of the option and further LNRs and NNRs

Option ID	Option Description	Summary of Moderate/Major SEA Findings
dukes cutswox TWU_STT_HI - IMP_STT_CN Q_sttpipo300	transferred to the River Thames upstream of Farmoor Reservoir, in the Dukes Cut to Farmoor 15Ml/d Pipeline (CON-RWS-OXC-FRM- 15). The resource comprises the use of surplus water from the Wolverhampton Level (combination of Bradley borehole and Chasewater Reservoir), which is fed into the Wolverhampton level via Brasshouse Sluice. Fed down Farmers Bridge Flight and Aston Flight onto the Erdington Level. Further flow augmentation can be provided if required via Perry Well borehole. Transfer then occurs down the Minworth and Curdworth Flight to Fazeley Junction. Transfer up the Coventry & Ashby Canal and North Oxford Canal, then over the South Oxford Summit and down the Claydon Flight. Release is into the River Cherwell via an automated control structure. After connectivity between the Oxford Canal and River Cherwell transfer back into the Oxford Canal for abstraction upstream of Duke's Cut.	 within 2,000m. There is potential for both direct and indirect effects on all of these sites during the construction phase. The option also passes through areas of Priority Habitat including Good quality semi-improved grassland and deciduous woodland. There is potential for loss of habitat during construction and species disturbance. There may be pockets of ancient woodland along the canal which could be affected. The HRA ToLS (2021) identified likely significant effects for Cannock Extension Canal SAC as the option includes this section of canal. Construction phase effects are therefore likely. There is potentially a high risk for the transfer / spread of INNS as the option involves the transfer of raw water. There is no carbon data available for this option. This option is estimated to have moderate construction emissions. Operation: There may be changes in water levels during the operational phases which may also have an effect on the sites listed above. Operational effects for the Cannock Extension Canal SAC are likely when the volume and flow of water may be altered.
O_sttpipe300 (lon) TWU KVZ HI	Transfer from River Thames to	Construction and Operation:
- TFR_UTC_AL L_thamestofo bney	Fobney, to supply 40MI/d to Kennet Valley. Existing treatment facilities available at Fobney.	Lousehill Copse LNR and McIlroy Park LNR are within 2,000m. The option is within a SSSI Impact Risk Zone (IRZ). The option passes through areas of

Option ID	Option Description	Summary of Moderate/Major SEA Findings
		woodland and priority habitat therefore potential for direct effects during the construction phase.
		There will be a new intake on the River Thames and therefore, there is potential for disturbance of aquatic ecology during construction of the intake and potential effects on aquatic ecology from abstraction during operation.
TWU_GUI_HI- TFR_RZ5_AL L_sewtogui	10MI/d transfer from South East Water (Hogsback) to Mount SR Guildford.	Construction: The option is entirely located within SSSI Impact Risk Zones. HRA ToLS identified option has potential direct impacts on SSSI Broadmoor to Bagshot Woods and Heaths and SPA Ash to Brookwood Heaths. No adverse effects concluded with mitigation applied (low and localised impacts).
		Option has potential direct impacts on Ancient Woodland, good quality semi- improved grassland, calcareous grassland, and deciduous woodland Priority Habitat associated with construction of the pipeline.
TWU_LON_HI - GRW_ALL_A LL_s'fleet lic disagg	Southfleet-Greenhithe licence disaggregation and new headworks and pumping station at borehole sites and new 3km main from Greenhithe to new WTW. DO benefit is 8MI/d average, 9MI/d peak.	None identified.
TWU_SWA_H I- TFR_SWX_AL L_swoxswa48	Abingdon WTW to Long Crendon to supply SWA.	Construction: This option intersects with 0.04% Brasenose Wood and Shotover Hill SSSI and is immediately adjacent to Wytham Woods SSSI. There are a further seven SSSIs, two SACs and a National Nature Reserves (NNR) within 500m of the option.
		The option is entirely located within SSSI Impact Risk Zones. The pipeline option intersects with approx. 70,469m ² Priority Habitat and 122Km ² woodland. A cut and fill mechanism of construction of the

Option ID	Option Description	Summary of Moderate/Major SEA
		option would result in habitat loss and a decrease in priority species during construction with potential for long- term negative impacts.
		Moderate INNS construction risk through the use of plant and movement of site personnel within or close to sensitive habitats.
TWU_KVZ_HI	Please see T2ST SRO Summary in S	Section 4.7
- TFR_T2S_AL L_t2st cul to speen		
TWU_TED_HI - RAB_RE1_C NO_teddingto n dra 75	A portion of Mogden STW effluent would be subject to tertiary treatment at the existing Mogden STW. The treated water would be transferred to a discharge location upstream of Teddington Weir. A new abstraction from the River Thames, upstream of the new effluent transfer discharge location, would pump water into the nearby existing Thames Lee Tunnel for transfer to the existing Lee Valley Reservoirs in East London.	Please see London Reuse SRO Summary in Section 4.7
TWU_KEM_HI	Please see London Reuse SRO Sum	mary in Section 4.7
- TFR_TED_AL L_tedd- kempton		
TWU_SWX_H I- TFR_SWA_AL L_tw(swa)to(s wx)con	Potable Water Transfer -Thames Water (SWA) to Thames Water (SWOX) – Conveyance.	None identified. This option is already operational and uses existing infrastructure, so no new significant impacts anticipated.
TWU_LON_HI - ROC_NET_C NO_hampton -battersea	New ring main tunnel from Hampton to Battersea.	Tunnel intersects SSSI/SAC/NNR Richmond Park with potential to result in loss of habitat or disturbance to designation interest features during construction. Tunnel has direct impact on GWDTE and Priority Habitat, potential for impacts during construction. HRA ToLS suggests likely significant impact on Richmond Park SSSI/SAC/NNR and Wimbledon Common SAC.

Option ID	Option Description	Summary of Moderate/Major SEA Findings	
		Risk of INNS transfer during construction of option as tunnel route passes over water courses, which could lead to INNS spread.	
TWU_SWX_H I- IMP_SWX_AL L_wessextos woxflax	Transfer 2.9MI/d from Wessex Water to Flaxlands. One new main from Minety SR (Wessex) to Flaxlands SR (TW). Also included is the transfer main from Charlton WTW to Minety SR.	None identified.	
TWU_SWX_H I- GRW_ALL_A LL_woods farm do	New borehole to be constructed on site to bring DO up to licence (this is an additional 2.4Ml/d to average licence of 4.99Ml/d or an additional 2.91Ml/d to peak licence of 5.5Ml/d). Currently the site is only able to produce up to 2.59Ml/d constrained by turbidity. Woods Farm WRMP24 option comprises: Retaining the current abstraction licence with construction of a new abstraction borehole in the unconfined Chalk, 1.4 km east of the existing Woods Farm boreholes; The option also includes a new 1.4km raw water pipeline from the new satellite borehole to Woods Farm WTW.	The option lies in Source Protection Zones (SPZ) SPZ 1 and 2, and the Thames Wallingford to Caversham National Vegetation Classification (NVZ). It also overlies the Berkshire Downs Chalk WFD groundwater body, a potential sensitive receptor. Potential for leaks and spills during construction and operation.	

5.6 Best for Environmental and Societal

The moderate/major negative and positive SEA findings for the BES supply-side options are summarised below. Full findings of the SEA can be found in Annex F and G. The SEA cumulative effects assessment is Table 5.6. Note that the Demand Management (DMO, Media, Non-Essential Use Bans (NEUB) and Temporary Use Bans (TUB)) and Catchment Management Options in the Best Environmental and Societal plan are the same as within the BVP (see Section 4). The assessments undertaken assume construction best practice and topic-specific mitigation (both outlined in Section 8). Proposed mitigation is also presented within the HRA AA and the Level 2 WFD assessment.

Option ID	Option Description	Summary of Moderate/Major SEA Findings
TWU_STT_HI - REU_RE1_AL L_p5-300- neth_p35	Netheridge pipeline 35MI/d - Difference between Element 5a and 5b relates to the length of discharge pipe only	None identified.

Table 5-4 : Summary of BES Options

Option ID	Option Description Summary of Moderate/Major SEA Findings				
	(Covered under STW Severn Trent Sources SRO developed by STW).				
TWU_U7T_HI	Please see STT SRO Summary in Section 4.7				
- RAB_RE1_AL L_p1-300- unsupported					
TWU_SWX_H I- TFR_STR_AL L_abing- farmoor pipe	Construction of a transfer pipeline to convey 24MI/d of raw water between a proposed reservoir at Abingdon and the existing Farmoor reservoir, in the SWOX WRZ.	ction of a transfer pipeline 24MI/d of raw water a proposed reservoir at n and the existing Farmoor r in the SWOX WRZ			
TWU_SWX_H	Please see SESRO SRO Summary in	Section 4.7			
I- ROC_WT1_C NO_abingdon wtw.ph1					
TWU_LON_HI - GRW_RE1_A LL_asrhorton kirby TWU_SWX_H I- GRW_RE1_A LL_britwell roc	Construction of pipelines between two existing ASR boreholes in the Lower Greensand aquifer to an existing WTW at Horton Kirby in Kent. Water abstracted from existing Chalk aquifer boreholes (via the mains supply) will be recharged into the two ASR boreholes during periods of water surplus and abstracted when needed and treated at the WTW. A new licence and discharge consent will be required from the Environment Agency to allow abstraction/recharge from the Lower Greensand aquifer. Run to waste to allow operation of existing borehole.	None identified.			
TWU_GUI_HI- GRW_ALL_A LL_dapdune lic disagg	Licence disaggregation. DO benefit 0MI/d average, 2.2MI/d peak.	None identified.			
TWU_SWA_H I- GRW_ALL_A LL_datchet do	Replacement of submersible pumps and lower of intake levels in two boreholes (three pumps) and increasing the capacity of the contact tank. DO benefit 5.4MI/d (peak) and 1.6MI/d (average) there is an assumed increase in	None identified.			

Option ID	Option Description	Summary of Moderate/Major SEA Findings		
	abstraction associated with this option.			
TWU_KGV_HI - TFR_TED_AL L_teddington drated/tlt	A portion of Mogden STW effluent would be subject to tertiary treatment at the existing Mogden STW. The treated water would be transferred to a discharge location upstream of Teddington Weir. A new abstraction from the River Thames, upstream of the new effluent transfer discharge location, would pump water into the nearby existing Thames Lee Tunnel for transfer to the existing Lee Valley Reservoirs in East London.	Please see Reuse SRO Summary in Section 4.7		
TWU_SWX_H I- TFR_SWX_AL L_dukescut- farmoor	15MI/d conveyance option from the Oxford Canal to Farmoor Reservoir, with abstraction from a point approximately 800m north of Dukes Cut on the Oxford Canal, discharging into the River Thames for subsequent re-abstraction at the existing Farmoor Reservoir intake. Resource to be provided by CRT - refer to separate F909 (RES- RWTS-OXC-DKC-15) for resource costs. This scheme has been developed with the following assumptions: It has been assumed that, as the transfer will only be used in periods of low flow, no works will be required to upgrade the existing intake structure at Farmoor Reservoir. It has been assumed that, as the transfer will only be used in periods of low flow, no works will be required to upgrade the existing treatment facilities at Farmoor Reservoir.	None identified.		
TWU_LON_HI - GRW_ALL_A LL_addington	New abstraction borehole at existing operational groundwater abstraction source & upgrade to WTW. DO benefit 1MI/d average, 1 5MI/d peak	None identified.		
TWU_SWA_H I- TFR_HEN_AL L_henley- swa5	Transfer 5MI/d from Sheeplands WTW to Hambledon WTW.	None identified.		

Option ID	Option Description	Summary of Moderate/Major SEA		
TWU_LON_HI - ROC_WT1_C NO_kempton wtw150	150 MLD water treatment works at Kempton treating raw reservoir water in west London. Purpose is to accommodate additional future demand.	Construction: Potential for direct effects on the Kempton Park Reservoirs SSSI, Kempton Nature Reserves LNR, and the South West London Waterbodies SPA / Ramsar including noise, air pollution and vibration, depending on the location of the treatment works and indirect effects. The option is entirely located within SSSI Impact Risk Zones. Depending on the location of the treatment works, there is potential for loss of deciduous woodland Priority Habitat.		
		Operation: The relative carbon scale identified that the option has moderate operation carbon emissions (relative to other WRSE Regional Plan options).		
TWU_TED_HI - TFR_TED_AL L_teddington dramog/ted	A portion of Mogden STW effluent would be subject to tertiary treatment at the existing Mogden STW. The treated water would be transferred to a discharge location upstream of Teddington Weir. A new abstraction from the River Thames, upstream of the new effluent transfer discharge location, would pump water into the nearby existing Thames Lee Tunnel for transfer to the existing Lee Valley Reservoirs in East London.	Please see Reuse SRO Summary in Section 4.7		
TWU_KVZ_HI - GRW_ALL_A LL_mortimer recomm	Refurbishment of two disused abstraction boreholes located on- site at the existing, but disused Mortimer water treatment works (WTW). Water abstracted from the boreholes will be treated at the disused WTW which will be upgraded for ammonia and iron removal and recommissioned. DO benefit 4.5MI/d average and peak.	None identified.		
TWU_SWX_H I- GRW_ALL_A LL_moulsford gw	Construction of an abstraction borehole in the unconfined Chalk north of Streatley on the west bank of the River Thames. Water abstracted from the borehole will be treated at the existing Cleeve water treatment works (WTW)	None identified.		

Option ID	Option Description	Summary of Moderate/Major SEA	
		Findings	
	located on the eastern side of the River Thames. The scheme also includes: Test pumping to support application for a new abstraction licence; 0.6km run to waste pipeline for clearance pumping of the boreholes to the River Thames; and 1.5km raw water pipeline between the boreholes and the WTW including a crossing under the River Thames and the Great Western Railway line. DO benefit is 3.5MI/d peak and 2MI/d average.		
TWU_STR_HI - RSR_RE1_CN O_abingdon1 50(lon)	Provision of a new fully bunded reservoir at Abingdon with live capacity of 150Mm ³ . Associated conveyance tunnel and intake / discharge structure at Culham on the River Thames to (i) fill reservoir by abstracting raw water from the River Thames, and (ii) support flows in River Thames by discharging water stored within the reservoir.	Construction: There may be negative effects during the construction phase on the following sites from disturbance: Barrow Farm Fen SSSI / GWDTE Frilford Heath, Ponds and Fens SSSI GWDTE Cothill Fen SSSI / GWDTE Culham Brake SSSI There is priority habitat and woodland within the footprint of the reservoir which will be permanently lost. The HRA ToLS identified three Natura 2000 sites which could be affected: Cothill Fen SAC, Little Wittenham SAC, and Hackpen Hill SAC. Potential INNS risks. The reservoir would lead to the permanent loss of agricultural land and there would likely be short-term negative effects resulting from loss of topsoil during construction phase. There are historic and authorised landfills within 500m of the reservoir boundary with two historic landfills immediately adjacent. The reservoir is within close proximity to the Oxford Greenbelt and can be viewed from the North Wessex Downs Area of Outstanding Natural Beauty (AONB). Moderate negative effects likely during construction phase.	

Option ID	Option Description	Summary of Moderate/Major SEA Findings		
		There are listed buildings and scheduled monuments within 500m of the reservoir. The reservoir boundary is also immediately adjacent to a listed building. There is potential for the setting of these historic assets to be affected during the construction phase. The reservoir appears to directly impact allotments and sports facilities that will likely be lost to this option. There are buildings, residential and commercial properties located within the reservoir boundary which would be permanently lost and therefore major		
TWU_SWX_H I- IMP_SWX_C NO_oxc- dukes cutswox	This element includes upgrades to the canal network to transfer 15Ml/d surplus from the Wolverhampton Levels to upstream of Duke's Cut. From that point, the water would be transferred to the River Thames upstream of Farmoor Reservoir, in the Dukes Cut to Farmoor 15Ml/d Pipeline (CON-RWS-OXC-FRM-	negative effects are identified. Construction: There are five SSSIs within or adjacent to this option, and four LNRs within or adjacent to this option. There are an additional 10 SSSIs within 2,000m of the option and further LNRs and NNRs within 2,000m. There is potential for both direct and indirect effects on all of these sites during the construction phase.		
	use of surplus water from the Wolverhampton Level (combination of Bradley borehole and Chasewater Reservoir), which is fed into the Wolverhampton level via Brasshouse Sluice. Fed down Farmers Bridge Flight and Aston Flight onto the Erdington Level. Further flow augmentation can be provided if required via Perry Well borehole. Transfer then occurs	The option also passes through areas of Priority Habitat including Good quality semi-improved grassland and deciduous woodland. There is potential for loss of habitat during construction and species disturbance. There may be pockets of ancient woodland along the canal which could be affected. The HRA ToLS (2021) identified likely significant effects for Cannock		
	down the Minworth and Curdworth Flight to Fazeley Junction. Transfer up the Coventry & Ashby Canal and North Oxford Canal, then over the South Oxford Summit and down the Claydon Flight. Release is into the River Cherwell via an automated control structure. After connectivity between the Oxford Canal and River Cherwell transfer back into the Oxford Canal for	Extension Canal SAC as the option includes this section of canal. Construction phase effects are therefore likely. This option is estimated to have moderate construction emissions. Operation: There may be changes in water levels during the operational phases which		

Option ID	Option Description	Summary of Moderate/Major SEA Findings		
	abstraction upstream of Duke's Cut.	may also have an effect on the sites listed above. There is a low risk for the transfer / spread of INNS as the option involves the transfer of treated water. Operational effects for the Cannock		
		Extension Canal SAC are likely when the volume and flow of water may be altered.		
TWU_STT_HI	Please see STT SRO Summary in Se	ection 4.7		
IMP_STT_CN O_sttpipe300 (lon)				
TWU_KVZ_HI - TFR_UTC_AL L_thamestofo bney	Transfer from River Thames to Fobney, to supply 40MI/d to Kennet Valley. Existing treatment facilities available at Fobney.	Construction and Operation: Lousehill Copse LNR and McIlroy Park LNR are within 2,000m. The option is within a SSSI IRZ. The option passes through areas of woodland and priority habitat therefore potential for direct effects during the construction phase. There will be a new intake on the River Thames and therefore, there is potential for disturbance of aquatic ecology during construction of the intake and potential effects on aquatic ecology from abstraction during operation.		
TWU_GUI_HI- TFR_RZ5_AL L_sewtogui	10MI/d transfer from South East Water (Hogsback) to Mount SR Guildford.	Construction: The option is entirely located within SSSI Impact Risk Zones. HRA ToLS identified option has potential direct impacts on SSSI Broadmoor to Bagshot Woods and Heaths and SPA Ash to Brookwood Heaths. No adverse effects concluded with mitigation applied (low and localised impacts). Option has potential direct impacts on Ancient Woodland, good quality semi- improved grassland, calcareous grassland, and deciduous woodland Priority Habitat associated with construction of the pipeline. Moderate INNS risk during construction phase as route passes through woodland and close to an area		

Option ID	Option Description	Summary of Moderate/Major SEA Findings		
		of heathland on the Thursley, Ash and Chobham SAC.		
TWU_LON_HI - GRW_ALL_A LL_s'fleet lic disagg	Southfleet-Greenhithe licence disaggregation and new headworks and pumping station at borehole sites and new 3km main from Greenhithe to new WTW. DO benefit is 8MI/d average, 9MI/d peak.	None identified.		
TWU_SWA_H I- TFR_SWX_AL L_swoxswa48	Abingdon WTW to Long Crendon to supply SWA.	Construction:This option intersects with 0.04%Brasenose Wood and Shotover HillSSI and is immediately adjacent toWytham Woods SSSI. There are afurther seven SSSIs, two SACs and aNNR within 500m of the option.The option is entirely located withinSSSI Impact Risk Zones.The pipeline option intersects withapprox. 70,469m² Priority Habitat and122Km² woodland. A cut and fillmechanism of construction of theoption would result in habitat loss anda decrease in priority species duringconstruction with potential for long-term negative impacts.Moderate INNS construction riskthrough the use of plant and movementof site personnel within or close to		
TWU_KVZ_HI - TFR_T2S_AL	Please see T2ST SRO Summary in S	Section 4.7		
speen				
TWU_TED_HI - RAB_RE1_C NO_teddingto n dra 75	A portion of Mogden STW effluent would be subject to tertiary treatment at the existing Mogden STW. The treated water would be transferred to a discharge location upstream of Teddington Weir. A new abstraction from the River Thames, upstream of the new effluent transfer discharge location, would pump water into the nearby existing Thames Lee Tunnel for	Please see London Reuse SRO Summary in Section 4.7		

Option ID	Option Description Summary of Moderate/Major SEA Findings		
	transfer to the existing Lee Valley Reservoirs in East London.	fer to the existing Lee Valley rvoirs in East London.	
TWU_KEM_HI - TFR_TED_AL L_tedd- kempton	Please see London Reuse SRO Sum	mary in Section 4.7	
TWU_KGV_E F- TFR_RE1_AL L_ted/tlt resource	A portion of Mogden STW effluent would be subject to tertiary treatment at the existing Mogden STW. The treated water would be transferred to a discharge location upstream of Teddington Weir. A new abstraction from the River Thames, upstream of the new effluent transfer discharge location, would pump water into the nearby existing Thames Lee Tunnel for transfer to the existing Lee Valley Reservoirs in East London.	Please see London Reuse SRO Summary in Section 4.7	
TWU_HEN_HI - TFR_KVZ_AL L_tw(kv)to(he n)con	This option is a potable water transfer, from Thames Water (Kennet Valley) to Thames Water (Henley) Conveyance.	None identified.	
TWU_SWX_H I- TFR_SWA_AL L_tw(swa)to(s wx)con	Potable Water Transfer -Thames Water (SWA) to Thames Water (SWOX) – Conveyance.	None identified. This option is already operational and uses existing infrastructure, so no new significant impacts anticipated.	
TWU_KGV_HI - TFR_KGV_AL L_lockwood ps-kgv res	It is likely during the construction phase for disturbance to occur that may affect nearby species such as birds. Uncertain effects remain during operation phase for each of the three sites, as the option could impact upon designated features of the site including bird assemblage. During the construction phase, works are in close proximity to a watercourse, meaning a pathway is available to contaminate water supplies if a pollution event were to occur. During the operational phase there will be new above-ground infrastructure that will increase raw water abstraction rates to infill King George V reservoir. This will likely have an associated level of maintenance activity throughout the operational phase.		
TWU_LON_HI - ROC_NET_C NO_hampton -battersea	New ring main tunnel from Hampton to Battersea.	Tunnel intersects SSSI/SAC/NNR Richmond Park with potential to result in loss of habitat or disturbance to designation interest features during construction. Tunnel has direct impact on GWDTE and Priority Habitat, potential for impacts during	

Option ID	Option Description	Summary of Moderate/Major SEA		
		Findings		
		construction. HRA ToLS suggests likely significant impact on Richmond Park SSSI/SAC/NNR and Wimbledon Common SAC. Risk of INNS transfer during construction of option as tunnel route passes over water courses, which could lead to INNS spread		
TWU_SWX_H I- IMP_SWX_AL L_wessextos woxflax	Transfer 2.9MI/d from Wessex Water to Flaxlands. One new main from Minety SR (Wessex) to Flaxlands SR (TW). Also included is the transfer main from Charlton WTW to Minety SR.	None identified.		
TWU_SWX_H I- GRW_ALL_A LL_woods farm do	New borehole to be constructed on site to bring DO up to licence (this is an additional 2.4Ml/d to average licence of 4.99Ml/d or and additional 2.91Ml/d to peak licence of 5.5Ml/d). Currently the site is only able to produce up to 2.59Ml/d constrained by turbidity. Woods Farm WRMP24 option comprises: Retaining the current abstraction licence with construction of a new abstraction borehole in the unconfined Chalk, 1.4km east of the existing Woods Farm boreholes; The option also includes a new 1.4km raw water pipeline from the new satellite borehole to Woods Farm WTW.	The option lies in SPZ 1 and 2, and the Thames Wallingford to Caversham NVZ. It also overlies the Berkshire Downs Chalk WFD groundwater body, a potential sensitive receptor. Potential for leaks and spills during construction and operation.		

5.7 Cumulative effects

This section outlines the cumulative effects of the options that have been selected in Situation 4 of the BES and LC plan (See Section 6 for the BVP). Intra-plan effects (that is, the effects of each selected plan as a whole) are outlined in Table 5.5 for the LC Plan and Table 5.6 for the BES. Inter-plan effects (that is, the effects of the plan with other plans, programmes and major developments) are in Table 5.7 and 5.8 for the LC, 5.9 and 5.10 for the BES.

Please note that due to the overlap in options between the LC and BES plans, the assessments are almost identical. However, for completeness, the assessments have been provided in full for both plans.

SEA Topic	SEA Criteria	Construction Phase Effects	Operation Phase Effects
SEA Topic Biodiversity, flora and fauna	SEA Criteria Protect and enhance biodiversity, priority species, vulnerable habitats and habitat	Construction Phase Effects TWU_SWA_HI-TFR_SWX_ALL_swoxswa48 and TWU_SWX_HI- IMP_SWX_CNO_oxc-dukes cutswox have potential for cumulative construction effects on Oxford Meadows SAC; the SAC has features dependent on surface and ground water supply, maintaining the quality and quantity of water supply is very important, especially at certain times of year. Poor water quality and inadequate quantities of water can adversely affect the structure and function of this habitat type. The HRA AA determined that with	Operation Phase Effects No further cumulative effects during operation have been identified. Operation of option of option TWU_KGV_HI- REU_RE1_CNO_deephams reuse 46.5b may have potential
	connectivity (no loss and improve connectivity where possible)	adherence to the proposed mitigation outlined in this report, the proposed works are not expected to have any significant adverse effects on the overall integrity of Oxford Meadows SAC, however further assessment work is required. There is also potential for cumulative adverse effects from construction of TWU_SWX_HI-TFR_SVE_ALL_dukescut-farmoor and TWU_SWA_HI-TFR_SWX_ALL_swoxswa48 are in proximity to Wytham Woods SSSI (3.50% Favourable, 96.50% Unfavourable - Recovering) the SSSI homes wildlife that may be vulnerable to disruption from construction activities; Birds which breed or have attempted to breed include nightingale, woodcock, redstart, hobby and firecrest, there is a large population of sparrowhawks. Mammals include fallow deer, muntjac and badger populations. Construction of option TWU_KGV_HI-REU_RE1_CNO_deephams reuse 46.5b may have potential cumulative impacts with TWU_KGV_HI-TFR_KGV_ALL_lockwood ps-kgv res however construction for TWU_KGV_HI-REU_RE1_CNO_deephams reuse 46.5b will not start before 2060 therefore cumulative effects will be considered at a later stage of development. (TWU_STR_HI-RSR_RE1_CNO_abingdon150(lon), TWU_SWX_HI-ROC_WT2_ALL_abingdon wtw ph1	46.5b may have potential cumulative impacts with TWU_KGV_HI- TFR_KGV_ALL_lockwood ps-kgv res however construction for TWU_KGV_HI- REU_RE1_CNO_deephams reuse 46.5b will not start before 2060 therefore cumulative effects will be considered at a later stage of development.

Table 5-5 : Cumulative Effects Assessment – Least Cost Plan

SEA Topic	SEA Criteria	Construction Phase Effects	Operation Phase Effects
		and TWU_SWX_HI-ROC_WT2_ALL_abingdon wtw ph2) intersect	
		the same area of BAP priority habitat: Coastal and floodplain	
		grazing marsh. There is potential for cumulative construction	
		impacts including loss of habitat. Embedded mitigation such as the	
		relocation of such species / habitats where appropriate will be	
		undertaken in advance of the works being undertaken.	
		Barrow Farm Fen SSSI / GWDTE (100.00% unfavourable -	
		recovering), is within 500m of both the site location of Abingdon	
		reservoir and Abingdon water treatment works, however, no	
		cumulative effects have been identified as there will be no overlap of	
		construction activities and the distance is sufficient enough that	
		residual construction effects are unlikely.	
		TWU_SWX_HI-TFR_STR_ALL_abing-farmoor pipe (2035-2040) and	
		TWU_SWA_HI-TFR_SWX_ALL_swoxswa48 (2045-2050) are in	
		close proximity to Frilford Heath SSSI (0.72% Favourable, 93.70%	
		Unfavourable recovering), both less than 70m from the designated	
		site, and both intersecting BAP priority habitat deciduous woodland	
		surrounding the SSSI. Although there is 5 years separating the	
		construction phases of these two options the close proximity of the	
		options may have residual cumulative impacts from construction	
		should there be permanent loss of habitat in or surrounding the	
		SSSI. Best practice construction techniques to be implemented to	
		reduce loss of nabitat.	
		TWILL STT HIDAR DE1 ALL DQ 200 samples 100 b and	
		TWU_STT_HIPRAD_RET_ALL_U9-SUU-VyTTWY_TUU_D alla	
		provimity to Waiplada Cliff SSSL As the entire TW/LL STT LL	
		Provining to wainford Cill 333. As the option 1000_{11} m ⁻	
		from Sovern Trent Water. Cumulative offects have not been	
		nom Sevent frent water. Cumulative effects have not been	

SEA Topic	SEA Criteria	Construction Phase Effects	Operation Phase Effects
		identified during construction or operation.	

SEA Topic	SEA Criteria	Construction Phase Effects	Operation Phase Effects
Soil	Protect and enhance the functionality, quantity and quality of soils	Options within the LC that include construction intercepting grade 1 Agricultural Land Classification (ALC) include TWU_SWA_HI- GRW_ALL_ALL_datchet do, TWU_SWA_HI-TFR_HEN_ALL_henley- swa5, however where pipelines are to be installed the ground will be reinstated and soil will remain functional, additionally, construction works associated with TWU_SWA_HI-GRW_ALL_ALL_datchet do are anticipated to be minimal and likely loss or disturbance will be minor. There will be no cumulative residual effects to grade 1 ALC soil.	No operational phase cumulative effects are anticipated for this SEA objective.
		TWU_SWX_HI-IMP_SWX_CNO_oxc-dukes cutswox, TWU_STR_HI- RSR_RE1_CNO_abingdon150(lon), TWU_SWX_HI- GRW_ALL_ALL_moulsford gw and TWU_SWX_HI- ROC_WT1_CNO_abingdon wtw ph1 have potential for cumulative effects of permanent loss of grade 2 ALC soil. Best practice construction techniques to be implemented to reduce loss and deterioration.	
		Construction in close proximity to landfill sites has the potential for risk of contamination. The following options are within proximity to an authorised land fill: TWU_STR_HI- RSR_RE1_CNO_abingdon150(lon), TWU_STT_HI- IMP_STT_CNO_sttpipe300(lon) and TWU_SWX_HI- TFR_STR_ALL_abing-farmoor. The following options are within proximity to a quarry, TWU_SWX_HI-TFR_STR_ALL_abing-farmoor and TWU_SWA_HI-	
		TFR_SWX_ALL_swoxswa48 pipeline.	

SEA Topic	SEA Criteria	Construction Phase Effects	Operation Phase Effects
		There is potential for cumulative risk of contamination. Effects can be mitigated with use of best practice construction techniques	
		around landfill.	

SEA Topic	SEA Criteria	Construction Phase Effects	Operation Phase Effects
Water	Increase	Options included in this plan are mostly located in Flood Zone 1,	TWU_STR_HI-
	resilience and	however options also pass through Flood Zones 2 and 3. A number	RSR_RE1_CNO_abingdon150(lon)
	reduce flood risk	of options also pass through the same area of flood zone including	and TWU_SWX_HI-
		TWU_STR_HI-RSR_RE1_CNO_abingdon150(lon) and	ROC_WT1_CNO_abingdon wtw
		TWU_SWX_HI-ROC_WT1_CNO_abingdon wtw ph1. However only	ph1 and TWU_SWX_HI-
		TWU_STR_HI-RSR_RE1_CNO_abingdon150(lon) has potential for	ROC_WT1_CNO_abingdon wtw
		residual construction effects on flood risk and as construction	have the potential for cumulative
		period of options will not overlap, therefore cumulative risks on	operational risks to flooding with
		flooding are unlikely. Flood risk mitigation and management will be	potential impacts to flood zone 2
		applied during the construction phase, these effects can be	and 3, a flood management plan
		lessened.	will be implemented during the
			design and construction of
		TWU_STT_HI-REU_RE1_ALL_p7-300-minworth_115,	Abingdon reservoir and associated
		TWU_STT_HI-REU_RE1_ALL_p11-300-min_115_p2 and	infrastructure.
		IWU_SWX_HI-IMP_SWX_CNO_oxc-dukes cutswox intersect the	
		same area of flood zone 2. There is potential for cumulative effects	
		on flood risk within the flood zone resulting from construction. Flood	
		risk management for TWU_STT_HI-REU_RE1_ALL_p/-300-	
		minworth_115, IWU_SII_HI-REU_RE1_ALL_p11-300-min_115_p2	
		will be covered under Severn Trent Minworth Effluent reuse SRO	
	Ducto et au el	developed by Severn Trent and Aminity water.	
	Protect and	I here are no options within the plan intercepting the same source	No cumulative effects are
	ennance the	protection zones, reducing the potential for adverse cumulative	anticipated on Source protection
	quality of the	effects on groundwater sources. Several water bodies including	zones.
	water	main rivers are intercepted by multiple options, including the river	
	environment and	inames.	
	Water resources	No construction phase cumulative effects are entirisated for this	
		No construction phase cumulative effects are anticipated for this	No negative operational phase
		SEA ODJECTIVE.	cumulative effects are anticipated
	water supplies		IOF THIS SEA ODJECTIVE.

SEA Topic	SEA Criteria	Construction Phase Effects	Operation Phase Effects
			All options in this plan, in- combination with the proposed demand management option, are aimed at improving water efficiency and increasing the resilience of water supplies in the TW region. The options will all overlap temporally during operation to improve resilience, including increased abstraction, transfers from areas with a surplus. Simultaneously, the demand management will look to provide water savings across the region to reduce demand. It is anticipated that there will be a major positive effect on this SEA
Air	Reduce and minimise air emissions	Within the plan options are anticipated to have minor to moderate effects to local air quality resulting from construction activity. These effects are anticipated to be local and short-term in nature. Where options are intersecting or in proximity to the same AQMA, no temporal overlap of construction activities is within the plan. It is anticipated that there would be no cumulative effects on this SEA objective during the construction phase.	No operational phase cumulative effects are anticipated for this SEA objective.

SEA Topic	SEA Criteria	Construction Phase Effects	Operation Phase Effects
Climatic Factors	Reduce embodied and operational carbon emissions	Construction Phase Effects Each option requires built infrastructure to varying degrees. Emissions related to construction activities are local and short-term and are not anticipated to result in cumulative effects. However, whilst the options are spatially, and temporally diverse Embodied carbon associated with the construction of these options will be cumulative. The options may also have further cumulative adverse effects for carbon sequestration, especially in areas where removal of wetland habitat and deciduous woodland is required. No construction phase cumulative effects are anticipated for this	Operation Phase Effects A number of the options will require energy-intensive processes during the operational phase. At present, there are no confirmed opportunities to supply the options with renewable energy during the operational phase however, these could be investigated as part of further design development. As the energy grid is decarbonised, greener energy will be available. It is anticipated that there would be a moderate negative cumulative effect on this SEA objective during the construction phase.
	vulnerability to climate change risks and hazards	SEA objective.	
Landscape	Conserve, protect and enhance landscape, townscape and seascape character and visual amenity	Each option will have a local and temporary effect on landscape and visual amenity through construction activities and traffic. Best practice mitigation measures can be applied to reduce this impact. TWU_SWA_HI-TFR_HEN_ALL_henley-swa5 directly impacts the Chilterns ANOB - Five years after initial operation, fields and compounds would be restored to their original condition. In the long-term, 15 years after initial operation, planting would mature and hedgerow connections re-established, aiding integration of the new built structures site into the landscape and setting of the	No operational phase cumulative effects are anticipated for this SEA objective.

SEA Topic	SEA Criteria	Construction Phase Effects	Operation Phase Effects
		AONB. There may however be temporary cumulative construction	
		impacts with temporally overlapping construction activities	
		pertaining to	
		TWU_SWX_HI-GRW_ALL_ALL_moulsford gw and TWU_SWX_HI-	
		GRW_RE1_ALL_britwell roc as well as TWU_KVZ_HI-	
		TFR_UTC_ALL_thamestofobney all of which within 500m of the	
		Chilterns ANOB but require minimal above ground infrastructure.	
Historic	Conserve,	Each option has the potential to affect the historic environment as a	No operational phase cumulative
Environment	protect and	result of construction activities. However, in most cases, the options	effects are anticipated for this SEA
	enhance the	are spatially and temporally diverse. TWU_STR_HI-	objective.
	historic	RSR_RE1_CNO_abingdon150(lon) and TWU_STT_HI-	
	environment,	IMP_STT_CNO_sttpipe300(Ion) both have the potential to affect a	
	including	Scheduled Monument: Dovecote at Culham Manor, 110m south	
	archaeology	west of St Paul's Church and therefore there is potential for	
		temporary cumulative effects on this receptor. There is also	
		potential for unknown buried archaeology, further study is likely	
		required to confirm the potential risk.	
		There is also potential for cumulative effects resulting from	
		construction of TWU_STR_HI-RSR_RE1_CNO_abingdon150(lon),	
		TWU_STT_HI-IMP_STT_CNO_sttpipe300(lon), TWU_SWX_HI-	
		TFR_STR_ALL_abing-farmoor pipe to both the historic setting of the	
		Scheduled monument: Sutton Wick settlement site and risk of	
		impact to buried archaeology if present.	
		Potential for temporary cumulative effects on Yarnton Manor grade	
		Il listed building with overlapping construction activities of	
		TWU_SWA_HI-TFR_SWX_ALL_swoxswa48 and TWU_SWX_HI-	
		TFR_SWX_ALL_dukescut-farmoor. Potential to impact the setting of	
		the historic asset as well as potential for risk to disturb buried	
		archaeology if present.	

SEA Topic	SEA Criteria	Construction Phase Effects	Operation Phase Effects
		Best practice mitigation measures to be implemented during	
		construction.	

SEA Topic	SEA Criteria	Construction Phase Effects	Operation Phase Effects
Population and	Maintain and	Options proposed as part of this plan have the potential to affect	Abingdon reservoir could lead to
Human Health	enhance the	health and wellbeing of local communities from reducing access to	enhanced operational benefits by
	health and	community facilities during construction activities.	incorporating education and
	wellbeing of the	The following options have potential for temporary cumulative	information resources within the
	local community,	effects on National Cycle networks due to potential overlapping of	reservoir design e.g. trails,
	including	construction activities:	information boards etc. When
	economic and		combined with increased water
	social wellbeing	-TWU_KGV_HI-TFR_KGV_ALL_lockwood ps-kgv res and	efficiency advice, as part of the
		TWU_LON_HI-GRW_ALL_ALL_s'fleet lic disagg	demand management option,
			especially focused on customer
		-TWU_STR_HI-RSR_RE1_CNO_abingdon150(lon) and	behavioural trends e.g. gardening
		TWU_SWX_HI-TFR_STR_ALL_abing-farmoor pipe	etc will result in moderate positive
			impacts during operation. There
		-TWU_STT_HI-IMP_STT_CNO_sttpipe300(lon) andTWU_SWA_HI-	are unconfirmed opportunities to
		TFR_SWX_ALL_swoxswa48 and TWU_SWX_HI-	improve access to the natural
		IMP_SWX_CNO_oxc-dukes cutswox	environment as part of the design
			of options. It is anticipated that
		Alternative cycle routes will be provided and cycle routes will be	there would be a moderate
		provided following construction.	positive cumulative effect on this
			SEA objective during the
		I here is potential cumulative effects on access to community	operational phase.
		facilities including residential areas and religious grounds resulting	
		from overlapping construction phase options within the plan.	
		Dest practice construction measures to be implemented including a	
		Best practice construction measures to be implemented including a	
		tranic management plan.	
		Furthermore, many of the entions result in miner positive effects	
		resulting from potential contributions to the local aconomy during	
		the construction phase	

SEA Topic	SEA Criteria	Construction Phase Effects	Operation Phase Effects
	Maintain and	The Thames Path National Trail is intercepted by the following	No operational phase cumulative
	enhance tourism	options with potential overlapping of construction phases:	effects are anticipated for this SEA
	and recreation	TWU_KVZ_HI-TFR_UTC_ALL_thamestofobney, TWU_SWA_HI-	objective.
		TFR_SWX_ALL_swoxswa48 and TWU_STT_HI-	
		IMP_STT_CNO_sttpipe300(lon); there is potential for temporary	
		cumulative effects during construction on the Thames Path National	
		trail, with potential for positive cumulative effects with enhancement	
		opportunities. All reasonable effort will be made to avoid temporary	
		closure of public rights of way and in the event that these are	
		required diversions will be provided instead. Public rights of way will	
		be reinstated following construction completion.	
Material Assets	Minimise	Extensive new infrastructure will be required for the implementation	No operational phase cumulative
	resource use	of the options within the plan.	effects are anticipated for this SEA
	and waste	Material resource use is required for construction and limited	objective.
	production	opportunities for re-use or recycling of waste materials have been	
		identified at present, however this could be investigated further	
		during later design stages.	

SEA Topic SEA Criteria C	Construction Phase Effects	Operation Phase Effects
Avoid negative effects on built assets and infrastructure Be Pl op di	Many of the options cross railway lines and major roads and herefore there is likely to be disruption to built assets and nfrastructure during the construction phase. Potential for temporally and spatially overlapping construction activities to have temporary cumulative effects on several notorways and A roads. Best practice measures included a plan wide Traffic Management Plan could be implemented to minimise disruption and whilst the options are temporally diverse, this could lead to extended disruption over a long period of time.	No operational phase cumulative effects are anticipated for this SEA objective.

SEA Topic	SEA Criteria	Construction Phase Effects	Operation Phase Effects
SEA Topic Biodiversity, flora and fauna	SEA Criteria Protect and enhance biodiversity, priority species, vulnerable habitats and habitat connectivity (no loss and improve connectivity where possible)	Construction Phase Effects TWU_SWA_HI-TFR_SWX_ALL_swoxswa48 and TWU_SWX_HI- IMP_SWX_CNO_oxc-dukes cutswox have potential for cumulative construction effects on Oxford Meadows SAC; the SAC has features dependent on surface and ground water supply, maintaining the quality and quantity of water supply is very important, especially at certain times of year. Poor water quality and inadequate quantities of water can adversely affect the structure and function of this habitat type. The HRA AA determined that with adherence to the proposed mitigation outlined in this report, the proposed works are not expected to have any significant adverse effects on the overall integrity of Oxford Meadows SAC, however further assessment work is required. There is also potential for cumulative adverse effects from construction of TWU_SWX_HI-TFR_SVE_ALL_dukescut-farmoor and TWU_SWA_HI-TFR_SWX_ALL_swoxswa48 are in proximity to Wytham Woods SSSI (3.50% Favourable, 96.50% Unfavourable - Recovering) the SSSI homes wildlife that may be vulnerable to disruption from construction activities; Birds which breed or have attempted to breed include nightingale, woodcock, redstart, hobby and firecrest, there is a large population of sparrowhawks. Mammals include fallow deer, muntjac and badger populations. Construction of option TWU_KGV_HI-REU_RE1_CNO_deephams reuse 46.5b may have potential cumulative impacts with TWU_KGV_HI-TFR_KGV_ALL_lockwood ps-kgv res however construction for TWU_KGV_HI-REU_RE1_CNO_deephams reuse 46.5b will not start before 2060 therefore cumulative effects will be	Operation Phase Effects No further cumulative effects during operation have been identified. Operation of option of option TWU_KGV_HI- REU_RE1_CNO_deephams reuse 46.5b may have potential cumulative impacts with TWU_KGV_HI- TFR_KGV_ALL_lockwood ps-kgv res however construction for TWU_KGV_HI- REU_RE1_CNO_deephams reuse 46.5b will not start before 2060 therefore cumulative effects will be considered at a later stage of development.
		construction for TWU_KGV_HI-REU_RE1_CNO_deephams reuse 46.5b will not start before 2060 therefore cumulative effects will be considered at a later stage of development.	

Table 5.6: Cumulative Effects Assessment – Best Environmental and Societal

SEA Topic	SEA Criteria	Construction Phase Effects	Operation Phase Effects
		(TWU_STR_HI-RSR_RE1_CNO_abingdon150(lon),	
		TWU_SWX_HI-ROC_WT2_ALL_abingdon wtw ph1	
		and TWU_SWX_HI-ROC_WT2_ALL_abingdon wtw ph2) intersect	
		the same area of BAP priority habitat: Coastal and floodplain	
		grazing marsh. There is potential for cumulative construction	
		impacts including loss of habitat. Embedded mitigation such as the	
		relocation of such species / habitats where appropriate will be	
		undertaken in advance of the works being undertaken.	
		Barrow Farm Fen SSSI / GWDTE (100.00% unfavourable -	
		recovering), is within 500m of both the site location of Abingdon	
		reservoir and Abingdon water treatment works, however, no	
		cumulative effects have been identified as there will be no overlap of	
		construction activities and the distance is sufficient enough that	
		residual construction effects are unlikely.	
		TWU_SWX_HI-TFR_STR_ALL_abing-farmoor pipe (2035-2040) and TWU_SWA_HI-TFR_SWX_ALL_swoxswa48 (2045-2050) are in close proximity to Frilford Heath SSSI (0.72% Favourable, 93.70% Unfavourable recovering), both less than 70m from the designated site, and both intersecting BAP priority habitat deciduous woodland surrounding the SSSI. Although there is 5 years separating the construction phases of these two options the close proximity of the options may have residual cumulative impacts from construction should there be permanent loss of habitat in or surrounding the SSSI. Best practice construction techniques to be implemented to	
		TWU_STT_HI-RAB_RE1_ALL_p9-300-vyrnwy_100_b and TWU_STT_HI-REU_RE1_ALL_p5-300-neth_p35 are in close	
		proximity to Wainlode Cliff SSSI. As the option TWU_STT_HI-	
SEA Topic	SEA Criteria	Construction Phase Effects	Operation Phase Effects
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		REU_RE1_ALL_p5-300-neth_p35 only includes the transfer of water	
		from Severn Trent Water. Cumulative effects have not been	
		identified during construction or operation.	

SEA Topic	SEA Criteria	Construction Phase Effects	Operation Phase Effects
Soil	Protect and	Options within the BES that include construction intercepting grade	No operational phase cumulative
	enhance the	1 Agricultural Land Classification (ALC) include TWU_SWA_HI-	effects are anticipated for this SEA
	functionality,	GRW_ALL_ALL_datchet do, TWU_SWA_HI-TFR_HEN_ALL_henley-	objective.
	quantity and	swa5, however where pipelines are to be installed the ground will be	
	quality of soils	reinstated and soil will remain functional, additionally, construction	
		works associated with TWU_SWA_HI-GRW_ALL_ALL_datchet do	
		are anticipated to be minimal and likely loss or disturbance will be	
		minor. There will be no cumulative residual effects to grade 1 ALC	
		soil.	
		TWU_SWX_HI-IMP_SWX_CNO_oxc-dukes cutswox, TWU_STR_HI- RSR_RE1_CNO_abingdon150(lon), TWU_SWX_HI- GRW_ALL_ALL_moulsford gw and TWU_SWX_HI- ROC_WT1_CNO_abingdon wtw ph1 have potential for cumulative effects of permanent loss of grade 2 ALC soil. Best practice construction techniques to be implemented to reduce loss and deterioration.	
		Construction in close proximity to landfill sites has the potential for risk of contamination. The following options are within proximity to an authorised land fill: TWU_STR_HI- RSR_RE1_CNO_abingdon150(lon), TWU_STT_HI- IMP_STT_CNO_sttpipe300(lon) and TWU_SWX_HI- TFR_STR_ALL_abing-farmoor.	
		The following options are within proximity to a quarry, TWU_SWX_HI-TFR_STR_ALL_abing-farmoor and TWU_SWA_HI- TFR_SWX_ALL_swoxswa48 pipeline.	

SEA Topic	SEA Criteria	Construction Phase Effects	Operation Phase Effects
		There is potential for cumulative risk of contamination. Effects can	
		be mitigated with use of best practice construction techniques	
		around landfill.	

SEA Topic	SEA Criteria	Construction Phase Effects	Operation Phase Effects
Water	Increase	Options included in this plan are mostly located in Flood Zone 1,	TWU_STR_HI-
	resilience and	however options also pass through Flood Zones 2 and 3. A number	RSR_RE1_CNO_abingdon150(lon)
	reduce flood risk	of options also pass through the same area of flood zone including	and TWU_SWX_HI-
		TWU_STR_HI-RSR_RE1_CNO_abingdon150(lon) and	ROC_WT1_CNO_abingdon wtw
		TWU_SWX_HI-ROC_WT1_CNO_abingdon wtw ph1. However only	ph1 and TWU_SWX_HI-
		TWU_STR_HI-RSR_RE1_CNO_abingdon150(lon) has potential for	ROC_WT1_CNO_abingdon wtw
		residual construction effects on flood risk and as construction	have the potential for cumulative
		period of options will not overlap, therefore cumulative risks on	operational risks to flooding with
		flooding are unlikely. Flood risk mitigation and management will be	potential impacts to flood zone 2
		applied during the construction phase, these effects can be	and 3, a flood management plan
		lessened.	will be implemented during the
			design and construction of
		TWU_STI_HI-REU_RE1_ALL_p7-300-minworth_115,	Abingdon reservoir and associated
		TWU_STI_HI-REU_RET_ALL_pTT-300-min_TT5_p2 and	Infrastructure.
		100_S00A_HI-INP_S00A_CNO_0x0-dukes cuisoox Intersect the	
		same area of noou zone z. There is potential for cumulative effects	
		risk management for TWLL STT HLRELL RE1 ALL p7-300-	
		minworth 115 TWU STT HLRELL RE1 ALL n11-300-min 115 n2	
		will be covered under Severn Trent Minworth Effluent reuse SRO	
		developed by Severn Trent and Affinity Water	
	Protect and	There are no options within the plan intercepting the same source	No cumulative effects are
	enhance the	protection zones, reducing the potential for adverse cumulative	anticipated on Source protection
	quality of the	effects on groundwater sources. Several water bodies including	zones.
	water	main rivers are intercepted by multiple options, including the river	
	environment and	Thames.	
	water resources		
	Deliver reliable	No construction phase cumulative effects are anticipated for this	No negative operational phase
	and resilient	SEA objective.	cumulative effects are anticipated
	water supplies		for this SEA objective.

SEA Topic	SEA Criteria	Construction Phase Effects	Operation Phase Effects
			All options in this plan, in-
			combination with the proposed
			demand management option, are
			aimed at improving water
			efficiency and increasing the
			resilience of water supplies in the
			TW region. The options will all
			overlap temporally during
			operation to improve resilience,
			including increased abstraction,
			transfers from areas with a
			surplus. Simultaneously, the
			demand management will look to
			provide water savings across the
			region to reduce demand. It is
			anticipated that there will be a
			major positive effect on this SEA
			objective during operation.
Air	Reduce and	Within the plan options are anticipated to have minor to moderate	No operational phase cumulative
	minimise air	effects to local air quality resulting from construction activity. These	effects are anticipated for this SEA
	emissions	effects are anticipated to be local and short-term in nature. Where	objective.
		options are intersecting or in proximity to the same AQMA, no	
		temporal overlap of construction activities is within the plan. It is	
		anticipated that there would be no cumulative effects on this SEA	
		objective during the construction phase.	

SEA Topic	SEA Criteria	Construction Phase Effects	Operation Phase Effects
Climatic Factors	Reduce embodied and operational carbon emissions	Each option requires built infrastructure to varying degrees. Emissions related to construction activities are local and short-term and are not anticipated to result in cumulative effects. However, whilst the options are spatially, and temporally diverse Embodied carbon associated with the construction of these options will be cumulative. The options may also have further cumulative adverse effects for carbon sequestration, especially in areas where removal of wetland habitat and deciduous woodland is required.	A number of the options will require energy-intensive processes during the operational phase. At present, there are no confirmed opportunities to supply the options with renewable energy during the operational phase however, these could be investigated as part of further design development. As the energy grid is decarbonised, greener energy will be available. It is anticipated that there would be a moderate negative cumulative effect on this SEA objective during the construction phase.
	vulnerability to climate change risks and hazards	SEA objective.	
Landscape	Conserve, protect and enhance landscape, townscape and seascape character and visual amenity	Each option will have a local and temporary effect on landscape and visual amenity through construction activities and traffic. Best practice mitigation measures can be applied to reduce this impact. TWU_SWA_HI-TFR_HEN_ALL_henley-swa5 directly impacts the Chilterns ANOB - Five years after initial operation, fields and compounds would be restored to their original condition. In the long-term, 15 years after initial operation, planting would mature and hedgerow connections re-established, aiding integration of the new built structures site into the landscape and setting of the	No operational phase cumulative effects are anticipated for this SEA objective.

SEA Topic	SEA Criteria	Construction Phase Effects	Operation Phase Effects
		AONB. There may however be temporary cumulative construction	
		impacts with temporally overlapping construction activities	
		pertaining to	
		TWU_SWX_HI-GRW_ALL_ALL_moulsford gw and TWU_SWX_HI-	
		GRW_RE1_ALL_britwell roc as well as TWU_KVZ_HI-	
		TFR_UTC_ALL_thamestofobney all of which within 500m of the	
		Chilterns ANOB but require minimal above ground infrastructure.	
Historic	Conserve,	Each option has the potential to affect the historic environment as a	No operational phase cumulative
Environment	protect and	result of construction activities. However, in most cases, the options	effects are anticipated for this SEA
	enhance the	are spatially and temporally diverse. TWU_STR_HI-	objective.
	historic	RSR_RE1_CNO_abingdon150(lon) and TWU_STT_HI-	
	environment,	IMP_STT_CNO_sttpipe300(lon) both have the potential to affect a	
	including	Scheduled Monument: Dovecote at Culham Manor, 110m south	
	archaeology	west of St Paul's Church and therefore there is potential for	
		temporary cumulative effects on this receptor. There is also	
		potential for unknown buried archaeology, further study is likely	
		required to confirm the potential risk.	
		There is also potential for cumulative effects resulting from	
		construction of TWU_STR_HI-RSR_RE1_CNO_abingdon150(lon),	
		TWU_STT_HI-IMP_STT_CNO_sttpipe300(lon), TWU_SWX_HI-	
		TFR_STR_ALL_abing-farmoor pipe to both the historic setting of the	
		Scheduled monument: Sutton Wick settlement site and risk of	
		impact to buried archaeology if present.	
		Potential for temporary cumulative effects on Yarnton Manor grade	
		Il listed building with overlapping construction activities of	
		TWU_SWA_HI-TFR_SWX_ALL_swoxswa48 and TWU_SWX_HI-	
		TFR_SWX_ALL_dukescut-farmoor. Potential to impact the setting of	
		the historic asset as well as potential for risk to disturb buried	
		archaeology if present.	

SEA Topic	SEA Criteria	Construction Phase Effects	Operation Phase Effects
		Best practice mitigation measures to be implemented during	
		construction.	

SEA Topic	SEA Criteria	Construction Phase Effects	Operation Phase Effects
Population and	Maintain and	Options proposed as part of this plan have the potential to affect	Abingdon reservoir could lead to
Human Health	enhance the	health and wellbeing of local communities from reducing access to	enhanced operational benefits by
	health and	community facilities during construction activities.	incorporating education and
	wellbeing of the	The following options have potential for temporary cumulative	information resources within the
	local community,	effects on National Cycle networks due to potential overlapping of	reservoir design e.g. trails,
	including	construction activities:	information boards etc. When
	economic and		combined with increased water
	social wellbeing	-TWU_KGV_HI-TFR_KGV_ALL_lockwood ps-kgv res and	efficiency advice, as part of the
		TWU_LON_HI-GRW_ALL_ALL_s'fleet lic disagg	demand management option,
			especially focused on customer
		-TWU_STR_HI-RSR_RE1_CNO_abingdon150(lon) and	behavioural trends e.g. gardening
		TWU_SWX_HI-TFR_STR_ALL_abing-farmoor pipe	etc will result in moderate positive
			impacts during operation. There
		-TWU_STT_HI-IMP_STT_CNO_sttpipe300(lon) andTWU_SWA_HI-	are unconfirmed opportunities to
		TFR_SWX_ALL_swoxswa48 and TWU_SWX_HI-	improve access to the natural
		IMP_SWX_CNO_oxc-dukes cutswox	environment as part of the design
			of options. It is anticipated that
		Alternative cycle routes will be provided and cycle routes will be	there would be a moderate
		provided following construction.	positive cumulative effect on this
			SEA objective during the
		There is potential cumulative effects on access to community	operational phase.
		facilities including residential areas and religious grounds resulting	
		from overlapping construction phase options within the plan.	
		Best practice construction measures to be implemented including a	
		traffic management plan.	
		Furthermore, many of the options result in minor positive effects	
		resulting from potential contributions to the local economy during	
		the construction phase.	

SEA Topic	SEA Criteria	Construction Phase Effects	Operation Phase Effects
	Maintain and	The Thames Path National Trail is intercepted by the following	No operational phase cumulative
	enhance tourism	options with potential overlapping of construction phases:	effects are anticipated for this SEA
	and recreation	TWU_KVZ_HI-TFR_UTC_ALL_thamestofobney, TWU_SWA_HI-	objective.
		TFR_SWX_ALL_swoxswa48 and TWU_STT_HI-	
		IMP_STT_CNO_sttpipe300(lon); there is potential for temporary	
		cumulative effects during construction on the Thames Path National	
		trail, with potential for positive cumulative effects with enhancement	
		opportunities. All reasonable effort will be made to avoid temporary	
		closure of public rights of way and in the event that these are	
		required diversions will be provided instead. Public rights of way will	
		be reinstated following construction completion.	
Material Assets	Minimise	Extensive new infrastructure will be required for the implementation	No operational phase cumulative
	resource use	of the options within the plan.	effects are anticipated for this SEA
	and waste	Material resource use is required for construction and limited	objective.
	production	opportunities for re-use or recycling of waste materials have been	
		identified at present, however this could be investigated further	
		during later design stages.	

SEA Topic	SEA Criteria	Construction Phase Effects	Operation Phase Effects
	Avoid negative effects on built assets and infrastructure	Many of the options cross railway lines and major roads and therefore there is likely to be disruption to built assets and infrastructure during the construction phase. Potential for temporally and spatially overlapping construction activities to have temporary cumulative effects on several motorways and A roads. Best practice measures included a plan wide Traffic Management Plan could be implemented to minimise disruption and whilst the options are temporally diverse, this could lead to extended disruption over a long period of time.	No operational phase cumulative effects are anticipated for this SEA objective.

Table 5-7	: Assessment	of Least Cost	against Local Plans
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Thames WRMP24 Option	Option Name	Other Development Scheme Reference	Scheme Type	Location	Description	Least cost within 2km	Potential Cumulative effects- Least Cost
TWU_KVZ_HI - TFR_UTC_AL L_thamestofo bney	River Thames to Fobney Transfer	ALL.BER.REA1	Local Plan Allocation	STATION HILL & FRIARS WALK	Indicative potential: 380- 570 dwellings, 80,000- 100,000 sq m of offices, retail and leisure (no significant net gain assumed)	Y	The ALL.BER.REA1 plan period is up to 3036. Construction activities do not overlap with TWU_KVZ_HI- TFR_UTC_ALL_thamestofobney. Residual construction effects are not anticipated. No operational cumulative effects have been identified.
		ALL.BER.REA2	Local Plan Allocation	Hosier Street	Indicative potential: 500- 750 dwellings, 4,000-6,000 sq m of retail and leisure.	Y	Option TWU_KVZ_HI- TFR_UTC_ALL_thamestofobney is within 1km of the allocation site. Schemes are geographically separated by an A-road. No likely cumulative effects identified.
		ALL.BER.REA3	Local Plan Allocation	Forbury Retail Park	Indicative potential: 1,230-1,840 dwellings, no net gain of retail	Ŷ	TWU_KVZ_HI- TFR_UTC_ALL_thamestofobney 1.5km from the site allocation. Schemes are geographically separated by an A-road. No likely cumulative effects identified.

Thames WRMP24 Option	Option Name	Other Development Scheme	Scheme Type	Location	Description	Least cost within	Potential Cumulative effects- Least Cost
		ALL.BER.REA4	Local Plan Allocation	Land north of Manor Farm Road Major Opportunity Area	Redevelopment of the Manor Farm Road site will primarily be for housing (between 680- 1,020 dwellings), an extension to the Whitley District Centre, school provision and open space and public realm improvements.	Y	Option TWU_KVZ_HI- TFR_UTC_ALL_thamestofobney within 1km of option. Potential for construction activities to overlap. However no cumulative effects have been identified given the nature and location of the schemes.

Thames WRMP24 Option	Option Name	Other Development Scheme Reference	Scheme Type	Location	Description	Least cost within 2km	Potential Cumulative effects- Least Cost
TWU_LON_H I- ROC_NET_C NO_hampton -battersea	TWRM extension - Hampton to Battersea - Construction	ALL.LON.H&F4	Site Allocation	South Fulham Riverside Regeneration Area	4,000 indicative additional homes	Y	Potential cumulative effects with TWU_LON_HI- ROC_NET_CNO_hampton- battersea (construction period 2034- 2040). Potential for construction activities to overlap. The option pipeline is located 0.5km at its closest distance to the site allocation. Potential for cumulative negative effects to traffic. Potential for temporary adverse effects to local residential areas and community facilities from noise disturbance and access. Temporary adverse effects on the setting of historic assets including grade II listed buildings. Best practice construction techniques to be implemented including screening to reduce effects of noise, visual intrusion and effects on traffic.

Thames WRMP24	Option Name	Other Development	Scheme Type	Location	Description	Least cost	Potential Cumulative effects- Least Cost
Option		Reference				2km	
		ALL.LON.LAM 1	Site Allocation	Land Bounded By Wandsworth Road To The West, Parry Street To The North, And Bondway And Railway Line To The East (Vauxhall Square)	578 residential units	Y	Potential cumulative effects with TWU_LON_HI- ROC_NET_CNO_hampton- battersea (construction period 2034- 2040). Potential for construction activities to overlap. 1.2km from option. Potential for cumulative negative effects to traffic including on an A-road. Potential for temporary adverse effects to local residential areas and community facilities from noise disturbance and access. Temporary adverse effects on the setting of historic assets including grade II listed buildings. Best practice construction techniques to be implemented including traffic planning and screening to reduce effects of visual intrusion.
		ALL.LON.WAN 2	Emerging Site Allocation	Armoury Way, SW18	Development should provide a mix of residential and intensified economic uses, including cultural workspace and provision for	Y	Option TWU_LON_HI- ROC_NET_CNO_hampton- battersea is adjacent to the emerging site allocation Potential for overlapping construction activities. Potential for direct construction interference with one another as well as cumulative effects on local traffic, noise pollution and visual intrusion.

Thames WRMP24 Option	Option Name	Other Development Scheme Reference	Scheme Type	Location	Description	Least cost within 2km	Potential Cumulative effects- Least Cost
					SMEs (small to medium-sized enterprise).		Potential to impact the A-roads and residential areas and community facilities. Best practice construction to be implemented including traffic management plan.
		ALL.LON.WAN	Emerging Site Allocation	The site is located to the east of the junction of the A3205 (Nine Elms Lane/Batterse a Park Road) and 'A-Road', which separates this site and 41- 49 Nine Elms Lane, and 49- 59 Battersea Park Road site (NE2). It is bounded to the south.	Residential-led, mixed-use development with retail and flexible workspace, a permeable network of new streets and urban spaces, and publicly accessible open space (forming part of Nine Elms Park).	Y	Option TWU_LON_HI- ROC_NET_CNO_hampton- battersea is less than 200m north of the Emerging site allocation. Potential of overlapping construction activities. Potential cumulative effects to traffic. Potential for cumulative effects of noise and visual intrusion.

Thames WRMP24 Option	Option Name	Other Development Scheme Reference	Scheme Type	Location	Description	Least cost within 2km	Potential Cumulative effects- Least Cost
		ALL.LON.WAN 1	Emerging Site Allocation	Ram Street/Armour y Way, Wandsworth, SW18	Mixed use development including residential, replacement economic floorspace; retail, restaurants, business space, cultural, and entertainment uses with provision for a riverside walk.	Y	Option TWU_LON_HI- ROC_NET_CNO_hampton- battersea is adjacent to the emerging site allocation Potential for overlapping construction activities. Potential for direct construction interference with one another as well as cumulative effects on local traffic, noise pollution and visual intrusion. potential to impact A-roads and residential areas and community facilities. Best practice construction to be implemented including traffic management plan.
TWU_TED_HI - TFR_TED_AL L_teddington dramog/ted, TWU_TED_HI - RAB_RE1_C NO_teddingt on dra 75	Teddington DRA 75 MLD - Construction	ALL.WAS.LON 4	Waste Allocation	Langhorn Drive, Twickenham, Richmond	Waste site	Y	Teddington DRA 75 MLD - located 1.2km from the waste allocation site. No cumulative effects are anticipated during construction phase or operation.

Thames WRMP24 Option	Option Name	Other Development Scheme Reference	Scheme Type	Location	Description	Least cost within 2km	Potential Cumulative effects- Least Cost
TWU_KGV_H I- TFR_KGV_AL L_lockwood ps-kgv res	TLT extension from Lockwood PS to King George V Reservoir intake	ALL.WAS.LON 6	Waste Allocation	Industrial area of Eleys Estate which incorporates a number of existing waste sites and neighbours Edmonton Eco Park and Aztec A406 Industrial Estate.	Integrated resource recovery facilities / resource parks, Thermal treatment, anaerobic digestion, pyrolysis / gasification, mechanical biological treatment, Waste transfer, indoor composting, in- vessel composting, processing and recycling.	Y	Option TWU_LON_HI- REU_CON_ALL_reuse lockwood_kgv adjacent to the waste allocation site. Potential for cumulative effects should construction activities overlap. Potential for temporary adverse effects to Chingford Reservoirs SSSI, disturbance to local bird populations during construction. Also potential to affect traffic on the A-roads. Potential for cumulative effects to local community and facilities from visual intrusion, noise and access.

Thames WRMP24 Option	Option Name	Other Development Scheme Reference	Scheme Type	Location	Description	Least cost within 2km	Potential Cumulative effects- Least Cost
		ALL.WAS.LON 8	Waste Allocation	Industrial Estate	Thermal treatment, anaerobic digestion, pyrolysis / gasification, mechanical biological treatment, waste transfer, processing and recycling. Areas not within Source Protection Zone 1 are potentially suitable to handle hazardous waste.	Y	Option TWU_LON_HI- REU_CON_ALL_reuse lockwood_kgv adjacent to the waste allocation site. Potential for cumulative effects should construction activities overlap. Potential for temporary adverse effects to Chingford Reservoirs SSSI, disturbance to local bird populations during construction. Also, potential to affect traffic. Potential for cumulative effects to local community and facilities from visual intrusion, noise and access.

Thames WRMP24 Option	Option Name	Other Development Scheme Reference	Scheme Type	Location	Description	Least cost within 2km	Potential Cumulative effects- Least Cost
		ALL.WAS.LON 9	Waste Allocation	To the east of the area lies the Lee Valley Regional Park. To the west, the site is bound by a railway line, with a train station to the south. Beyond the railway line are industrial and residential uses. There are allotments to the south and an Ikea ret.	Thermal treatment, anaerobic digestion, pyrolysis / gasification, mechanical biological treatment, waste transfer, processing and recycling.	Y	Option TWU_LON_HI- REU_CON_ALL_reuse lockwood_kgv adjacent to the waste allocation site. Potential for cumulative effects should construction activities overlap. Potential for temporary adverse effects to Chingford Reservoirs SSSI, disturbance to local bird populations during construction. Also potential to affect traffic on A- roads. Potential for cumulative effects to local community and facilities from visual intrusion, noise and access.

Thames WRMP24 Option	Option Name	Other Development Scheme Reference	Scheme Type	Location	Description	Least cost within 2km	Potential Cumulative effects- Least Cost
TWU_KGV_H I- REU_RE1_C NO_deepha ms reuse 46.5b	Deephams Reuse – 46.5MI/d, to TLT - Construction	ALL.WAS.LON 6	Waste Allocation	Industrial area of Eleys Estate which incorporates a number of existing waste sites and neighbours Edmonton Eco Park and Aztec A406 Industrial Estate.	Integrated resource recovery facilities / resource parks, Thermal treatment, anaerobic digestion, pyrolysis / gasification, mechanical biological treatment, Waste transfer, indoor composting, in- vessel composting, processing and recycling.	Y	Option Deephams Reuse – 46.5MI/d, to TLT - Construction adjacent to the waste allocation site. Potential for cumulative effects should construction activities overlap. Potential for temporary adverse effects to Chingford Reservoirs SSSI, disturbance to local bird populations during construction Also potential to affect traffic on an A-road. Potential for cumulative effects from noise and visual intrusion.
TWU_SWX_H I- IMP_SWX_C NO_oxc- dukes cutswox	Oxford Canal - Duke's Cut (SWOX) - Construction	ALL.OXF.CHE6	Site Allocation	Bankside Phase 2	600 homes with associated services, facilities and other infrastructure.	N	No cumulative effects anticipated.

Thames WRMP24 Option	Option Name	Other Development Scheme Reference	Scheme Type	Location	Description	Least cost within 2km	Potential Cumulative effects- Least Cost
		ALL.OXF.CHE4	Site Allocation	Banbury Canalside	Provision of new homes, retail, office and leisure uses, public open space, pedestrian and cycle routes including new footbridges over the railway line, river and canal, and multi-storey car parks to serve Banbury railway station.	Y	No cumulative effects anticipated.
		ALL.OXF.CHE5	Site Allocation	Hardwick Farm, Southam Road (East and West)	Residential development (of approximately 600 dwellings).	Y	No cumulative effects anticipated.

Thames WRMP24 Option	Option Name	Other Development Scheme Reference	Scheme Type	Location	Description	Least cost within 2km	Potential Cumulative effects- Least Cost
		ALL.OXF.CHE8	Site Allocation	South of Salt Way - East	New neighbourhood of up to 1,345 dwellings with associated facilities and infrastructure as part of south west Banbury.	Y	No cumulative effects anticipated.
TWU_SWX_H I- TFR_SWX_A LL_dukescut- farmoor	Dukes Cut to Farmoor	ALL.OXF.WES	Site Allocation	Land to the north of the A40, near Eynsham	A working assumption of about 2,200 homes	Y	Option TWU_SWX_HI- TFR_SWX_ALL_dukescut-farmoor is located 2km from the allocation. Potential for overlapping construction activities. Should construction activities overlap there is potential for adverse cumulative effects to traffic and access.
		ALL.OXF.WES 4	Site Allocation	Land to the west of Eynsham	Land to the west of Eynsham to accommodate a sustainable integrated community that forms a positive addition to Eynsham, including: about 1,000	Y	Option TWU_SWX_HI- TFR_SWX_ALL_dukescut-farmoor is located 2km from the allocation. Potential for overlapping construction activities. Should construction activities overlap there's potential for adverse cumulative effects to traffic and access.

Thames WRMP24 Option	Option Name	Other Development Scheme Reference	Scheme Type	Location	Description	Least cost within 2km	Potential Cumulative effects- Least Cost
					homes with a balanced and appropriate mix of house types and tenures.		
TWU_GUI_HI - GRW_ALL_A LL_dapdune lic disagg		ALL.SUR.GUI1	Local Plan Allocation	Slyfield Area Regeneration Project, Guildford	Mixed-use development including 1,000 dwellings.	Y	License Disaggregation - no cumulative effects anticipated.
TWU_GUI_HI - TFR_RZ5_AL L_sewtogui	SouthEast Water to Guildford	ALL.SUR.GUI3	Local Plan Allocation	Blackwell Farm, Hogs Back, Guildford	Mixed-use development including 1,500 dwellings.	Y	Local plan allocation lasts up until 2035. No overlap of construction activities. No cumulative residual effect anticipated and no operational cumulative operational effects anticipated.

Scheme	Location and Description	Submission Date	Status/Stage	Potential cumulative effects – Least Cost
DCO:	Land west of the B430,	The application is	Pre-application	The DCO is located 2.8km from TWU_SWX_HI-
Oxfordshire	east of Upper Heyford	expected to be		IMP_SWX_CNO_oxc-dukes cutswox (construction start
Strategic Rail	Former Airfield, and south	submitted to the		date 2045).
Freight	of the village of Ardley.	Planning		
Interchange	The proposed	Inspectorate Q2		Construction: No cumulative effects anticipated.
	development consists of	2023.		Operation: No cumulative effects anticipated.
	the construction of a rail			
	treight terminal served via			
	Chiltern Bailway Lina			
	Chillent Raliway Line.			

Table 5-8 : Assessment of Least cost against Major Developments

Scheme	Location and Description	Submission Date	Status/Stage	Potential cumulative effects – Least Cost
DCO: M25 Junction 10/A3 Wisley Interchange Improvement	M25 junction 10, near Wisley, Surrey and A3 between Cobham/Byfleet and Ripley/Ockham Improvement of the Wisley interchange to allow free-flowing movement in all directions, together with improvements to the neighbouring Painshill interchange on the A3 to improve safety and congestion across the two sites.	Granted 12/05/2022	Granted	There is potential for the option TWU_GUI_HI- TFR_RZ5_ALL_sewtogui (construction start date 2045) to have cumulative effects of the DCO: Potential for overlap of construction activities. This may have temporary cumulative effects on traffic on an A-road including diversions. Best practice construction techniques and a traffic management plan to be implemented to minimise effects. No cumulative effects during operation phase are anticipated.

Scheme	Location and Description	Submission Date	Status/Stage	Potential cumulative effects – Least Cost
DCO: River Thames Scheme	The flood channels are proposed between Egham Hythe and Chertsey and between Laleham and Weybridge. A new river channel built in two sections between Egham Hythe in Runnymede and Shepperton in Spelthorne; capacity improvements to existing river structures (including at Sunbury, Molesey and Teddington Weirs and Desborough Cut); new green open spaces; habitat creation and enhancement; active travel provision and associated development.	The Applicant has not yet set a timetable for this project.	Pre-application	The DCO has potential for cumulative effects during construction with option TWU_LON_HI- ROC_NET_CNO_hampton-battersea (construction start date 2034-2040) Tunnel intersects SSSI/SAC/NNR Richmond Park with potential to result in loss of habitat or disturbance. Tunnel has direct impact on GWDTE and Priority Habitat, potential for impacts during construction. HRA ToLS suggests likely significant impact on Richmond Park SSSI/SAC/NNR and Wimbledon Common SAC. Majority of tunnel will be underground, so effects localised to areas of above ground construction. There are potential for adverse effects associated with the proximity of heritage assets during construction activities: The Hampton to Battersea pipeline route runs through both Bushy Park and Richmond Park Registered Park and Garden. Directional drilling will be used to mitigate effects on these designations. Also potential for temporary effects on Landscape objectives; the Option is within the Inner London and Thames Valley NCAs and the London Area Greenbelt. Potential to affect visual amenity during construction. Minimal above ground infrastructure anticipated. Overlapping construction activities may have effects on traffic, noise, and air quality. Public rights of way and cycle paths will be re-provided. Cumulative operational effects are not anticipated.
Hybrid Scheme: HS2	Phase 1 London to West Midlands. HS2	Examination Hearing Phase 1- 08/01/2014		Construction: No cumulative effects anticipated. Operation: No cumulative effects anticipated.

Scheme	Location and Description	Submission Date	Status/Stage	Potential cumulative effects – Least Cost
TWAO: Oxford Station Phase 2 Improvements	Oxford Station Improvement and upgrade works in and around Oxford Station.	Granted 22/06/2022	Granted	Construction: No cumulative effects anticipated. Operation: No cumulative effects anticipated.
TWAO: East West Rail Bicester to Bedford Improvements	Bicester to Bletchley and Aylesbury to Claydon Junction. Upgrade the Bicester to Bletchley and Aylesbury to Claydon Junction together with station works at Winslow, Bletchley, Aylesbury Vale Parkway, Woburn Sands and Ridgmont.	Granted 29/1/2020	Granted	Construction: No cumulative effects anticipated. Operation: No cumulative effects anticipated.
TWAO: Barking Riverside Extension	Extension of the Barking to Gospel Oak London Overground line.	Granted 15/08/2017	Granted	Barking riverside is open (July 2022) and follows existing rail infrastructure. Construction: No cumulative effects anticipated. Operation: No cumulative effects anticipated.

Thames WRMP24 Option	Option Name	Other Development Scheme Reference	Scheme Type	Location	Description	Least cost within 2km	Potential Cumulative effects- Least Cost
TWU_KVZ_HI - TFR_UTC_AL L_thamestofo bney	River Thames to Fobney Transfer	ALL.BER.REA1	Local Plan Allocation	STATION HILL & FRIARS WALK	Indicative potential: 380- 570 dwellings, 80,000- 100,000 sq m of offices, retail and leisure (no significant net gain assumed)	Y	The ALL.BER.REA1 plan period is up to 3036. Construction activities do not overlap with TWU_KVZ_HI- TFR_UTC_ALL_thamestofobney. Residual construction effects are not anticipated. No operational cumulative effects have been identified.
		ALL.BER.REA2	Local Plan Allocation	Hosier Street	Indicative potential: 500- 750 dwellings, 4,000-6,000 sq m of retail and leisure.	Y	Option TWU_KVZ_HI- TFR_UTC_ALL_thamestofobney is within 1km of the allocation site. Schemes are geographically separated by an A-road. No likely cumulative effects identified.
		ALL.BER.REA3	Local Plan Allocation	Forbury Retail Park	Indicative potential: 1,230-1,840 dwellings, no net gain of retail	Ŷ	TWU_KVZ_HI- TFR_UTC_ALL_thamestofobney 1.5km from the site allocation. Schemes are geographically separated by an A-road. No likely cumulative effects identified.

Table 5-9 : Assessment of Best Environmental and Societal against Local Plans

Thames WRMP24 Option	Option Name	Other Development Scheme	Scheme Type	Location	Description	Least cost within	Potential Cumulative effects- Least Cost
		ALL.BER.REA4	Local Plan Allocation	Land north of Manor Farm Road Major Opportunity Area	Redevelopment of the Manor Farm Road site will primarily be for housing (between 680- 1,020 dwellings), an extension to the Whitley District Centre, school provision and open space and public realm improvements.	Y	Option TWU_KVZ_HI- TFR_UTC_ALL_thamestofobney within 1km of option. Potential for construction activities to overlap. However no cumulative effects have been identified given the nature and location of the schemes.

Thames WRMP24 Option	Option Name	Other Development Scheme Reference	Scheme Type	Location	Description	Least cost within 2km	Potential Cumulative effects- Least Cost
TWU_LON_H I- ROC_NET_C NO_hampton -battersea	TWRM extension - Hampton to Battersea - Construction	ALL.LON.H&F4	Site Allocation	South Fulham Riverside Regeneration Area	4,000 indicative additional homes	Y	Potential cumulative effects with TWU_LON_HI- ROC_NET_CNO_hampton- battersea (construction period 2034- 2040). Potential for construction activities to overlap. The option pipeline is located 0.5km at its closest distance to the site allocation. Potential for cumulative negative effects to traffic. Potential for temporary adverse effects to local residential areas and community facilities from noise disturbance and access. Temporary adverse effects on the setting of historic assets including grade II listed buildings. Best practice construction techniques to be implemented including screening to reduce effects of noise, visual intrusion and effects on traffic.

Thames WRMP24	Option Name	Other Development	Scheme Type	Location	Description	Least cost	Potential Cumulative effects- Least Cost
Option		Reference				within 2km	
		ALL.LON.LAM 1	Site Allocation	Land Bounded By Wandsworth Road To The West, Parry Street To The North, And Bondway And Railway Line To The East (Vauxhall Square)	578 residential units	Y	Potential cumulative effects with TWU_LON_HI- ROC_NET_CNO_hampton- battersea (construction period 2034- 2040). Potential for construction activities to overlap. 1.2km from option. Potential for cumulative negative effects to traffic including on an A-road. Potential for temporary adverse effects to local residential areas and community facilities from noise disturbance and access. Temporary adverse effects on the setting of historic assets including grade II listed buildings. Best practice construction techniques to be implemented including traffic planning and screening to reduce effects of visual intrusion.
		ALL.LON.WAN 2	Emerging Site Allocation	Armoury Way, SW18	Development should provide a mix of residential and intensified economic uses, including cultural workspace and provision for	Y	Option TWU_LON_HI- ROC_NET_CNO_hampton- battersea is adjacent to the emerging site allocation Potential for overlapping construction activities. Potential for direct construction interference with one another as well as cumulative effects on local traffic, noise pollution and visual intrusion.

Thames WRMP24 Option	Option Name	Other Development Scheme Reference	Scheme Type	Location	Description	Least cost within 2km	Potential Cumulative effects- Least Cost
					SMEs (small to medium-sized enterprise).		Potential to impact the A-roads and residential areas and community facilities. Best practice construction to be implemented including traffic management plan.
		ALL.LON.WAN	Emerging Site Allocation	The site is located to the east of the junction of the A3205 (Nine Elms Lane/Batterse a Park Road) and 'A-Road', which separates this site and 41- 49 Nine Elms Lane, and 49- 59 Battersea Park Road site (NE2). It is bounded to the south.	Residential-led, mixed-use development with retail and flexible workspace, a permeable network of new streets and urban spaces, and publicly accessible open space (forming part of Nine Elms Park).	Y	Option TWU_LON_HI- ROC_NET_CNO_hampton- battersea is less than 200m north of the Emerging site allocation. Potential of overlapping construction activities. Potential cumulative effects to traffic. Potential for cumulative effects of noise and visual intrusion.

Thames WRMP24 Option	Option Name	Other Development Scheme Reference	Scheme Type	Location	Description	Least cost within 2km	Potential Cumulative effects- Least Cost
		ALL.LON.WAN 1	Emerging Site Allocation	Ram Street/Armour y Way, Wandsworth, SW18	Mixed use development including residential, replacement economic floorspace; retail, restaurants, business space, cultural, and entertainment uses with provision for a riverside walk.	Y	Option TWU_LON_HI- ROC_NET_CNO_hampton- battersea is adjacent to the emerging site allocation Potential for overlapping construction activities. Potential for direct construction interference with one another as well as cumulative effects on local traffic, noise pollution and visual intrusion. potential to impact A-roads and residential areas and community facilities. Best practice construction to be implemented including traffic management plan.
TWU_TED_HI - TFR_TED_AL L_teddington dramog/ted, TWU_TED_HI - RAB_RE1_C NO_teddingt on dra 75	Teddington DRA 75 MLD - Construction	ALL.WAS.LON 4	Waste Allocation	Langhorn Drive, Twickenham, Richmond	Waste site	Y	Teddington DRA 75 MLD - located 1.2km from the waste allocation site. No cumulative effects are anticipated during construction phase or operation.

Thames WRMP24 Option	Option Name	Other Development Scheme Reference	Scheme Type	Location	Description	Least cost within 2km	Potential Cumulative effects- Least Cost
TWU_KGV_H I- TFR_KGV_AL L_lockwood ps-kgv res	TLT extension from Lockwood PS to King George V Reservoir intake	ALL.WAS.LON 6	Waste Allocation	Industrial area of Eleys Estate which incorporates a number of existing waste sites and neighbours Edmonton Eco Park and Aztec A406 Industrial Estate.	Integrated resource recovery facilities / resource parks, Thermal treatment, anaerobic digestion, pyrolysis / gasification, mechanical biological treatment, Waste transfer, indoor composting, in- vessel composting, processing and recycling.	Y	Option TWU_LON_HI- REU_CON_ALL_reuse lockwood_kgv adjacent to the waste allocation site. Potential for cumulative effects should construction activities overlap. Potential for temporary adverse effects to Chingford Reservoirs SSSI, disturbance to local bird populations during construction. Also potential to affect traffic on the A-roads. Potential for cumulative effects to local community and facilities from visual intrusion, noise and access.

Thames WRMP24 Option	Option Name	Other Development Scheme Reference	Scheme Type	Location	Description	Least cost within 2km	Potential Cumulative effects- Least Cost
		ALL.WAS.LON 8	Waste Allocation	Industrial Estate	Thermal treatment, anaerobic digestion, pyrolysis / gasification, mechanical biological treatment, waste transfer, processing and recycling. Areas not within Source Protection Zone 1 are potentially suitable to handle hazardous waste.	Y	Option TWU_LON_HI- REU_CON_ALL_reuse lockwood_kgv adjacent to the waste allocation site. Potential for cumulative effects should construction activities overlap. Potential for temporary adverse effects to Chingford Reservoirs SSSI, disturbance to local bird populations during construction. Also, potential to affect traffic. Potential for cumulative effects to local community and facilities from visual intrusion, noise and access.
Thames WRMP24 Option	Option Name	Other Development Scheme Reference	Scheme Type	Location	Description	Least cost within 2km	Potential Cumulative effects- Least Cost
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		ALL.WAS.LON 9	Waste Allocation	To the east of the area lies the Lee Valley Regional Park. To the west, the site is bound by a railway line, with a train station to the south. Beyond the railway line are industrial and residential uses. There are allotments to the south and an Ikea ret.	Thermal treatment, anaerobic digestion, pyrolysis / gasification, mechanical biological treatment, waste transfer, processing and recycling.	Y	Option TWU_LON_HI- REU_CON_ALL_reuse lockwood_kgv adjacent to the waste allocation site. Potential for cumulative effects should construction activities overlap. Potential for temporary adverse effects to Chingford Reservoirs SSSI, disturbance to local bird populations during construction. Also potential to affect traffic on A- roads. Potential for cumulative effects to local community and facilities from visual intrusion, noise and access.

Thames WRMP24 Option	Option Name	Other Development Scheme Reference	Scheme Type	Location	Description	Least cost within 2km	Potential Cumulative effects- Least Cost
TWU_KGV_H I- REU_RE1_C NO_deepha ms reuse 46.5b	Deephams Reuse – 46.5MI/d, to TLT - Construction	ALL.WAS.LON 6	Waste Allocation	Industrial area of Eleys Estate which incorporates a number of existing waste sites and neighbours Edmonton Eco Park and Aztec A406 Industrial Estate.	Integrated resource recovery facilities / resource parks, Thermal treatment, anaerobic digestion, pyrolysis / gasification, mechanical biological treatment, Waste transfer, indoor composting, in- vessel composting, processing and recycling.	Y	Option Deephams Reuse – 46.5MI/d, to TLT - Construction adjacent to the waste allocation site. Potential for cumulative effects should construction activities overlap. Potential for temporary adverse effects to Chingford Reservoirs SSSI, disturbance to local bird populations during construction Also potential to affect traffic on an A-road. Potential for cumulative effects from noise and visual intrusion.
TWU_SWX_H I- IMP_SWX_C NO_oxc- dukes cutswox	Oxford Canal - Duke's Cut (SWOX) - Construction	ALL.OXF.CHE6	Site Allocation	Bankside Phase 2	600 homes with associated services, facilities and other infrastructure.	N	No cumulative effects anticipated.

Thames WRMP24 Option	Option Name	Other Development Scheme Reference	Scheme Type	Location	Description	Least cost within 2km	Potential Cumulative effects- Least Cost
		ALL.OXF.CHE4	Site Allocation	Banbury Canalside	Provision of new homes, retail, office and leisure uses, public open space, pedestrian and cycle routes including new footbridges over the railway line, river and canal, and multi-storey car parks to serve Banbury railway station.	Y	No cumulative effects anticipated.
		ALL.OXF.CHE5	Site Allocation	Hardwick Farm, Southam Road (East and West)	Residential development (of approximately 600 dwellings).	Y	No cumulative effects anticipated.

Thames WRMP24 Option	Option Name	Other Development Scheme Reference	Scheme Type	Location	Description	Least cost within 2km	Potential Cumulative effects- Least Cost
		ALL.OXF.CHE8	Site Allocation	South of Salt Way - East	New neighbourhood of up to 1,345 dwellings with associated facilities and infrastructure as part of south west Banbury.	Y	No cumulative effects anticipated.
TWU_SWX_H I- TFR_SWX_A LL_dukescut- farmoor	Dukes Cut to Farmoor	ALL.OXF.WES	Site Allocation	Land to the north of the A40, near Eynsham	A working assumption of about 2,200 homes	Y	Option TWU_SWX_HI- TFR_SWX_ALL_dukescut-farmoor is located 2km from the allocation. Potential for overlapping construction activities. Should construction activities overlap there is potential for adverse cumulative effects to traffic and access.
		ALL.OXF.WES 4	Site Allocation	Land to the west of Eynsham	Land to the west of Eynsham to accommodate a sustainable integrated community that forms a positive addition to Eynsham, including: about 1,000	Y	Option TWU_SWX_HI- TFR_SWX_ALL_dukescut-farmoor is located 2km from the allocation. Potential for overlapping construction activities. Should construction activities overlap there's potential for adverse cumulative effects to traffic and access.

Thames WRMP24 Option	Option Name	Other Development Scheme Reference	Scheme Type	Location	Description	Least cost within 2km	Potential Cumulative effects- Least Cost
					homes with a balanced and appropriate mix of house types and tenures.		
TWU_GUI_HI - GRW_ALL_A LL_dapdune lic disagg		ALL.SUR.GUI1	Local Plan Allocation	Slyfield Area Regeneration Project, Guildford	Mixed-use development including 1,000 dwellings.	Y	License Disaggregation - no cumulative effects anticipated.
TWU_GUI_HI - TFR_RZ5_AL L_sewtogui	SouthEast Water to Guildford	ALL.SUR.GUI3	Local Plan Allocation	Blackwell Farm, Hogs Back, Guildford	Mixed-use development including 1,500 dwellings.	Y	Local plan allocation lasts up until 2035. No overlap of construction activities. No cumulative residual effect anticipated and no operational cumulative operational effects anticipated.

Scheme	Location and Description	Submission Date	Status/Stage	Potential cumulative effects – Least Cost
DCO: Oxfordshiro	Land west of the B430,	The application is	Pre-application	The DCO is located 2.8km from TWU_SWX_HI-
Strategic Rail Freight	Former Airfield, and south of the village of Ardley.	submitted to the Planning		date 2045).
Interchange	The proposed	Inspectorate Q2		Construction: No cumulative effects anticipated.
	development consists of the construction of a rail freight terminal served via new connections to the Chiltern Railway Line.	2023.		Operation: No cumulative effects anticipated.

Table 5-10 : Assessment of the Best Environmental and Societal against major developments

Scheme	Location and Description	Submission Date	Status/Stage	Potential cumulative effects – Least Cost
DCO: M25 Junction 10/A3 Wisley Interchange Improvement	M25 junction 10, near Wisley, Surrey and A3 between Cobham/Byfleet and Ripley/Ockham Improvement of the Wisley interchange to allow free-flowing movement in all directions, together with improvements to the neighbouring Painshill interchange on the A3 to improve safety and congestion across the two sites.	Granted 12/05/2022	Granted	There is potential for the option TWU_GUI_HI- TFR_RZ5_ALL_sewtogui (construction start date 2045) to have cumulative effects of the DCO: Potential for overlap of construction activities. This may have temporary cumulative effects on traffic on an A-road including diversions. Best practice construction techniques and a traffic management plan to be implemented to minimise effects. No cumulative effects during operation phase are anticipated.

Scheme	Location and Description	Submission Date	Status/Stage	Potential cumulative effects – Least Cost
DCO: River Thames Scheme	The flood channels are proposed between Egham Hythe and Chertsey and between Laleham and Weybridge. A new river channel built in two sections between Egham Hythe in Runnymede and Shepperton in Spelthorne; capacity improvements to existing river structures (including at Sunbury, Molesey and Teddington Weirs and Desborough Cut); new green open spaces; habitat creation and enhancement; active travel provision and associated development.	The Applicant has not yet set a timetable for this project.	Pre-application	The DCO has potential for cumulative effects during construction with option TWU_LON_HI-ROC_NET_CNO_hampton-battersea (construction start date 2034-2040) Tunnel intersects SSSI/SAC/NNR Richmond Park with potential to result in loss of habitat or disturbance. Tunnel has direct impact on GWDTE and Priority Habitat, potential for impacts during construction. HRA ToLS suggests likely significant impact on Richmond Park SSSI/SAC/NNR and Wimbledon Common SAC. Majority of tunnel will be underground, so effects localised to areas of above ground construction. There are potential for adverse effects associated with the proximity of heritage assets during construction activities: The Hampton to Battersea pipeline route runs through both Bushy Park and Richmond Park Registered Park and Garden. Directional drilling will be used to mitigate effects on these designations. Also potential for temporary effects on Landscape objectives; the Option is within the Inner London and Thames Valley NCAs and the London Area Greenbelt. Potential to affect visual amenity during construction. Minimal above ground infrastructure anticipated. Overlapping construction activities may have effects on traffic, noise, and air quality. Public rights of way and cycle paths will be re-provided. Cumulative operational effects are not anticipated.
Hybrid Scheme: HS2	Phase 1 London to West Midlands. HS2	Examination Hearing Phase 1- 08/01/2014		Construction: No cumulative effects anticipated. Operation: No cumulative effects anticipated.

Scheme	Location and Description	Submission Date	Status/Stage	Potential cumulative effects – Least Cost
TWAO: Oxford Station Phase 2 Improvements	Oxford Station Improvement and upgrade works in and around Oxford Station.	Granted 22/06/2022	Granted	Construction: No cumulative effects anticipated. Operation: No cumulative effects anticipated.
TWAO: East West Rail Bicester to Bedford Improvements	Bicester to Bletchley and Aylesbury to Claydon Junction. Upgrade the Bicester to Bletchley and Aylesbury to Claydon Junction together with station works at Winslow, Bletchley, Aylesbury Vale Parkway, Woburn Sands and Ridgmont.	Granted 29/1/2020	Granted	Construction: No cumulative effects anticipated. Operation: No cumulative effects anticipated.
TWAO: Barking Riverside Extension	Extension of the Barking to Gospel Oak London Overground line.	Granted 15/08/2017	Granted	Barking riverside is open (July 2022) and follows existing rail infrastructure. Construction: No cumulative effects anticipated. Operation: No cumulative effects anticipated.

5.8 Summary

The cumulative effects assessment of the LC and BES are presented in Section 5.7 and the cumulative effects assessment of the BVP is in Section 6.2. The LC and BES include two additional options which are not included in the BVP (a 5MI/d Henley to SWA transfer and a transfer from Duke's Cut to Farmoor as part of the Oxford Canal scheme). The selection of these two additional options in the LC and BES have the potential to result in additional cumulative effects compared to the BVP, particularly in relation to SEA objectives on biodiversity and water. Cumulative effects for the LC and BES are otherwise identical to the BVP as summarised below.

All three plans involve the construction of multiple infrastructure projects. There are 'standard' cumulative impacts associated with this construction activity (e.g. material use and waste generation, impact on soils, temporary impact on roads, cycle paths and national trails, and community facilities). Best practice mitigation for these impacts will be implemented as part of option delivery.

The HRA assessment identified that all three plans have the potential for localised in-combination construction effects on Cothill Fen, and the BES and LC have the potential to affect an additional site (Oxford Meadows SAC), based on the timing of options relative to one another within the plans. This will be explored further to better understand the magnitude of impacts and actions to avoid or mitigate these, as part of finalising the plan. A small number of options within the plans intersect the same area of biodiversity action plan priority habitat, with construction periods at the same time or relatively close together. The reduction of any habitat loss will be sought through further option development, as well as best practice construction techniques (such as species relocation) as the plan is finalised

As part of the INNS assessment, the Duke's Cut to Farmoor option within the LC and BES is identified to present an additional risk. This is identified to be a medium INNS risk in the absence of mitigation. An evaluation of suitable mitigation measures will be undertaken as options are progressed and the WRMP is finalised.

The WFD assessment has identified 21 water bodies which are impacted by more than one option in the BVP, LC and BES. Of these water bodies, four of the waterbodies assessed indicate that there is a potential risk of cumulative impacts (i.e. multiple options could lead to a change in risk of WFD deterioration) and further assessment is needed to confirm this. The additional options selected in the LC and BES plans would lead to additional potential cumulative effects on five waterbodies as identified in the WFD in-combination assessment. The BVP cumulative effects assessment sets out that no risk of deterioration is anticipated on the Thames (Leach to Evenlode) water body. With the inclusion of the Dukes Cut to Farmoor transfer to this assessment, although there is a risk of deterioration (amber adverse), this will not be increased from that set out in the Dukes Cut to Farmoor transfer assessment. In addition, to these new options, two of the SRO options (SESRO - 150Mm3 option; and STT - 300MI/d option) are included at a different size to those in the BVP. However, in both cases the change in the option size does not alter the outcome of the WFD assessment.

There may be temporary cumulative impacts on landscape and visual amenity for temporally overlapping construction activities related to three options included within the three plans, all of which are within 500m of an AONB but require minimal above ground infrastructure. Altering

construction timings and implementing best practice construction measures will be explored to reduce these potential effects.

There is also potential for cumulative effects resulting from construction of SESRO, aspects of STT and the Abingdon to Farmoor Pipeline on a Scheduled monument. Embedded construction mitigation is expected to prioritise minimising these effects through consideration of the siting of temporary and permanent works.

The plans provide substantial positive cumulative effects on reducing vulnerability to climate change risks and hazards and on delivering reliable and resilient water supplies, providing a long term benefit for communities in the region.

6 Preferred Best Value Plan (WRMP24)

This Section focuses on cumulative effects of Thames Water's Water Resources Management Plan (WRMP24) Best Value Plan. It sets out the cumulative intra-plan and inter-plan effects, providing a brief summary for each SEA Objective. It also identifies those cumulative inter-plan effects that are specific to the Best Value Plan.

6.1 Introduction

The moderate or major SEA Summary findings for the Best Value Plan options have been presented in Section 4.

The majority of effects arising from the Best Value Plan are associated with construction. The majority of moderate adverse and major adverse residual effects have been identified for the biodiversity objective: River Thames to Fobney Transfer Option, Thames Water Ring Main (TWRM) Extension – Hampton to Battersea Option, Abingdon Water Treatment Works (WTW) to Long Crendon to supply SWA, Kempton – 100 Phase 1 and, Abingdon to Farmoor Reservoir Pipeline. Construction activities will result in some direct loss of priority habitats and some indirect effects on designated sites that are within 1km however, it is considered with appropriate mitigation and best practice these effects can be mostly avoided. Further option development will inform mitigation and further option screening as necessary.

The River Thames to Fobney Transfer Option SEA identified that this option could have major negative residual operational effects for biodiversity, flora and fauna and moderate negative residual operational effects on water quality. The option is within an Sites of Special Scientific Interest (SSSI) Impact Risk Zone (IRZ) and Lousehill Copse Local Nature Reserve (LNR) and McIlroy Park LNR are within 2,000m. The option passes through areas of woodland and priority habitat therefore potential for direct effects during the construction phase. There will be a new intake on the River Thames and therefore, there is potential for disturbance of aquatic ecology during construction of the intake and potential effects on aquatic ecology from abstraction during operation. It is important to note that this option is under development and will be developed further for the final plan – this will facilitate better understanding of whether available mitigation can reduce impacts sufficient to make the option progressable.

For the operation phase, a majority of options have been assessed as resulting in a minor beneficial effect on the delivery of a reliable and resilient water supply, which is expected given the nature of the options. The Abingdon Reservoir 100Mm³ option has been assessed as resulting in major beneficial effects during operation. The reservoir also has the potential to create a new habitat. Also, this option will increase capacity, which improves the resilience for supply. It will also help reduce abstractions in more vulnerable areas and during times of low flow. This will increase the resilience of the water supply, as well as the environment, through having capacity to release water into the river during low flow and drought conditions, and reducing abstraction in more vulnerable areas that would be exacerbated by drought conditions.

The assessments undertaken assume construction best practice mitigation and identified mitigation (both outlined in Section 8).

6.2 Cumulative Effects Assessment

Please see Table 6.1 for outputs of the intra-cumulative assessment for the BVP.

SEA Topic	SEA Criteria	Construction Phase Effects	Operation Phase Effects
Biodiversity, flora	Protect and	(TWU_STR_HI-RSR_RE1_CNO_abingdon100(lon),	Cumulative effects of the BVP on
and fauna	enhance	TWU_SWX_HI-ROC_WT2_ALL_abingdon wtw ph1 and	Natura 2000 sites are outlined
	biodiversity,	TWU_SWX_HI-ROC_WT2_ALL_abingdon wtw ph2) intersect the	within the Habitat Regulation
	priority species,	same area of Biodiversity Action Plan (BAP) priority habitat:	Assessment (HRA) Report
	vulnerable habitats	Coastal and floodplain grazing marsh. There is potential for	(Appendix C). No further
	and habitat	cumulative construction impacts including loss of habitat.	cumulative effects during
	connectivity (no	Embedded mitigation such as the relocation of such species /	operation of the BVP have been
	loss and improve	habitats where appropriate will be undertaken in advance of the	identified.
	connectivity where	works being undertaken.	
	possible)		
		Barrow Farm Fen Sites of Special Scientific Interest (SSSI) /	
		Groundwater Dependant Terrestrial Ecosystem (GWDTE)	
		(100.00% unfavourable - recovering), is within 500m of both the	
		site location of Abingdon reservoir and Abingdon water treatment	
		works, however, no cumulative effects have been identified as	
		there will be no overlap of construction activities and the distance	
		is sufficient enough that residual construction effects are unlikely.	
		TWU_SWX_HI-TFR_STR_ALL_abing-farmoor pipe (2035-2040)	
		and TWU_SWA_HI-TFR_SWX_ALL_swoxswa48 (2045-2050) are	
		in close proximity to Frilford Heath SSSI (0.72% Favourable,	
		93.70% Unfavourable recovering), both less than 70m from the	
		designated site, and both intersecting BAP priority habitat	
		deciduous woodland surrounding the SSSI. Although there is 5	
		years separating the construction phases of these two options the	
		close proximity of the options may have residual cumulative	
		impacts from construction should there be permanent loss of	
		habitat in or surrounding the SSSI. Best practice construction	
		techniques to be implemented to reduce loss of habitat.	

Table 6-1 : Cumulative Effects Assessment – Best Value Plan

SEA Topic	SEA Criteria	Construction Phase Effects	Operation Phase Effects
SEA Topic	SEA Criteria	Construction Phase Effects TWU_STT_HI-RAB_RE1_ALL_p9-300-vyrnwy_100_b and TWU_STT_HI-REU_RE1_ALL_p5-300-neth_p35 are in close proximity to Wainlode Cliff SSSI. As the option TWU_STT_HI- REU_RE1_ALL_p5-300-neth_p35 only includes the transfer of water from Severn Trent. Cumulative effects have not been identified during construction or operation. Cumulative effects of construction will be assessed by Severn Trent Water. HRA identified the following potential cumulative effects on N2K sites: Cothill Fen Special Area of Conservation (SAC) may be affected by two Options: SWOX to SWA (located at approximately 0.05km distance) and Abingdon to Farmoor Reservoir pipeline (located at approximately 0.1km distance. This SAC is designated for supporting alkaline fens; calcium-rich spring water-fed fens (H7230) and alluvial forests with (<i>Alnus glutinosa</i>) and fraxinus excelsior (<i>Alno-Padion, Alnion incanae, Salicion albae</i>) in addition to alder woodland on floodplains (H91E0).	Operation Phase Effects

SEA Topic	SEA Criteria	Construction Phase Effects	Operation Phase Effects
Soil	Protect and	Options within the BVP that include construction intercepting	No operational phase cumulative
	enhance the	grade 1 Agricultural Land Classification (ALC) include	effects are anticipated for this SEA
	functionality,	TWU_SWA_HI-GRW_ALL_ALL_datchet do, however where	objective.
	quantity and	pipelines are to be installed the ground will be reinstated and soil	
	quality of soils	will remain functional, additionally, construction works associated	
		with TWU_SWA_HI-GRW_ALL_ALL_datchet do are anticipated to	
		be minimal and likely loss or disturbance will be minor. There will	
		be no cumulative residual effects to grade 1 ALC soil.	
		TWU_STR_HI-RSR_RE1_CNO_abingdon100(lon) and	
		TWU_SWX_HI-GRW_ALL_ALL_MOUISTORD gw and TWU_SWX_HI-	
		ROC_WII_CNO_abingdon wtw pn I have potential for	
		cumulative effects of permanent loss of grade 2 ALC soll. Best	
		practice construction techniques to be implemented to reduce	
		Construction in close proximity to landfill sites has the potential for	
		risk of contamination. The following options within the BVP are	
		within proximity to an authorised land fill: TWU STR HI-	
		RSR RE1 CNO abingdon100(lon). TWU STT HI-	
		IMP STT CNO sttpipe500(Ion) and TWU SWX HI-	
		TFR_STR_ALL_abing-farmoor.	
		The following options are within proximity to a quarry,	
		TWU_SWX_HI-TFR_STR_ALL_abing-farmoor and TWU_SWA_HI-	
		TFR_SWX_ALL_swoxswa48 pipeline.	
		There is potential for cumulative risk of contamination.	
			<u> </u>

SEA Topic	SEA Criteria	Construction Phase Effects	Operation Phase Effects
		Effects can be mitigated with use of best practice construction	
		techniques around landfill.	

SEA Topic	SEA Criteria	Construction Phase Effects	Operation Phase Effects
Water	Increase resilience and reduce flood risk	Options included in this plan are mostly located in Flood Zone 1, however options also pass through Flood Zones 2 and 3. A number of options also pass through the same area of flood zone including TWU_STR_HI-RSR_RE1_CNO_abingdon100(lon) and TWU_SWX_HI-ROC_WT1_CNO_abingdon wtw ph1 and TWU_SWX_HI-ROC_WT1_CNO_abingdon wtw ph2. However only TWU_STR_HI-RSR_RE1_CNO_abingdon100(lon) has potential for residual construction effects on flood risk and as construction period of options will not overlap, therefore cumulative risks on flooding are unlikely. Flood risk mitigation and management will be applied during the construction phase, these effects can be lessened.	TWU_STR_HI- RSR_RE1_CNO_abingdon100(Ion) and TWU_SWX_HI- ROC_WT1_CNO_abingdon wtw ph1 and TWU_SWX_HI- ROC_WT1_CNO_abingdon wtw have the potential for cumulative operational risks to flooding with potential impacts to flood zone 2 and 3, a flood management plan will be implemented during the design and construction of Abingdon reservoir and associated infrastructure.
	Protect and enhance the quality of the water environment and water resources	There are no options within the plan intercepting the same source protection zones, reducing the potential for adverse cumulative effects on groundwater sources. Several water bodies including main rivers are intercepted by multiple options, including the river Thames. The Intra-plan cumulative effects assessment has identified 21 water bodies which are impacted by more than one BVP option. Of these water bodies, all waterbodies assessed indicate that there is no risk of cumulative impacts (i.e., multiple options do not lead to a change in risk of WFD deterioration).	No cumulative effects are anticipated on source protection zones. Cumulative WFD assessment is included within the WFD Assessment – Appendix D.
	Deliver reliable and resilient water supplies	No construction phase cumulative effects are anticipated for this SEA objective.	No negative operational phase cumulative effects are anticipated for this SEA objective. All options in this plan, in combination with the proposed demand management option, are aimed at improving water

SEA Topic	SEA Criteria	Construction Phase Effects	Operation Phase Effects
Air	Reduce and minimise air emissions	Within the plan options are anticipated to have minor to moderate effects to local air quality resulting from construction activity. These effects are anticipated to be local and short-term in nature. Where options are intersecting or in proximity to the same Air Quality Management Area (AQMA), no temporal overlap of construction activities is within the plan. It is anticipated that there would be no cumulative effects on this SEA objective during the	efficiency and increasing the resilience of water supplies in the TW region. The options will all overlap temporally during operation to improve resilience, including increased abstraction, transfers from areas with a surplus. Simultaneously, the demand management will look to provide water savings across the region to reduce demand. It is anticipated that there will be a major positive effect on this SEA objective during operation. No operational phase cumulative effects are anticipated for this SEA objective.
Climatic Factors	Reduce embodied and operational	construction phase.Each option requires built infrastructure to varying degrees.Emissions related to construction activities are local and short-	A number of the options will require energy-intensive
	carbon emissions	term and are not anticipated to result in cumulative effects. However, whilst the options are spatially, and temporally diverse Embodied carbon associated with the construction of these options will be cumulative.	processes during the operational phase. At present, there are no confirmed opportunities to supply the options with renewable energy during the operational phase however, these could be

SEA Topic	SEA Criteria	Construction Phase Effects	Operation Phase Effects
		The options may also have further cumulative adverse effects for	investigated as part of further
		carbon sequestration, especially in areas where removal of	design development. As the
		wetland habitat and deciduous woodland is required.	energy grid is decarbonised,
			greener energy will be available. It
			is anticipated that there would be
			a moderate negative cumulative
			effect on this SEA objective during
			the construction phase.
	Reduce	No construction phase cumulative effects are anticipated for this	There is likely to be positive
	vulnerability to	SEA objective.	cumulative effects for this
	climate change		objective. The plan includes
	risks and hazards		transferring water from areas of
			surplus to areas of deficit,
			combined with Abingdon reservoir,
			which will increase resilience of
			the environment by having
			capacity to release water into river
			during low flow and drought
			conditions and reducing
			abstraction in more vulnerable
			areas that would be exacerbated
			by drought conditions. The
			additional demand options will help
			to manage water resources in
			periods of drought.
Landscape	Conserve, protect	Each option will have a local and temporary effect on landscape	No operational phase cumulative
	and enhance	and visual amenity through construction activities and traffic. Best	effects are anticipated for this SEA
	landscape,	practice mitigation measures can be applied to reduce this	objective.
	townscape and	impact. TWU_SWA_HI-TFR_HEN_ALL_henley-swox5 directly	
	seascape	impacts the Chilterns Area of Outstanding Natural Beauty	

SEA Topic	SEA Criteria	Construction Phase Effects	Operation Phase Effects
	character and	(ANOB) Five years after initial operation, fields and compounds	
	visual amenity	would be restored to their original condition. In the long-term, 15	
		years after initial operation, planting would mature and hedgerow	
		connections re-established, aiding integration of the new built	
		structures site into the landscape and setting of the AONB. There	
		may however be temporary cumulative construction impacts with	
		temporally overlapping construction activities pertaining to	
		TWU_SWX_HI-GRW_ALL_ALL_moulsford gw and TWU_SWX_HI-	
		GRW_RE1_ALL_britwell roc as well as TWU_KVZ_HI-	
		TFR_UTC_ALL_thamestofobney all of which within 500m of the	
		Chilterns ANOB but require minimal above ground infrastructure.	
Historic	Conserve, protect	Each option has the potential to affect the historic environment as	No operational phase cumulative
Environment	and enhance the	a result of construction activities. However, in most cases, the	effects are anticipated for this SEA
	historic	options are spatially and temporally diverse. TWU_STR_HI-	objective.
	environment,	RSR_RE1_CNO_abingdon100(lon) and TWU_STT_HI-	
	including	IMP_STT_CNO_sttpipe500(Ion) both have the potential to affect	
	archaeology	a Scheduled Monument: Dovecote at Culham Manor, 110m	
		south west of St Paul's Church and therefore there is potential for	
		temporary cumulative effects on this receptor. There is also	
		potential for unknown buried archaeology, further study is likely	
		required to confirm the potential risk. Best practice mitigation	
		measures to be implemented during construction.	
		There is also potential for cumulative effects resulting from	
		construction of TWU_STR_HI-RSR_RE1_CNO_abingdon100(lon),	
		TWU_STT_HI-IMP_STT_CNO_sttpipe500(lon), TWU_SWX_HI-	
		TFR_STR_ALL_abing-farmoor pipe to both the historic setting of	
		the Scheduled monument: Sutton Wick settlement site and risk of	
		impact to buried archaeology if present. Best practice mitigation	
		measures to be implemented during construction.	

SEA Topic	SEA Criteria	Construction Phase Effects	Operation Phase Effects
Population and	Maintain and	Options proposed as part of this plan have the potential to affect	Abingdon reservoir could lead to
Human Health	enhance the health	health and wellbeing of local communities from reducing access	enhanced operational benefits by
	and wellbeing of	to community facilities during construction activities.	incorporating education and
	the local	The following options have potential for temporary cumulative	information resources within the
	community,	effects on National Cycle networks due to potential overlapping of	reservoir design e.g. trails,
	including	construction activities:	information boards etc. When
	economic and		combined with increased water
	social wellbeing	TWU_KGV_HI-TFR_KGV_ALL_lockwood ps-kgv res and	efficiency advice, as part of the
		TWU_LON_HI-GRW_ALL_ALL_s'fleet lic disagg	demand management option,
			especially focused on customer
		TWU_STR_HI-RSR_RE1_CNO_abingdon100(lon)	behavioural trends e.g. gardening
		TWU_SWX_HI-TFR_STR_ALL_abing-farmoor pipe	etc will result in moderate positive
			impacts during operation. There
		TWU_STT_HI-IMP_STT_CNO_sttpipe500(lon)	are unconfirmed opportunities to
		TWU_SWA_HI-TFR_SWX_ALL_swoxswa48	improve access to the natural
			environment as part of the design
		Alternative cycle routes will be provided and cycle routes will be	of options. It is anticipated that
		provided following construction.	there would be a moderate
			positive cumulative effect on this
		There is potential cumulative effects on access to community	SEA objective during the
		facilities including residential areas and religious grounds	operational phase.
		resulting from overlapping construction phase of options within	
		the BVP.	
		Best practice measures construction measures to be	
		implemented including a traffic management plan.	
		Furthermore, many of the options result in minor positive effects	
		resulting from potential contributions to the local economy during	
		the construction phase.	

SEA Topic	SEA Criteria	Construction Phase Effects	Operation Phase Effects
	Maintain and	The Thames Path National Trail is intercepted by the following	No operational phase cumulative
	enhance tourism	options with potential overlapping of construction phases:	effects are anticipated for this SEA
	and recreation	TWU_KVZ_HI-TFR_UTC_ALL_thamestofobney, TWU_SWA_HI-	objective.
		TFR_SWX_ALL_swoxswa48 and TWU_STT_HI-	
		IMP_STT_CNO_sttpipe500(lon); there is potential for temporary	
		cumulative effects during construction on the Thames Path	
		National trail, with potential for positive cumulative effects with	
		enhancement opportunities. All reasonable effort will be made to	
		avoid temporary closure of public rights of way and in the event	
		that these are required diversions will be provided instead. Public	
		rights of way will be reinstated following construction completion.	
Material Assets	Minimise resource	Extensive new infrastructure will be required for the	No operational phase cumulative
	use and waste	implementation of the options within the plan.	effects are anticipated for this SEA
	production	Material resource use is required for construction and limited	objective.
		opportunities for reuse or recycling of waste materials have been	
		identified at present, however this could be investigated further	
		during later design stages.	

SEA Topic	SEA Criteria	Construction Phase Effects	Operation Phase Effects
	Avoid negative	Many of the options cross railway lines and major roads and	No operational phase cumulative
	effects on built	therefore there is likely to be disruption to built assets and	effects are anticipated for this SEA
	assets and	infrastructure during the construction phase.	objective.
	infrastructure	One A-road is intercepted by five options within the plan with	
		potential cumulative effects resulting overlapping construction	
		phase of TWU_KVZ_HI-TFR_T2S_ALL_t2st cul to speen,	
		TWU_STR_HI-RSR_RE1_CNO_abingdon100(lon) and	
		TWU_SWX_HI-TFR_STR_ALL_abing-farmoor pipe between 2032	
		and 2040. Then, TWU_STT_HI-IMP_STT_CNO_sttpipe500(lon)	
		and IWU_SWA_HI-IFR_SWX_ALL_swoxswa48 between 2045	
		and 2050.	
		A read by every learning construction phases of TWLL STT LU	
		MP_STT_CNO_sttpipe500(lop) and TW/L_SWA_HI	
		A third A-road is intercepted by the TWU STT HI-	
		IMP_STT_CNO_sttpipe500(lon) and TWU_SWA_HL-	
		TER_SWX_ALL_swoxswa48 with over lapping construction	
		phases.	
		Best practice measures included a plan wide Traffic Management	
		Plan could be implemented to minimise disruption and whilst the	
		options are temporally diverse, this could lead to extended	
		disruption over a long period of time.	

6.3 Cumulative Effects with Other Plans, Programmes and Projects

Links to other Plans, Programmes at the Project Level

The Thames Water WRMP24 and its options have been assessed at a high strategic level. The options that form the WRMP24 (the Best Value Plan) will be subject to the formal planning process when implemented and may require an Environmental Impact Assessment under the Town and Country Planning (Environmental Impact Assessment) Regulations 2017 (as amended). Requirements for an environmental impact assessment will be determined on an option-by-option basis. As part of this process more detailed option-specific mitigation measures will be developed.

The large supply options proposed under the adaptive strategy (e.g., new reservoirs and desalination plants) may be classified as 'Nationally Significant Infrastructure' and would therefore be required to go through the Development Consent Order planning route. As mentioned previously the strategy has been identified to enable 'pre-planning' activities for these options so that they are available for delivery if they are selected in Thames Water's WRMP24.

The WRMP24 supports several local, regional, and national plans and programmes. It will have a direct link to water resources and water supply plans and policies, for example in Local Plans. The development of the WRMP has taken future population growth into account and as such will support Local Plan policies on housing and development. The WRMP will also have indirect links to plans that relate to health and well-being, housing, and the environment.

The WRMP24 will also have direct links to other Thames Water plans such as the Drought Management Plan and other water company's plans. The WRMP24 will interact with and support the Thames Water Drought Plan. The Drought Plan looks at demand-side management actions and supply-side management actions for ensuring water supply during drought conditions, set out in Section 4. Demand management options in the Drought Plan such as leakage reduction are also contained in the WRMP24 but for the Drought Plan leakage reduction works would be increased during periods of potential or actual drought. The Drought Plan also includes measures such as temporary use bans and non-essential use bans, which are similarly set out in Section 4.

Links are possible with other water company's plans and strategies, particularly where water trading and transfers cross water company boundaries, for example through the SROs. The coordination of both mitigation and monitoring activities will need to be ensured where multiple water companies are responsible for the delivery of a particular option or scheme.

Role of WRSE

The WRSE regional plans has undertaken a cumulative effects assessment, specifically covering the intra-plan cumulative effects between the regional plan schemes and inter-plan cumulative effects with other regional plans and projects. To meet legislative requirements, a cumulative inter-plan effects assessment, specific to Thames Water WRMP24, has also been undertaken, the results for which are also included within this section.

The cumulative inter-plan effects for the HRA and WFD have been presented in Appendix C and Appendix D, respectively.

6.4 Thames Water's Drought Plan

Thames Water's Drought Plan 2022 (covering the period to 2027) sets out the range of demand management and supply augmentation measures that the company may need to implement during drought conditions to maintain essential water supplies to its customers. The measures include water use restrictions (Temporary Use Bans and Drought Orders to further restrict non-essential water use) as well as Drought Permit or Drought Order options to temporarily authorise amendments to abstraction licence conditions to enable more water to be abstracted during drought from water sources.

A number of these have been assessed as part of the WRMP24 Environmental Assessments as the WRMP24 and the Drought Plan 2022 are fundamentally linked, with the measures contained in each plan acting in-combination to provide a resilient water supply to customers in the Thames Water region and safeguard the provision of essential water supplies in drought conditions.

In particular, the WRMP24 includes schemes to provide greater resilience to severe drought conditions by ensuring that, despite significant growth in demand for water, there are sufficient water supplies reliably available to sustain essential water supplies during a severe drought that may only occur on average once in every 500 years. The supply schemes are complemented by a very substantial programme of demand management measures to reduce the scale of future growth in demand.

The demand management measures in the revised draft Drought Plan 2022 will have beneficial effects on the water environment in-combination with the extensive demand management programmes included in the WRMP by reducing the pressure on water resources in periods of prolonged dry weather when river flows, and groundwater levels are well below normal. Negative effects are also identified during the implementation of the drought management measures.

In terms of geographic location, cumulative effects may occur in catchments where the drought management plans are put in place, particularly if this occurs at a time before adequate supplyside options have been introduced. Drought Plans are required to be updated every five years by water companies. The cumulative effects assessments will need to be updated over time to reflect any changes to the Drought Plans.

6.5 Neighbouring water companies' 2024 WRMPs and Drought Plans

The WRSE regional plan has undertaken a cumulative effects assessment, specifically covering the intra-plan cumulative effects between the regional plan schemes and inter-plan cumulative effects with other regional plans and projects. The results of the regional cumulative effects assessment, including effects specific to the Thames Water WRMP24, are available in the WRSE regional plan environmental report.

The WRSE regional plan assessment has highlighted the potential for in-combination effects for the construction and operational phases of a number of water company options therefore major negative effects have been identified. There is also potential for cumulative effects on aquatic ecology during the construction phases. Priority habitats, woodland and Ancient Woodland may also be impacted directly, indirectly or cumulatively. Further mitigation of these effects will be investigated as part of finalising the regional plan. The catchment management schemes within

the Best Value Plan are not specifically within the water company boundary buffers, however, they may result in positive cumulative effects as they include schemes such as river restoration, terrestrial habitat / management, and wetland creation, amongst others.

6.6 River Basin Management Plans

The WRMP24 may have cumulative effects with the Thames River Basin Management Plan (RBMP) and the Severn RBMP. The RBMPs acknowledge that, to support economic growth and development, significant or large-scale infrastructure projects will occasionally take place within the river basin district.

In accordance with the RBMPs, the WRMP24 includes measures to maintain a supply-demand balance while addressing the need to deliver sustainable abstraction from water bodies. The WRMP24 includes measures to maximise the use of existing water resources in a sustainable manner and to develop a major water reuse scheme to reduce the need for additional abstraction from freshwater resources in the Thames basin.

Overall, the SEA has concluded there may be cumulative minor adverse effects with the RBMPs due to the need to increase the overall volume of water being abstracted from the Thames and Severn basins to meet future demand growth for water. However, the WRMP24 also includes a very substantial programme of demand management activities that have been assessed in the SEA as having cumulative major beneficial effects with the Thames RBMP measures targeted at implementing and encouraging water efficiency measures.

Additionally, the WRMP24 includes commitments by Thames Water to carry out further investigations in consultation with the Environment Agency of some existing water sources to assess whether abstraction licence conditions should be modified to ensure a long-term sustainable water environment.

6.7 Local development and land use plans

The Thames Water WRMP24 cumulative inter-plan effects assessment for the SEA has considered the following list of developments located within the Thames Water operating area:

- Large existing and emerging Local Plan allocations e.g. 500 or more dwellings
- Projects on the Planning Inspectorate's Programme of Projects
- Hybrid Bills e.g. HS2 Phase One
- Transport and Works Act Orders for large-scale transport infrastructure
- Minerals and waste applications, including for landfill and energy from waste
- Major planning applications made under the Town and Country Planning Act (1990)

Table 6.3 presents those developments that have been identified within 2km of the options for the alternative plans. Given the proximity of these developments to the options selected in the alternative programmes, there is a potential that the programmes will result in a cumulative inter-plan effect. Further investigation of the identified developments is required to determine the likely spatial and temporal overlap of the construction and operation of the developments with the alternative programmes. Additional information on these developments, such as locations of proposed activities and the programme of construction and operation works, will allow further refinement of the cumulative inter-plan effects assessment, including proposals for additional mitigation where required.

Thames WRMP24 Option	Option Name	Other Development Scheme Reference	Scheme- Type	Location	Description	Best Value Plan within 2km	Potential Cumulative effects
TWU_KVZ_ River HI- Thames to TFR_UTC_ Fobney ALL_thame Transfer stofobney	River Thames to Fobney Transfer	ALL.BER.RE A1	Local Plan Allocation	STATION HILL & FRIARS WALK	Indicative potential: 380-570 dwellings, 80,000- 100,000 sq. m of offices, retail and leisure (no significant net gain assumed).	Y	The ALL.BER.REA1 plan period is up to 2036. Construction activities do not overlap with TWU_KVZ_HI- TFR_UTC_ALL_thamestofobney. Residual construction effects are not anticipated. No operational cumulative effects have been identified.
		ALL.BER.RE A2	Local Plan Allocation	Hosier Street	Indicative potential: 500-750 dwellings, 4,000- 6,000 sq m of retail and leisure.	Y	Option TWU_KVZ_HI- TFR_UTC_ALL_thamestofobney is within 1km of the allocation site. Schemes are geographically separated by an A-road.
		ALL.BER.RE A3	Local Plan Allocation	Forbury Retail Park	Indicative potential: 1,230- 1,840 dwellings, no net gain of retail.	Y	TWU_KVZ_HI-TFR_UTC_ALL_thamestofobney 1.5km from the site allocation. Schemes are geographically separated by an A-road. No likely cumulative effects identified.

Thames WRMP24 Option	Option Name	Other Development Scheme Reference	Scheme- Type	Location	Description	Best Value Plan within 2km	Potential Cumulative effects
		ALL.BER.RE A4	Local Plan Allocation	Land north of Manor Farm Road Major Opportunity Area	Redevelopment of the Manor Farm Road site will primarily be for housing (between 680- 1,020 dwellings), an extension to the Whitley District Centre, school provision and open space and public realm improvements.	Y	Option TWU_KVZ_HI- TFR_UTC_ALL_thamestofobney within 1km of option. Potential for construction activities to overlap. However no cumulative effects have been identified given the nature and location of the schemes.

Thames WRMP24 Option	Option Name	Other Development Scheme Reference	Scheme- Type	Location	Description	Best Value Plan within 2km	Potential Cumulative effects
TWU_LON _HI- ROC_NET_ CNO_ham pton- battersea	TWRM extension - Hampton to Battersea - Constructio n	ALL.LON.H& F4	Site Allocation	South Fulham Riverside Regeneration Area	4,000 indicative additional homes	Y	Potential cumulative effects with TWU_LON_HI-ROC_NET_CNO_hampton- battersea (construction period 2034- 2040). Potential for construction activities to overlap. The option pipeline is located 0.5km at its closest distance to the site allocation. Potential for cumulative negative effects to traffic. Potential for temporary adverse effects to local residential areas and community facilities from noise disturbance and access. temporary adverse effects on the setting of historic assets including grade II listed buildings. Best practice construction techniques to be implemented including screening to reduce effects of visual intrusion.

Thames WRMP24 Option	Option Name	Other Development Scheme Reference	Scheme- Type	Location	Description	Best Value Plan within 2km	Potential Cumulative effects
		ALL.LON.LA M1	Site Allocation	Land Bounded By Wandsworth Road To The West, Parry Street To The North, And Bondway And Railway Line To The East (Vauxhall Square)	578 residential units	Y	Potential cumulative effects with TWU_LON_HI-ROC_NET_CNO_hampton- battersea (construction period 2034- 2040). Potential for construction activities to overlap. 1.2km from option. Potential for cumulative negative effects to traffic. Potential for temporary adverse effects to local residential areas and community facilities from noise disturbance and access. Temporary adverse effects on the setting of historic assets including grade II listed buildings. Best practice construction techniques to be implemented including screening to reduce effects of visual intrusion.

Thames WRMP24 Option	Option Name	Other Development Scheme Reference	Scheme- Type	Location	Description	Best Value Plan within 2km	Potential Cumulative effects
		ALL.LON.WA N2	Emerging Site Allocation	Armoury Way, SW18	Development should provide a mix of residential and intensified economic uses, including cultural workspace and provision for SMEs (small to medium- sized enterprise).	Y	Option TWU_LON_HI- ROC_NET_CNO_hampton-battersea is adjacent to the emerging site allocation. Potential for overlapping construction activities. Potential for direct construction interference with one another as well as cumulative effects on local traffic, noise pollution and visual intrusion. Potential to impact A-roads and residential areas and community facilities. Best practice construction to be implemented including traffic management plan.

Thames WRMP24 Option	Option Name	Other Development Scheme Reference	Scheme- Type	Location	Description	Best Value Plan within 2km	Potential Cumulative effects
		ALL.LON.WA N3	Emerging Site Allocation	The site is located to the east of the junction of the A3205 (Nine Elms Lane / Battersea Park Road) and 'A- Road', which separates this site and 41-49 Nine Elms Lane, and 49- 59 Battersea Park Road site (NE2). It is bounded to the south	Residential-led, mixed-use development with retail and flexible workspace, a permeable network of new streets and urban spaces, and publicly accessible open space (forming part of Nine Elms Park).	Y	Option TWU_LON_HI- ROC_NET_CNO_hampton-battersea is less than 200m north of the Emerging site allocation. Potential of overlapping construction activities. Potential cumulative effects to traffic. Potential for cumulative effects of noise and visual intrusion.

Thames WRMP24 Option	Option Name	Other Development Scheme Reference	Scheme- Type	Location	Description	Best Value Plan within 2km	Potential Cumulative effects
		ALL.LON.WA N1	Emerging Site Allocation	Ram Street / Armoury Way, Wandsworth, SW18	Mixed use development including residential, replacement economic floorspace; retail, restaurants, business space, cultural, and entertainment uses with provision for a riverside walk.	Y	Option TWU_LON_HI- ROC_NET_CNO_hampton-battersea is adjacent to the emerging site allocation. Potential for overlapping construction activities. Potential for direct construction interference with one another as well as cumulative effects on local traffic, noise pollution and visual intrusion. potential to impact A-roads and residential areas and community facilities. Best practice construction to be implemented including traffic management plan.
TWU_TED_ HI- TFR_TED_ ALL_teddin gtondramo g/ted, TWU_TED_ HI- RAB_RE1_ CNO_teddi ngton dra 75	Teddington DRA 75 MLD - Constructio n	ALL.WAS.LO N4	Waste Allocation	Langhorn Drive, Twickenham, Richmond	Waste site	Y	Teddington DRA 75 MLD - located 1.2 Km from the waste allocation site. No cumulative effects are anticipated during construction phase or operation.

Thames WRMP24 Option	Option Name	Other Development Scheme Reference	Scheme- Type	Location	Description	Best Value Plan within 2km	Potential Cumulative effects
TWU_KGV _HI- TFR_KGV_ ALL_lockw ood ps-kgv res	extension from Lockwood PS to King George V Reservoir intake	ALL.WAS.LO N6	Waste Allocation	Industrial area of Eleys Estate which incorporates a number of existing waste sites and neighbours Edmonton Eco Park and Aztec A406 Industrial Estate.	Integrated resource recovery facilities/resource parks, Thermal treatment, anaerobic digestion, pyrolysis / gasification, mechanical biological treatment, Waste transfer, indoor composting, in- vessel composting, processing and recycling	Y	Option TWU_LON_HI-REU_CON_ALL_reuse lockwood_kgv adjacent to the waste allocation site. Potential for cumulative effects should construction activities overlap. Potential for temporary adverse effects to Chingford Reservoirs SSSI, disturbance to local bird populations during construction. Also potential to affect traffic on A-roads. Potential for cumulative effects to local community and facilities from visual intrusion, noise and access.
		ALL.WAS.LO N8	Waste Allocation	Industrial Estate	Thermal treatment, anaerobic digestion, pyrolysis / gasification, mechanical biological treatment, waste transfer, processing and recycling. Areas not within Source Protection Zone 1 are potentially suitable to handle hazardous waste.	Y	Option TWU_LON_HI-REU_CON_ALL_reuse lockwood_kgv adjacent to the waste allocation site. Potential for cumulative effects should construction activities overlap. Potential for temporary adverse effects to Chingford Reservoirs SSSI, disturbance to local bird populations during construction. Also potential to affect traffic. Potential for cumulative effects to local community and facilities from visual intrusion, noise and access.

Thames WRMP24 Option	Option Name	Other Development Scheme Reference	Scheme- Type	Location	Description	Best Value Plan within 2km	Potential Cumulative effects
		ALL.WAS.LO N9	Waste Allocation	To the east of the area lies the Lee Valley Regional Park. To the west, the site is bound by a railway line, with a train station to the south. Beyond the railway line are industrial and residential uses. There are allotments to the south.	Thermal treatment, anaerobic digestion, pyrolysis / gasification, mechanical biological treatment, waste transfer, processing and recycling	Υ	Option TWU_LON_HI-REU_CON_ALL_reuse lockwood_kgv adjacent to the waste allocation site. Potential for cumulative effects should construction activities overlap. Potential for temporary adverse effects to Chingford Reservoirs SSSI, disturbance to local bird populations during construction. Also potential to affect traffic on A-roads. Potential for cumulative effects to local community and facilities from visual intrusion, noise and access.
TWU_GUI_ HI- GRW_ALL_ ALL_dapdu ne lic disagg		ALL.SUR.GUI 1	Local Plan Allocation	Slyfield Area Regeneration Project, Guildford	Mixed-use development including 1,000 dwellings.	Y	License Disaggregation - no cumulative effects anticipated.
TWU_GUI_ HI- TFR_RZ5_ ALL_sewto gui	SouthEast Water to Guildford	ALL.SUR.GUI 3	Local Plan Allocation	Blackwell Farm, Hogs Back, Guildford	Mixed-use development including 1,500 dwellings.	Y	Local plan allocation lasts up until 2035. No overlap of construction activities. No cumulative residual effect anticipated and no operational cumulative operational effects anticipated.

Scheme	Location and Description	Submission Date	Status/Stage	BVP
DCO: Oxfordshire Strategic Rail Freight Interchange	Land west of the B430, east of Upper Heyford Former Airfield, and south of the village of Ardley. The proposed development consists of the construction of a rail freight terminal served via new connections to the Chiltern Railway Line.	The application is expected to be submitted to the Planning Inspectorate Q2 2023.	Pre-application	Construction: No cumulative effects anticipated. Operation: No cumulative effects anticipated.
DCO: M25 Junction 10/A3 Wisley Interchange Improvement	M25 Junction 10, near Wisley, Surrey and A3 between Cobham/Byfleet and Ripley/Ockham Improvement of the Wisley interchange to allow free-flowing movement in all directions, together with improvements to the neighbouring Painshill interchange on the A3 to improve safety and congestion across the two sites.	Granted 12/05/2022	Granted	Construction: No cumulative effects anticipated. Operation: No cumulative effects anticipated.

Table 6.4: Assessment of the BVP against major developments
Scheme	Location and Description	Submission Date	Status/Stage	BVP
DCO: River Thames Scheme	The flood channels are proposed between Egham Hythe and Chertsey and between Laleham and Weybridge. A new river channel built in two sections between Egham Hythe in Runnymede and Shepperton in Spelthorne; capacity improvements to existing river structures (including at Sunbury, Molesey and Teddington Weirs and Desborough Cut); new green open spaces; habitat creation and enhancement; active travel provision and associated development	The Applicant has not yet set a timetable for this project.	Pre-application	The DCO has potential for cumulative effects during construction with option TWU_LON_HI- ROC_NET_CNO_hampton-battersea (construction start date 2034-2040) Tunnel intersects SSSI/SAC/National Nature Reserves (NNR) Richmond Park with potential to result in loss of habitat or disturbance. Tunnel has direct impact on GWDTE and Priority Habitat, potential for impacts during construction. HRA ToLS suggests likely significant impact on Richmond Park SSI/SAC/NNR and Wimbledon Common SAC. Majority of tunnel will be underground so effects localised to areas of above ground construction. There are potential for adverse effects associated with the proximity of heritage assets during construction activities: The Hampton to Battersea pipeline route runs through both Bushy Park and Richmond Park Registered Park and Garden. Directional drilling will be used to mitigate effects on Landscape objectives; the Option is within the Inner London and Thames Valley NCAs and the London Area Greenbelt. Potential to affect visual amenity during construction. Minimal above ground infrastructure anticipated. Overlapping construction activities may have effects are not anticipated.
Hybrid Scheme: HS2	Phase 1 London to West Midlands. HS2	Examination Hearing Phase 1- 08/01/2014		Construction: No cumulative effects anticipated. Operation: No cumulative effects anticipated.
TWAO: Oxford Station Phase 2 Improvements	Oxford Station Improvement and upgrade works in and around Oxford Station.	Granted 22/06/2022	Granted	Construction: No cumulative effects anticipated. Operation: No cumulative effects anticipated.

Scheme	Location and Description	Submission Date	Status/Stage	BVP
TWAO: East West Rail Bicester to Bedford Improvements	Bicester to Bletchley and Aylesbury to Claydon Junction. Upgrade the Bicester to Bletchley and Aylesbury to Claydon Junction together with station works at Winslow, Bletchley, Aylesbury Vale Parkway, Woburn Sands and Ridgmont.	Granted 29/1/2020	Granted	Construction: No cumulative effects anticipated. Operation: No cumulative effects anticipated.
TWAO: Barking Riverside Extension	Extension of the Barking to Gospel Oak London Overground line.	Granted 15/08/2017	Granted	Barking riverside is open (July 2022) and follows existing rail infrastructure. Construction: No cumulative effects anticipated. Operation: No cumulative effects anticipated.

6.8 Strategic Resource Options – Inter-plan Cumulative effects

Strategic Resource Options Considered

South East Strategic Reservoir Option and Thames to Southern Transfer (T2ST)

South East Strategic Reservoir Option (SESRO) is a proposed new reservoir to be located between Abingdon, Steventon and East Hanney in Oxfordshire covering an area of up to approximately 7km². It is currently scheduled to have an earliest operational date of 2038. SESRO is composed by three sub-options:

- Reservoir Abingdon 100 (Lon) Construction (ID: TWU_STR_HI-RSR_RE1_CNO_abingdon100(lon))
- Abingdon WTW Ph1 Construction (ID: TWU_SWX_HI-ROC_WT1_CNO_abingdon wtw ph1)
- Abingdon WTW Enhanced (ID: TWU_SWX_HI-ROC_WT2_ALL_abingdon wtw ph2)

T2ST Culham to Speen transfer Option (TWU_KVZ_HI-TFR_T2S_ALL_t2st cul to speen) as well as the three SESRO options above have been included in the intra-plan cumulative effects assessments. If constructed, the T2ST SRO will transfer water from the new SESRO site to the existing Yew Hill Winter Storage Reservoir. There is the potential for cumulative construction effects if the schemes T2ST and SESRO are constructed together, effects would arise from construction traffic, noise, dust and visual intrusion. Potential receptors include; Frilford Heath, Ponds & Fens SSSI, Cothill Fen SSSI, Barrow Farm Fen SSSI, A-roads and Drayton residential areas.

Severn to Thames Transfer

Severn to Thames Transfer (STT) is a proposed new water transfer pipeline which enables the transfer of raw water from the River Severn to the River Thames. It is currently scheduled to have an earliest operational date of 2033. If constructed, the T2ST SRO will connect to the STT system and transfer water to the existing Yew Hill WSR. There is the potential for cumulative construction effects if the schemes are constructed together, effects would arise from construction traffic, noise, dust and visual intrusion. Potential receptors include; Abingdon AQMA, Marcham AQMA, Barrow Farm Fen SSSI, and Frilford Heath, Ponds and Fens SSSI.

Cumulative effects on WFD Water bodies

The Inter-plan cumulative effects assessment identified two water bodies which are impacted by more than one BVP option and one or more planning project. These waterbodies are: GB106039030331: Thames Wallingford to Caversham, GB106039030334: Thames (Evenlode to Thame). Further information on the planning projects would be required to quantify the cumulative effects on these water bodies. STT will involve the transfer of water. SESRO will involve the construction of a new culvert, watercourse realignment and transfer of water. River Thames to Fobney Transfer will involve dewatering, installation of a new pipeline and intake structure and new surface water abstraction. This option has the potential to reduce flow and velocity as well increase physical modification (mitigation measures assessment). Moulsford 1 will involve installation of a new pipeline and new abstraction borehole and increased groundwater abstraction. This could lead to reduce groundwater levels and could lead to a reduction in flow. Woods Farm Increase DO will involve a new abstraction boreholes and increased groundwater abstraction. This could lead to reduced groundwater levels and could lead to a reduction in flow. Potential cumulative effects on the WFD water body: GB106039030334: Thames (Evenlode to Thame). SESRO will involve the construction of a new culvert, watercourse realignment and transfer of water. T2ST will involve a new surface water abstraction. STT will involve a transfer of water. SWOX to SWA (Abingdon WTW to Long Crendon to supply SWA) will involve the construction of a new pipeline. Abingdon to Farmoor Reservoir Pipeline will involve a transfer of water, new intake structure, new discharge from WTW and additional abstraction maybe required. This could lead to reduction of flow and velocity.

Thames to Affinity Transfer

The source of water for the Beckton Reuse Indirect Option is the River Lee. However, the natural flow in the river is insufficient and so operation of the scheme would be dependent on recycled water being fed into the river from the London Effluent Reuse SRO.

During construction of the Beckton Reuse Indirect Option, there is a risk of construction related impacts on the aquatic communities associated with the river (Lea Navigation Enfield Lock to Tottenham Locks). The construction related impacts include localised impacts on water quality due to increased sediment loads and/or pollution incidents. Temporary disturbance of fish communities (including migratory species such as European eel) could also occur. Overall, the aquatic communities associated with the construction activities are considered to be tolerant and impacts are considered temporary and reversible. Any impacts on the aquatic communities are therefore expected to be short-term with, no or negligible change in aquatic ecological community receptors expected. Cumulative effects of Thames to Affinity Transfer (T2AT) with the London Effluent Reuse SRO are therefore unlikely during construction.

The operational impacts on the River Lee have been assessed as part of the London Effluent Reuse SRO. The operation of the Beckton Reuse Indirect Option, therefore, assumes that sufficient water would be available for the abstraction and that impacts on the aquatic communities are considered negligible. During maintenance of any infrastructure, impacts are likely to be negligible. Cumulative effects with the London Effluent Reuse SRO are therefore unlikely during operation.

7 Summary of the Other Environmental Assessments

This Section focuses on the likely outcomes of the other environmental assessments undertaken. It sets out the effects identified, providing a brief summary for each assessment. For full assessment outputs please see:

- Habitats Regulations Assessments Appendix C
- Water Framework Directive Assessments Appendix D
- Natural Capital and Biodiversity Net Gain Assessments Appendix AA
- Invasive Non-Native Species Assessment Appendix BB

7.1 Habitats Regulations Assessment

Sixteen options required a HRA Stage 2 Appropriate Assessment (AA) after Likely Significant Effect (LSE) were identified during the respective Stage 1 screenings. Following further review, a further five options were scoped-out of Stage 2 AA as no pathways were identified during the screening review.

All the 16 Best Value Plan (BVP) Options evaluated in the HRA Stage 2 AA are unlikely to result in adverse effects on the integrity of the Designated Sites (alone) after mitigation has been implemented. However, two options requested further studies to evaluate the use of functionally linked habitat by qualifying species to assess potential adverse effects in more detail and determine more targeted mitigation measures:

- South East Water to Guildford Option Further investigation on the use of functionally linked habitat by qualifying features within Thames Basin Heaths SPA and Thursley, Ash, Pirbright and Chobham SAC is requested to minimize uncertainty.
- Four Options composing STT SRO Further investigation to reduce uncertainty with regards to the current condition of some of the features of the Severn Estuary SAC, as well as the use of functionally linked habitat by the Severn Estuary SPA and Ramsar are required. Fish surveys were also recommended to determine the use of functionally linked habitat and habitat suitability for migratory species and lampreys.

7.2 Water Framework Directive Assessment

For the Thames Water, Water Resources Management Plan (WRMP24) BVP, 37 options were selected that were scoped in for WFD assessment. Of these, 11 options form part of SRO projects and three are considered under drought plans. The Level 1 WFD assessments indicated that 14 options are anticipated to have very low risks of being non-compliant with WFD objectives, and do not require further assessment. Further, the post-2050 options were not taken forward for Level 2 assessment for reasons as outlined in Section 4.9.

Therefore, WFD Level 2 assessments have been completed for the remaining 22 BVP options. Eleven of these were carried out under the relevant SRO projects and the findings are summarised in this report.

The majority of the options assessed as part of the BVP have only been subject to high level design and if they are taken forward would require additional design and assessment as they progress to next stage of optioneering. Due to this, the confidence in the option design has been rated as low throughout all of the Level 2 assessments undertaken. For the SRO options, WFD assessments have been undertaken using the Gate 2 designs and therefore design is assessed as medium confidence.

The findings indicate that there are precautionary WFD compliance risks associated primarily with the operation of additional/new abstractions and new or ceased discharges (see Appendix D: WFD Assessment The potential hydrological effects of these activities, among several other varying impacts, could conflict with achieving WFD status objectives. This is particularly the case where hydrology/river flow is an existing limiting factor, recorded in WFD baseline data as a 'reason for not achieving good'. The potential biological effects, particularly on fish, and physio-chemical changes (for example, reduced dilution as a result of a new or increased abstraction) would require further assessment to improve certainty of the scale of effects.

For groundwater bodies deterioration risks were primarily associated with changes to quantitative surface water dependent status elements or Groundwater Dependant Terrestrial Ecosystem (GWDTE) dependent status elements, as a result of new or increased groundwater abstractions, or construction of below ground works.

For new or modified intakes, it is recognised that appropriate fish and eel screening would be required to prevent entrainment. At this stage, this has been considered as likely mitigation, but moderate/amber risks have been maintained until option designs and assessments are further progressed. The same conservative approach has been taken with other likely mitigation such as using trenchless methods to cross watercourses where feasible or discharging dewatered water into a watercourse to maintain flow.

7.3 Natural Capital and Biodiversity Net Gain Assessment

The NCA, BNG and ecosystem services outputs of the BVP identified the following:

NCA: The BVP options will cause the temporary and permanent loss of natural capital stocks. The BVP is likely to cause the permanent loss of ancient woodland and orchards and top fruit stocks, which are considered irreplaceable habitats. Thames Water should seek to avoid this by diverting routes where possible to avoid these high-value natural capital stocks. The assessment has been undertaken on a precautionary basis and where these high-value stocks cannot be avoided, suitable compensation strategies would be developed by Thames Water in collaboration with stakeholders, such as non-governmental organisations (NGOs) and landowners .

Ecosystem services: The plan presents opportunities to improve the existing habitats along the route through post construction remediation and the replacement of low value habitats with higher value habitats. The potential permanent loss of ancient woodland, orchards and top fruit, active flood plain, rivers, arable and pastoral habitat could result in the permanent loss of several ecosystem services that the stock provides in synergy, including carbon sequestration, natural hazard management, air pollution removal, and food production. The potential permanent loss of arable and pastoral stock could result in the permanent loss of food production. The BVP shows a positive impact on recreation & amenity value ecosystem services, with the provision of services associated with the Abingdon reservoir (SESRO) and in the surrounding areas.

BNG: The plan is likely to result in a loss of BNG habitat units due to the permanent loss of natural capital assets during construction. Mitigation and enhancement opportunities for the scheme have been suggested, which can work to improve BNG and introduce environmental

net gain. Alternatively, credits can be bought by developers as a last resort when on site and local off-site provision of habitat cannot deliver the BNG required. Thames Water's BVP would require the purchase of 1819.28 units³. The price of biodiversity credits will be set higher than prices for equivalent biodiversity gain on the market. Thames Water would develop BNG and environmental net gain strategies, working in collaboration with stakeholders such as landowners and NGOs to identify opportunities, favouring solutions with wider range of environmental benefits to deliver environmental net gain.

7.4 Invasive Non-Native Species Assessment

The Environment Agency's SRO Aquatic INNS Risk Assessment Tool (SAI-RAT) was used to assess the BVP options. Nine WRMP options are SROs and therefore are required to have a more detailed Level 2 assessment; a Level 1 screening was therefore not undertaken for these options.

Four options were given a risk rating of 'No additional risk'. Nineteen options were given a risk rating of 'Very Low' and therefore did not require a Level 2 assessment. The Abingdon to Farmoor pipeline option scored a risk magnitude of High and therefore was progressed to a Level 2 INNS risk assessment. The River Thames to Fobney transfer option scored a risk magnitude of Low and therefore was progressed to a Level 2 INNS risk assessment.

The following conclusions have been drawn from the results of the Level 2 detailed assessment:

- Overall risk scores of the assessed options, as assessed using SAI-RAT, are as follows:
 - The Abingdon to Farmoor pipeline option was given a result of Medium risk (risk score 41.63%).
 - The River Thames to Fobney option was given a result of Medium risk (risk score 35.60%).
- The greatest risks associated with the two non-SRO options progressed to level 2 is the transfer of raw water between currently unconnected locations which could create a new pathway for INNS to be transferred and introduced, including risks associated with pipe bursts.

These assessments reflect operational risks of INNS transfer only. It is acknowledged that construction-phase work may also result in INNS being transferred. The SAI-RAT tool does not account for construction-phase risks; however, Thames Water will assess such risks at a later stage in option design and mitigated through best practice, such that residual risks are negligible.

These assessments were subject to the information available at the time; however, it is likely that as options are developed, more relevant information will be available to inform assessments. It is therefore recommended that for options which are progressed, the SAI-RAT tool is used to update INNS assessments as further design information becomes available. Operational INNS risks may be mitigated through design or biosecurity measures. With respect to biosecurity measures, these were not known at the time of assessment and their impact on residual operational INNS risk may not be fully accounted for by the SAI-RAT tool; however, an

³ BNG purchase units correspond to the number of units required to offset losses resulting from the implementation of options and the units required for 10% net gain across the BVP.

evaluation of potential biosecurity measures will be undertaken as options are progressed and the WRMP is finalised.

The INNS Report (Appendix BB) summarises the SRO INNS Risk, however it is noted that further assessments will be undertaken for the SROs as part of the RAPID Gated Process.

8 Mitigation Measures and Enhancement Opportunities

8.1 Mitigation Measures

Mitigation measures have been suggested as part of the SEA options assessment process. These measures have also been collated and presented in Table 8.1. Where possible mitigation measures have been incorporated into the options development process. This has included pipeline re-routing and directional drilling to avoid significant effects on designated sites and heritage assets. Incorporation of these measures at this early strategic stage will help deliver a Water Resources Management Plan (WRMP) that benefits the environment and reduces the risk of significant negative effects and cost-prohibitive mitigation measures further down the line during detailed design of specific options. Thames Water is committed to delivering all mitigation measures identified by the SEA and Habitat Regulation Assessment (HRA), and the outcomes of this initial environmental assessment work will help inform the option-level assessments required during later design stages. Further investigation of available mitigation measures to minimise the impacts identified across the reports will be undertaken as part of preparing the final WRMP24.

Table 8.1 provides a summary of mitigation measures over and above the application of standard good practice or best construction practices. The bullet point list below outlines which construction best practice measures are considered across all options. The purpose of these is to minimise the effects of construction activity on people, recreation, and the environment:

- General: A Construction Environmental Management Plan (CEMP) will be produced for each development, detailing the general and specific mitigation measures required to avoid and/or minimise impacts. The CEMP will detail the control measures, thresholds, and necessary feedback mechanisms.
- General: construction compounds will be located to avoid the need for the removal of trees, hedgerows, or other important vegetation, where possible.
- Air: best practice construction methods for dust suppression, and measures to reduce construction related transport emissions and emissions from plant machinery. Measures to be outlined in a CEMP such as bulk deliveries, transport by rail if feasible, turning off idling equipment and engines, using alternatives to diesel generators.
- Biodiversity: during construction, appropriate biosecurity mitigation measures will be put in place to avoid the spread of any INNS that may be present in the construction areas. Invasive species on site are to be identified and removed or treated in advance of construction works, in line with national INNS protocols and guidance. Tunnel commissioning will be undertaken with treated water.
- Biodiversity: habitat and protected species surveys will be undertaken for each development to determine whether further site and species/habitat specific mitigation measures are required.
- Biodiversity: where trees need removal, or works are in proximity, an Arboricultural Implications Assessment will be completed to minimise impacts and identify root protection zones that should be observed.
- Health and wellbeing: trenchless pipeline construction techniques will be used where appropriate to mitigate impacts on health and wellbeing.
- Health and wellbeing: operational noise impacts should be effectively mitigated using noise insulation and enclosing such plant within buildings as part of their design.
- Recreation and access: during construction all, reasonable effort will be made to avoid temporary closure of public rights of way and if these are required diversions will be provided instead. Public rights of way will be reinstated following construction

completion. Careful siting and use of screening where work locations are in proximity to public rights of way will be undertaken.

- Soils: reinstatement of land to the same or better-quality following pipeline construction.
- Material assets: excavated material will be reused on site.
- Archaeology: archaeological desk-based studies, written schemes of investigation and watching briefs will be required where options are near heritage sites or where there is the potential for archaeological finds to be uncovered as part of excavation works.
- Water: potential construction impacts on surface and groundwater quality will be minimised using pipejacking, and any chemical /oil storage will be fully bunded to prevent accidental pollution.
- Water: drainage water from operational sites will be disposed of appropriately to avoid pollution (e.g., road drainage).
- Water: adherence to Environment Agency Pollution Prevention Guidelines (although now formally withdrawn they are a useful source of information).

SEA Topic	Proposed Mitigation
Biodiversity, flora, and fauna	Best practice methods are to be implemented during construction to minimise disturbance effects, prevent the spread of INNS, and habitat loss. This includes refining pipeline alignment or using trenchless techniques to avoid woodland habitat, particularly Ancient Woodland and Biodiversity Action Plan (BAP) Priority Habitat. To ensure that the operation does not lead to a transfer of invasive species, appropriate filtration species must be in place. Treatment at the upgraded Water Treatment Works (WTW) would prevent any non-native species being transferred further. However, there still may be residual risk. Pollution prevention measures are to be implemented, including the use of directional drilling or other trenchless techniques where the pipeline crosses watercourses. In the short-term there is potential for effects. With mitigation, no effects are predicted as a result of construction. Route re-alignment is recommended if it is possible to avoid direct impacts with the Sites of Special Scientific Interest (SSSI), Ramsar, Special Area of Conservation (SAC), Special Protection Area (SPA) and Marine Protected Areas (MPA), or to avoid the most high-value habitats. Abstraction from rivers will be taken at appropriate times to mitigate against effects on water-dependent designated sites. Ecology surveys will be required at further design stages to determine the effects and mitigation that will be required at the secured that the
	the effects and mitigation that will be required. It is assumed that the recommended mitigation will be implemented, therefore residual operational effects will be lessened, although this would not negate the need for a potential appropriate assessment. Habitat will be reinstated upon completion, and compensatory habitat is to be considered to replace damaged or lost habitat.

Table 8-1 : Proposed Mitigation Measures

SEA Topic	Proposed Mitigation	
	A new reservoir has significant opportunities for benefits to ecology. Operational residual impacts are also lessened assuming the implementation of this adequate mitigation.	
Population and Human Health	Best practice construction techniques are to be implemented to prevent the disturbance of contaminated material.	
	Damage to agricultural land will be lessened through design, to reduce the option footprint and the construction working area. This will restrict the amount of land permanently taken or temporarily disturbed. The ground will be reinstated, meaning that long-term residual effects on agricultural soils because of pipeline construction are unlikely. The new reservoir, pumping stations, desalination plant, and effluent reuse plant will all result in a permanent loss and subsequently residual effects are identified.	
	Permanent loss should be on non-BMV (best and most versatile) land where possible, and only on BMV land where there are no other alternatives. The reinstatement or reprovision of land will be required post-construction.	
Water	Best practice measures will be implemented to reduce the impact on flooding during the construction phase, however the risk remains during construction, meaning short-term flood risk effects may remain. An Flood Risk Assessment (FRA) is to be undertaken and above-ground infrastructure will be designed to be flood resilient. Floodplain compensation may be required. Pollution prevention measures are to be implemented, including the use of directional drilling or other trenchless techniques where the pipeline crosses watercourses. With mitigation, residual construction effects are considered negligible. Operational impacts will remain on river flow from abstraction and potential transfer of INNS, but residual impacts are lessened assuming implementation of adequate mitigation. The monitoring of river flows is required to determine when surface water can be abstracted. Groundwater levels will also be monitored to minimise the effect of them. Further assessment of the effects under the WFD would be required for those waterbodies detrimentally affected. If there is a likelihood of deterioration to, or prevention of future improvement to the ecological	
	status of the waterbodies, evidence would be required to demonstrate that there are no reasonable alternative options that would avoid these effects. If no alternative options are available, consideration would need to be given to the presence of reasons of overriding public interest, and mitigation measures would need to be secured.	
Soil	Best practice mitigation measures are to be implemented during construction; however short-term air quality effects may remain.	

SEA Topic	Proposed Mitigation
Air	The use of renewables for the energy supply during construction and operation will be investigated, as well as the use of materials with lower embodied carbon. A carbon footprint study could help identify areas for carbon savings or alternative materials. As the electricity grid is decarbonised, greener energy will become available. Although carbon emissions could be reduced through mitigation, negative effects in the short and medium-term will likely remain. The sustainable use of water should be ensured to reduce the vulnerability of the local environment.
Climatic Factors	Best practice measures are to be implemented to minimise effects during construction, although temporary effects during construction may remain.
	Land affected by transfer pipelines will be reinstated upon completion, meaning that, with appropriate mitigation, no residual effects are likely to remain during operation.
	Measures will be incorporated to reduce landscape and visual impact of the reservoir and embankment, for example the planting of trees to screen and reduce the height of any embankment. However, although design features will likely improve the aesthetics, the landscape will remain changed.
	If possible, re-routing the pipeline would minimise the damage and disruption to woodland, including Ancient Woodland. The utilisation of directional drilling or other trenchless techniques would reduce construction effects.
Historic Environment	Best practice measures are to be implemented to minimise setting effects for other heritage assets during construction.
	Measures will be incorporated to reduce setting impact of the reservoir and embankment, for example the planting of trees to screen and reduce the height of any embankment. However, although design features will likely reduce the setting impact, there may be residual effects.
	The preferred mitigation for the Registered Park and Garden (RPG) and conservation area is to re-route the pipeline; however, if this is not possible then careful construction and reinstatement to its original condition with no detrimental effect on the character, appearance, or design of the RPG or conservation area should be implemented.
	Further work is likely to be required to determine the significance of effect, depending on the presence or absence of buried archaeology. Residual effects may remain due to the potential loss of archaeological remains.

SEA Topic	Proposed Mitigation
Landscape	Best practice mitigation measures, for example noise management, are to be implemented to minimise disturbance during construction. However, temporary effects are likely to still occur during construction.
	There could be potential to enhance the cycleways as part of the works, for example during re-instatement.
	Operational benefits could be enhanced by incorporating education and information resources within the reservoir design, for example in trails and information boards. They could also be enhanced by incorporating recreational activities into the reservoir design, such as fishing, sailing, and canoeing
	The direct land take of recreational sites will be avoided where possible, and land is to be reinstated. However, temporary effects are likely to still occur during construction.
Material Assets	Opportunities will be sought after to implement sustainable design measures (design to reduce footprint, selection of materials) and reuse excavated material to reduce the impact. However, it is likely that negative effects will remain.
	Best practice measures, including a Traffic Management Plan, are to be implemented to minimise disturbance during construction. However, temporary effects are likely to still occur.

8.2 Enhancement Opportunities

The SEA identified numerous enhancement measures across the option assessments, these included:

- Enhance public rights of way networks.
- Incorporate education and information resources in option design to enhance operational benefits.
- Enhance the reservoirs through incorporating recreational activities into the design process.
- Development of tourism and recreational assets on site, this also has potential to add economic value to the area.
- Opportunities to create new habitats alongside the reservoir.
- Opportunities to improve existing habitats during post-construction remediation. Options are suitable for planting high value habitats.
- Opportunities to use sustainable materials and implement sustainable design measures.

A number of BNG enhancement opportunities have been identified through the option appraisal process, Table 8.2 outlines those identified

Table 8-2 : Summary of potential enhancement opportunities

Option element	Enhancement opportunity
All option elements	Creation of higher value habitat within grassland, arable and pasture natural capital assets onsite to achieve an increase in Biodiversity Units (BU) and work towards a 10% uplift in BNG.
	 Habitat creation work within the adjacent priority habitats. Options fall within or are in the vicinity of habitat network zones: Habitat restoration-creation Restorable habitat Fragmentation action zone Network enhancement zones 1 and 2 Expansion zone These areas identify specific locations for a range of actions to help improve the ecological resilience for each of the habitat / habitat networks. The options should look to identify habitat network zones and priority habitats within the near vicinity and look to improve / create / restore habitats which would help to work towards increasing BU and work towards a 10% uplift in
	BNG. Increase the quality / quantity of freshwater assets, including lakes, ponds located in designated SSSIs, pending detailed
	Options to identify suitable areas off-site for the creation, enhancement and/or restoration in order to develop off-site net gains, working towards achieving a 10% uplift in BNG.
Option elements located along the canals	Identify areas of local peatland restoration. Possibly create man-made floating wetland islands, enabling plants and microbes to form and attract wildlife both above and below the water's surface and create biochemical and physical processes to improve things such as water quality.
Wastewater treatment works, abstraction and treatment works, and other option elements that contain above ground infrastructure	Seeding of grassland within footprints of the above ground infrastructure, where possible.

Furthermore, regarding BNG, it can be achieved via a new statutory biodiversity credits scheme. Credits can be bought by developers as a last resort when on site and local off-site provision of habitat cannot deliver the BNG required. The price of biodiversity credits will be set higher than prices for equivalent biodiversity gain on the market and are expected to be purchased through a national register for net gain delivery sites. Natural England is in the process of running pilot schemes to provide a practical insight into the implications of the scheme, which is expected to go live spring 2023.

Habitat creation possibilities, other than unit purchase, to support achieving a 10% BNG gain include:

- On site: Improve the existing habitats on site through post construction remediation and replacement of low BNG value habitats with higher BNG value habitats
- Off-site: Purchase suitable areas of off-site land within the local area and/or at a regional scale to offset BNG decrease by improving the existing habitats within the off-site land and/or by replacing existing habitats with higher BNG value habitats.
- On site and off-site: Improve existing habitats and/or replacement of low BNG value habitats with higher BNG value habitats as part of the catchment management options considered as part of the regional plan process.

It is important that, where possible, the BVP starts to consider reaching out to local NGOs and planning authorities who may potentially be able to carry out BNG both onsite and off-site. Early engagement may help provide further insight on local opportunities for enhancement, how this can be achieved, local priorities and limiting factors. It should be noted that the delivery of offsite BNG will required further work and collaboration with local landowners, tenants and operators, amongst others, to ensure their long-term success.

BNG and environmental net gain strategies will likely be developed in the future. The requirements of these will be built into option design as each is progressed through the design and planning process in the future. It is acknowledged that enhancements not captured by BNG, such as the river and hedgerow metrics, will require further work and will need to be considered appropriately.

8.3 Further Investigation

Further investigation is required where the SEA and associated environmental assessments have identified the potential for significant effects. For example, where the WFD has determined that waterbodies may be detrimentally affected, further evidence would be required to demonstrate that there are no reasonable alternative options that would avoid these effects. If no alternative options are available, consideration would need to be given to the presence of reasons of overriding public interest, and mitigation measures would need to be secured.

9 Monitoring Proposals

Monitoring the negative effects of implementing the WRMP is an essential ongoing element of the SEA process. Monitoring helps ensure that the identified SEA objectives are being achieved and allows for early identification of unforeseen adverse effects and thus appropriate remedial action can be taken. Monitoring will be an important requirement to measure performance and ensure the WRMP is being successfully implemented.

The SEA Regulations expect that monitoring should focus on the significant negative effects identified through the assessment. The UK Water Industry Research (UKWIR) guidance recommends that existing arrangements for monitoring should be used where possible to avoid duplication of effort.

Negative effects or uncertainty identified during the SEA process focused on effects on ecology, carbon emissions, landscape, and the historic environment. Table 9.1 presents the SEA monitoring proposals for the WRMP, to be carried out by Thames Water. The monitoring proposals put forward as part of WRMP19 have been reviewed and carried through into WRMP24 where relevant for continuity. Additional indicators have been included where new risks have been identified as part of WRMP24 and the indicators have been adapted to those developed as part of the SEA Framework in Table 4.1. Indicators have also been chosen to record the potential benefits that the WRMP achieves, for example recreational assets created or waste recycled/reused.

SEA Objective	Indicator	Timescale
Protect and enhance biodiversity, priority species, vulnerable habitats and habitat connectivity (no loss	Condition of statutory and non-statutory ecological sites. Sites of Special Scientific Interest (SSSI) monitoring.	Every five years
where possible).	Area of blue and green infrastructure created % of habitat creation or existing habitat enhancement.	Every five years
	% of Invasive and Non-Native Species (INNS) risks mitigated.	During construction
	Ecological status of water bodies.	Annually
To protect and enhance the functionality and quality of soils, including the protection of high-grade agricultural land, and geodiversity.	Area of agricultural land (by grade) lost to and restored by WRMP options.	Every five years
Increase resilience and reduce flood risk.	% of flood risks noted in Flood Risk Assessment (FRA) for projects mitigated.	During construction

Table 9-1 : Monitoring proposals

SEA Objective	Indicator	Timescale
Protect and enhance the quality of the water environment and water resources.	Chemical status of water bodies. Changes in WFD condition status (both positive and negative) of surface and groundwater bodies.	Annually
	Number of geological sites affected Groundwater quality testing.	Annually
	Achievements against WFD objectives.	Annually
Deliver reliable and resilient water supplies.	Number of supply disruptions per annum	Annually
	% of people with supply demand deficits for each WRMP.	Annually
To reduce and minimise air emissions during construction and operation.	Local air quality monitoring.	During construction
To minimise/reduce embodied and operational carbon emissions.	Reduction of greenhouse gas emissions per MI/d. Energy use from new operations and change in energy use per MI/d. % Energy supplied by renewable sources. Reduction of operational and capital carbon emissions. Number of options that utilise existing infrastructure. Volume of waste generated. Waste disposal method by %.	Annually
Reduce vulnerability to climate change risks and hazards.	% of climate risks mitigated.	Every five years
To conserve, protect and enhance landscape and townscape character and visual amenity.	Number of WRMP options including additional landscaping. Changes to baseline, construction and operational landscape conditions of sensitive landscapes (and townscapes where applicable).	Every five years
Conserve, protect and enhance the historic environment, including archaeology.	Condition of historic assets, including heritage at risk. Number of historic assets enhanced by options. Condition of buried archaeology monitored through Watching Briefs, where required, during the construction phase.	Every five years

SEA Objective	Indicator	Timescale
To maintain and enhance the health and wellbeing of the local community, including economic and social wellbeing.	Number of complaints and customer satisfactory through surveys and reporting through Thames Water's annual performance processes. Level of disruption due to construction and operational works (where relevant) through environmental management plans, such as the CEMP.	During construction and operational phases
	Number of Public Rights of Way (PRoW) closures or diversions. Number, type, and area of community assets created. Km of new footpath/cycleway created.	During construction phases Every five years
Maintain and enhance tourism and recreation.	Number of tourism assets created. Surveys of recreational and other amenities likely to be affected (both positive and negatively), including assessment of the success of agreed mitigation measures.	Every five years
Minimise resource use and waste production.	% of A-Rated, recycled, reused material used in infrastructure options. Number of options that utilise existing infrastructure. Volume of waste generated. Waste disposal method by %.	Annually
Avoid negative effects on built assets and infrastructure.	Number of complaints. Number of road closures or diversions.	During construction

10 Consultation and Next Steps

10.1 Environmental Report Consultation

This Environmental Report is published alongside the draft Water Resources Management Plan (WRMP) for public consultation. The public consultation will be open for 14 weeks from Autumn 2022 into the early part of 2023.

10.2 Next Steps

Following consultation, responses will be reviewed, and the Environmental Report updated as appropriate. A log of consultation comments will be provided as an annex in the updated Environmental Report, which will accompany Thames Water's Final WRMP24.

Thames Water will work closely with WRSE as part of an iterative process where any updates from the WRMP24 consultation process (or if any other updates are required) will be fed back into the WRSE model. WRSE will then feed these back to Thames Water to be included within reporting.

Following adoption of Thames Water WRMP24, a Post-Adoption statement will be produced which outlines how the SEA process has influenced the development of the WRMP24, how consultation comments were taken into consideration and how the WRMP24 will be monitored. This summary will provide enough information to make it clear how the Thames Water WRMP24 was influenced by the SEA process and consultation.

Stage E 'Monitoring implementation of the plan' of the SEA process will be carried out by Thames Water. It is likely that monitoring of the Thames Water WRMP24 will be incorporated with the annual monitoring process.

Annexes

- A. SEA Process Tasks
- B. Scoping Report Consultation Log
- C. Policies, Plans and Programmes Review
- D. Baseline Review and Baseline Maps
- D.1 Introduction
- D.2 Baseline information
- D.3 Baseline Maps
- E. Assessment Scoring Criteria
- F. SEA Option Assessments (Options New to WRMP24)
- G. SEA Options Assessments (WRMP19 Options)
- H. WRMP19 Mitigation Register

Annex A: SEA Process Tasks

Table A.1: Description of SEA Stages and TasksSEA StageSEA TaskTable A.1: Description of SEA Stage

SEA Stage	SEA Task	Task Purpose
Stage A Setting the context and objectives, establishing the baseline and deciding on the scope	A1: Identifying other relevant plans, programmes, and environmental protection objectives A2: Collecting baseline information	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 to identify SEA objectives To provide an evidence base for environmental problems, prediction of effects, and monitoring; to help in the development of SEA objectives
	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
	A4: Developing SEA objectives	To provide a means by which the environmental performance of the plan or programme and alternatives can be assessed
	A5: Consulting on the scope of SEA	To ensure that the SEA covers the likely significant environmental effects of the plan or programme. This is a statutory five-week consultation period, as a minimum)
Stage B Developing and refining alternatives and assessing effects	B1: Testing the plan or programme objectives against the SEA objectivesB2: Developing strategic alternatives	To identify potential synergies or inconsistencies between the objectives of the plan or programme and the SEA objectives and help in developing alternatives To develop and refine strategic alternatives
	B3: Predicting the effects of the draft plan or programme, including alternatives	To predict the significant environmental effects of the plan or programme and alternatives
	B4: Evaluating the effects of the draft 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
	B5: Considering ways of mitigating adverse effects	To ensure that adverse effects are identified and potential mitigation measures are considered

	B6: Proposing measures to monitor the environmental effects of plan or programme implementation	To details the means by which the environmental performance for the plan or programme can be assessed
Stage C Preparing the Environmental Report	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	D1: Consulting on the draft plan or programme and 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. There is no set time period for consultation. The SEA Directive states that the Consultation Bodies and the public 'shall be given an early and effective opportunity within appropriate time frames to express their opinion on the draft plan or programme and the accompanying environmental report before the adoption of the plan or programme or its submission to the legislative procedure'. The Environmental Report will be consulted upon alongside the draft WRMP To gather more information through the opinions and concerns of the public
	D2: Assessing significant changes D3: Decision making and	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 To provide information on how the
	providing information	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 implementatio	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
n of the plans or programme	E2: Responding to adverse effects	To prepare for appropriate responses where adverse effects are identified

Annex B: Scoping Report Consultation Log

Please see WRSE Draft Regional Plan Scoping Consultation Log – Outlined in Table B.1

Table B.1 : WRSE Scoping Consultation Log

Ref	Organisation	Topic / Report	Feedback	Response
1	Natural England	Overarching advice	There is much in the Strategic Environmental Assessment (SEA) scoping report that is good and Natural England welcomes WRSE commitment to environmental assessment	Noted. No action required.
2	Natural England	Overarching advice	The Habitats Regulations Assessment (HRA) methodology in Appendix F does not appear to have fully had regards to advice contained within Natural England's response to the draft Environmental Assessment Methodology Guidance sent on the 20th July 2020. In particular the reference and language used with regards to assessment of plans and programme impacts sites protected under Conservation of Habitats and Species Regulations 2017 (as amended) is not consistent with the HRA tests or relevant Government guidance and therefore should be amended (see Annex IA for further details).	Noted. The HRA methodology will be amended to comply up with Natural England's response to the draft Environmental Assessment Methodology Guidance sent on the 20th July 2020.
3	Natural England	Overarching advice	As we previously set out there is a lack of precision in, not only the language used, but also the methodology proposed in terms of assessment of ecological impacts (as opposed to other environmental impacts) that at best renders some of the guidance unhelpful at worst could potentially lack compliance with legislation and drivers.	We feel that the inclusion of a proposal to sift options using a RAG scoring, dependent on distance to N2K sites alongside and in addition to the HRA process probably confused issues here. The RAG scoring has been removed from the assessment process, at least partly to remove this ambiguity. Beyond this, hopefully the refreshed methodology in line with the above comment will include the require precision and ensure compliance with legislation.

Ref	Organisation	Topic / Report	Feedback	Response
4	Natural England	Overarching advice	Natural England has made recommendations for amendments to the methodology (See Annex 1A and 1B for further details)	Noted. See above.
5	Natural England	Appendix F HRA - Section F1 Guidance	This section should begin by reference to Regulation 9 of the Conservation of Habitats and Species Regulations 2017 (S.I. 2017/1012) as amended (Habitats Regulations) as this requires every competent authority, in the exercise of any of its functions, to have regard to the requirements of the Habitats Directive. This requirement includes restoring favourable conservation status. Regulation 10 places a duty on a competent authority, in exercising any function, to use all reasonable endeavours to avoid any pollution or deterioration of habitats of wild birds. In addition, regulation 63 places obligations on competent authorities in respect of plans or projects likely to have a significant effect on a protected site. Note that for marine protected area that are European and Ramsar sites the legal tests are the same as terrestrial European sites. In England, as a matter of policy, sites listed or proposed under the "Ramsar Convention on Wetlands of International Importance" receive the same level of protection as European sites.	We will include reference to the described Regulations. We are aware of, and agree with, the rest of this content of this comment.
6	Natural England	Appendix F HRA - Section F1 Guidance	Reference to draft guidance is welcome but it would be more helpful to the companies for their HRAs to refer to the legislation and legislative tests (set out above) that require the Habitats Regulations Assessments to be undertaken and to refer to the relevant Government guidance. Outside of the draft the remaining guidance referred to in Appendix F is largely out-of-date and much case law has occurred since the guidance referred to in section F.1 was written. Case law has significantly influenced the applications of the Habitats Regulations to plans and projects especially with regards to the likely significant effect and appropriate assessment stages. The UK Water Industry is updating its guidance on SEA and HRA assessments to take account of the changes in legislative	We will update the methodology and documents to align with the UK Water Industry guidance on HRA as necessary.

Ref	Organisation	Topic / Report section	Feedback	Response
			interpretation and the legislation itself (i.e. Updates in 2017 and 2019).	
7	Natural England	Appendix F HRA - Section F1 Guidance	The stages of the Habitats Regulations set out in the methodology are muddled and not strictly in compliance with the guidance. The Government guidance now refers to sites covered by the provisions of the Habitats Regulations as 'habitats sites' in line with the wording in the National Planning Policy Framework. This nomenclature may be useful for WRSE going forwards as it will be necessary to replace reference to European sites after December 2020	Noted. We will refer to sites as 'habitat sites' rather than Designated Sites. All stages of the HRA will be clear and distinct, to comply with all relevant legislation.
8	Natural England	Appendix F HRA - Stage 1 Likely Significant effect test	Under this section the text states "HRA screening determines whether there will be any LSE on any European site as a result of an options implementation (either on their own or 'in combination' with other plans or projects) and, if so, whether these effects will result in any potential adverse effects on the site's integrity." Pg116 This statement combines the LSE test with the stage 2integrity test which can only be undertaken within an appropriate assessment. This is an inaccurate statement and should be replaced.	Agree - assessing for adverse effects on integrity will not be undertaken at Stage 1.

Ref	Organisation	Topic / Report	Feedback	Response
9	Natural England	Appendix F HRA - Stage 1 Likely Significant effect test	The methodology goes on to state 'Likely' Significant Effect means one that cannot be ruled out on the basis of objective information. A likely effect would be considered significant if it could undermine a site's integrity and/or the conservation objectives and/or qualifying features of that European site. Pg. 116 This is incorrect in terms of the definition of likely and significance. Tests of the site's integrity do not occur at the likely significant effect stage. Government guidance on appropriate assessments states "A significant effect should be considered likely if it cannot be excluded on the basis of objective information and it might undermine a site's conservation objectives. A risk or a possibility of such an effect is enough to warrant the need for an appropriate assessment". Natural England recommend you replace the text on Pg116 with the above information.	As above, agree. We can use the provided wording to better explain our methodology.
10	Natural England	Appendix F HRA - Stage 1 Likely Significant effect test	The methodology goes on to state that "If a conclusion of no LSE cannot be reached on the basis of high-level scheme specific information, there will be the opportunity and requirement for more detailed investigation at the appropriate assessment (Stage 2) if the option is taken forward by WRSE".Pg117. This suggests that a plan level appropriate assessment will not be undertaken of the programmes. It would be helpful if clarification that appropriate assessments will be undertaken of the WRSE options for which a likely significant effect cannot be excluded on objective evidence as appears to be the case later in the methodology	Appropriate Assessment will be undertaken at a plan level, if necessary. It is important to note that many other assessments and factors will contribute to the optioneering process that moves us from the long list of options to the short list. The short list may or may not therefore include options for which a likely significant effect cannot be excluded on objective evidence. Individual options will then be grouped into viable combinations called Programmes that, in their totality, may be a solution for providing adequate water resources across the WRSE administrative area. At

Ref	Organisation	Topic / Report section	Feedback	Response
				Appropriate Assessment stage, these Programmes will be considered as a whole, so effectively at this stage the (potential) Regional Plan is being assessed.
11	Natural England	Appendix F HRA - Zone of Influence	Whilst Natural England welcomes the concept of zones of influence, the distance criteria in Table F.1: for the zones of influence do not appear precautionary and it is unclear what evidence was used to select these distances. Since a second screening stage happens after this stage 1 screening the distances used here should be as precautionary as possible. For example, raising a large reservoir could impact a designated site kilometres downstream if it reduces the freshwater flows, for example, and yet only a 500m screening area is chosen. It is unclear how issues such as habitat severance and reduced connectivity would be screened at this initial stage. For example, a large reservoir could interrupt flight pathways of certain bat species many kilometres away from the SAC and though severance issue is covered in step 2 of the proposed WRSE methodology such impacts would already have been screened out by the stage 1-step 1 screening.	This is a confusion between the HRA process the separate sifting that was proposed, which included RAG assessment based on proximity. This was distinct from, and unrelated to, the HRA process, but because of the ambiguity it has created, has been removed from the assessment proposals.

Ref	Organisation	Topic / Report	Feedback	Response
12	Natural England	Appendix F HRA - Zone of Influence	The guidance goes on to state it should be noted that for alterations to current abstractions, only effects on European sites downstream of new abstractions are considered as potential LSE. For increases to current abstraction volume it is assumed that the increased abstraction is still within the current licence limits and therefore unlikely to result in impacts on designated sites, as they are protected by the Environment Agency's Review of Consents process. Pg. 118.Natural England has previously advised in consultation webinars that groundwater abstractions can act upstream and downstream as can abstractions on freshwater but tidal sections of rivers. In addition we have advised it is no longer safe for long term planning to rely on the Environment Agency's review of consents(RoC)for likely significant effect. RoC is a good place to begin for assessment of impact pathways to existing assets but much of the information on which it was based is 15 to 20 years old and the legislation, the caselaw, the evidence base and the climate have all changed since this assessment was undertaken.	Noted. Assessment of abstraction sites will not confine themselves to downstream effects. The EA's Review of Consents will not solely be relied on. Alterations to current abstractions will be subject to full assessment and will not assume that the RoCs are sufficient to rule out LSE.
13	Natural England	Appendix F HRA - Zone of Influence	Assessment of plans or projects must use the best available evidence, relying on a historic assessment when features continue to decline is not consistent with the precautionary principle and will make no contribution to government aspirations in the 25 Year Environment Plan (25YEP) which are the stated environmental "destination" of WRSE. Government guidance on appropriate assessments states The conservation objectives relate to each of the habitats and species for which the site was designated and will be provided in more detail by Natural England. A competent authority must consult Natural England for the purposes of the assessment and must have regard to any representations that Natural England may wish to make within a reasonable time (as specified by the competent authority). Natural England's formal advice on	Agree

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			conservation objectives is publicly available for both European terrestrial sites and European marine sites	
14	Natural England	Appendix F HRA - Zone of Influence	The methodology states "With strategy-level HRAs, uncertainty is sometimes addressed by including caveats or mitigation as an assumption to the plan (and therefore all the plan components) to ensure that significant or adverse effects will not occur. "This approach was never an acceptable approach to HRA of a plan and since you later go on to explain that mitigation cannot be taken into account at LSE stage due to recent caselaw, Natural England recommends you remove this statement.	Agree - we will remove this statement.
15	Natural England	Appendix F HRA - Zone of Influence	Stage 1.5 and the section above on uncertainty are really the early parts of the appropriate assessment and it might be more logical to put 1.5 into section 2	We will review and amend if appropriate
16	Natural England	Appendix F HRA - Stage 2 Appropriate Assessment	Stage 1.5 and 2 involve liaison with Natural England. It is essential that the timetable for this is agreed with Natural England in advance with reasonable consultation timescales. This will ensure Natural England is able to adequately resource this consultation. As set out in the Government Guidance referred to above conservation objectives are available for most 'habitats sites 'apart from the newly classified Solent and Dorset Coast SPA. As set out in the Government guidance quoted above most habitats sites also have	We will keep Natural England updated in terms of our programme, and will agree suitable times and durations for consultation.

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			supplementary advice to the conservation objectives which can help with the appropriate assessment.	
17	Natural England	Appendix F HRA - In Combination assessment	This assessment should not only consider in combination effects with other water resources options as set out, but also other options that could combine to have a likely significant effect. For example discharges affect water quality which can be exacerbated by abstraction impacts. At a high level impacts with local plans could be considered.	Agree - the in-combination effects will consider all options that could combine to have LSE, both within the water industry and wider study area.
18	Natural England	Appendix F HRA - Dealing with Uncertainty	This section states no adverse effects, then the option will not go ahead (subject to provision of over-riding public interest).Pg124This should read "no adverse effects, then the option will not go ahead unless the project can prove no alternatives and imperative reasons of over-riding public interest (IROPI) and secure necessary compensation". The test of no alternatives comes before the IROPI test in the regulations as set out in the subsequent sections of the SEA methodology text. Government guidance states "Where an adverse effect on the site's integrity cannot be ruled out, and where there are no alternative solutions, the plan or project can only proceed if there are imperative reasons of over-riding public interest and if the necessary compensatory measures can be secured"	Agree - Alternatives will be considered prior to IROPI, which itself will only be considered if the necessary compensatory measures can be secured.
19	Natural England	Appendix F HRA - Need for compensatory habitat	The final stage after IROPI consideration is compensatory habitat since the 'no alternatives 'and IROPI stages are covered in this guidance the need for compensatory habitat should be included at the end of the document	Agree - we will add this section to the description of the process.

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20	Natural England	SEA - Plans & Programmes	Since many of the strategic resource options in the WRSE are likely to be National Strategic Infrastructure Projects (NSIPs) you should reference to the Planning Act 2008. You may wish to include National Parks and Access to the Countryside Act 1949 for completion. You may wish to consider referring to the relevant case law to assessment of plans and projects under both Habitats Regulations and Strategic Environmental Assessment. You may wish to include the WISER guidance.	The suggested plans and legislation will be reviewed and included in the plans and programmes review
21	Natural England	SEA - Plans & Programmes - Local plans for improvements	There are a number of plans for improvements of biodiversity that may be of use to refer to as the WRSE plans evolves. River restoration plans for a number of SSSI rivers exist and have relevance to in combination abstraction impacts and their mitigation. There are other biodiversity restoration plans including the Natural Capital improvement plans by local Nature Partnership (e.g. Sussex Nature Partnership). Having regards to the relevant local plans may be of more relevant as the SEA and WRSE plans emerge and in plan comparisons than in the SEA per se.	Agreed that these plans will be relevant. At this stage for the regional plan they are considered too detailed but they will be referenced and should be used as options are taken forward in WRMP24.
22	Natural England	Baseline	Generally the baseline summary is good however in Natural England's view the scoping document underplays information on the state and declining trends of some of the environmental baseline and the part which abstractions and public water supply play in the baseline condition. In our letter to WRSE of the 4thSeptember Natural England stated: The existing amount of water taken from the environment for abstraction in the south east is too high and the impacts this is having on our wildlife, including some of our most iconic and legally protected habitats and species is unacceptable. The situation is worse in drought with permits and orders in company's drought plans that impact some of our most precious wildlife throughout the south east including orders that cannot conclude no adverse effects on integrity of European site features. This represents a failing of the most stringent legal protection for any	The environmental destination work will address the issues raised in this scoping response. The more detailed baseline can be incorporated into the assessment process and the modelling of impacts on flow deficits will be reviewed. The catchment mapping and environmental resilience systems modelling will also be incorporated into the overall assessment. Climate change scenarios will be developed for

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			ecologically protected sites in England. Many aquifers are not at good ecological status for their quantity of water. Climate change is predicted to make this situation more difficult, with hotter drier summers increasing wildlife's need for water as well as impacting supply and increasing demand. This is not reflected adequately in either the baseline section nor the future climate section.	land use changes and the EA's environmental destination scenarios will be run through the simulator model. All this will contribute to the SEA.
23	Natural England	Baseline Maps	Though it is difficult to be certain, as the information on these baseline maps is very high level, some of the information appears incomplete. South Downs and the New Forest National Parks are missing from the protected landscapes map key which only shows the Areas of Outstanding Natural Beauty, the Parks are on the maps but difficult to see. Some of the MCZs may be missing and some of the SPAs in maps C.4 and C.1 for example Solent and Dorset Coast SPA is missing. It might be worth including the national trails on these maps such as the south downs way, the Thames Path and the England Coast Path which is due to be completed in 2021.	Noted, the environmental database was updated following feedback to ensure that all relevant layers are up to date and the Dorset SPA is included
24	Natural England	SSSI Condition Baseline	It would be useful to compile the condition of the SSSIs in the region from the baseline data you have obtained especially since this pertains to a WRSE environmental destination and 25 YEP objective	As part of the HRA any linked SSSIs (sites that are also SSSIs) that could be affected by an option will be identified and the conditions assessment reported. This will then be used in the environmental assessment

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				process and for the environmental destination.
25	Natural England	Table 4.1	Ecological sites in the WRSE Region lists one marine protected area but lists the SAC, SPA, Ramsar, Marine conservation Zones and SSSIs separately. Marine Protected Areas (MPA) is the catchall name used in the OSPAR convention for areas protected by legislation below mean high water. In the UK this includes Ramsar sites, SACs, SPAs (including those offshore), SSSIs and MCZs. Please can you clarify this list and what the MPA is that is not also one of the other designations	Table 4.1 will be reviewed and clarified.
26	Natural England	Table 4.7 WFD classifications	The updated classifications are now available and this baseline information should be updated. Priority habitats lists –you may wish to include a summary of the regions chalk streams in the tables given their prominence in the environmental destination for WRSE and in the current abstraction profiles of WRSE companies	Noted, baseline information to be updated.
27	Natural England	Natural Capital Baseline - urban	it is unusual to classify urban as a natural capital. In the text you refer to wildlife and habitats that occur in urban environments particularly in parks and gardens –It is arguable if the urban environment is the natural capital or it is the parks and gardens and their wildlife that is natural capital.	Noted, Urban was used as an overarching term for the different Natural Capital Stocks within the urban environment in line with the national natural capital atlas such as: Blue space Green space - not semi-natural Open mosaic habitats Woodland, scrub and hedge Semi-natural habitats Further detailed will be provided within the environmental assessment report.

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28	Natural England	Natural Capital Baseline - coastal and marine	if the WRSE region goes out to 1 nautical mile (as the WFD does) it is surprising that the WRSE region only has 1% coverage of marine and coastal habitats. Clarification of this point would be helpful. The importance of the near shore marine and coastal habitats for recreation, health and migratory fish is not fully recognised and information on this should be expanded.	The agreed the percentage covers will be updated and Marine capital considered within the assessment
29	Natural England	Key issues and opportunities	Natural England welcomes the reference to net gain as an opportunity. The state of the natural environment included that most impacted should be referenced more fully in the issues section. Please refer to Natural England's letter dated 4thSeptember on WRSE's Policy consultation. In that Natural England recommended that the policies of WRSE should be more clearly the 25 YEP policies and there should be clearly stated commitments to how your policies are going to contribute to the 25 YEP goals. The baseline, issues and opportunities list should set out more clearly the potential of WRSE to contribute to Governments 25 YEP goals including: An aim to restore "75% of our one million hectares of terrestrial and freshwater protected sites to favourable condition, securing their wildlife value for the long term "The Defra 25 Year Environment Plan states "We will achieve a growing and resilient network of land, water and sea that is richer in plants and wildlife this includes[] creating or restoring 500,000 hectares of wildlife-rich habitat outside the protected site network, focusing on priority habitats as part of a wider set of land management changes providing extensive benefits."	The key issues and opportunities will be updated to make it clearer how the WRSE regional plan could support and contribute to the 25 Year Environment Plan goals.

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30	Natural England	Key issues and opportunities - nature based solutions and synergistic impacts	The issues and opportunities section is very light on the need for and benefits of nature-based solutions. Reference should be made to opportunities to use nature based solution to deliver multiple benefits such as carbon sequestration, biodiversity, nutrient capture, urban cooling, flood risk mitigation in addition to improved infiltration and storage of water for resources.	The key issues and opportunities table will be updated to include more reference to the need for and benefits of nature-based solutions. This will be a combination of the natural capital assessment and the outcomes from the catchment workshops, this will support the development of NBS options.
31	Natural England	Key issues and opportunities - nature based solutions and synergistic impacts	One issue common to all SEAs is that separating the impacts into separate topics makes it more difficult to identify the synergistic impacts of schemes but also the multiple benefits from nature-based solutions	Noted, it is aimed that by using the SEA and Natural capital assessment that benefits across different areas will all be captured. In addition, as the SEA benefit score will be the combination of all the SEA positive impacts it will capture benefits that span multiple topic areas.
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32	Natural England	Key issues and opportunities - making water available for wildlife to adapt to climate change	Inherent in the Defra objective above is the need to make wildlife more resilient to climate change. In the climate section, the opportunity to make more space and in particular water available for wildlife is not adequately covered. There are two opportunities linked to climate change for wildlife for the WRSE: i)The to reduce impacts of abstraction and water supply infrastructure from current levels and leave more water to enable wildlife to be more resilience to climate change in its current location ii)To reduce impacts of abstraction and water supply infrastructure from current levels and leave more water to enable wildlife to adapt to climate change and more, in particular for those freshwater species to avoid saline intrusion by migrating upstream. Currently there is insufficient water left in the environment to create new water dependant habitats to help even our most rare and protected wildlife adapt to climate change. The issue of "freshwater squeeze" is particularly acute in the South East where we have a sinking coastline due to isostatic readjustment from the last ice age and where our highly modified coast is forcing saline wedges higher up estuaries than would naturally be the case.	The suggested opportunities will be added into the key issues and opportunities section.
33	Natural England	Proposed SEA objectives and assessment - Biodiversity Objectives	Table 6.1 is more closely aligned to the objectives in the 25 YEP and statutory requirements than the issues and options table which is welcome.	Noted. As per the comment above the key issues and opportunities will be updated to include clearer alignment and reference to the 25 YEP.
34	Natural England	Proposed SEA objectives and assessment - Biodiversity Objectives	The first objective which currently states "Is the option likely to affect the conservation status of any SPA, SACs, Ramsar sites, SSSI or locally designated sites"? Needs to be reworded as Is the option likely to affect the conservation status of any SPA, SACs, Ramsar sites and MCZ, undermine or prevent restoration of SSSI condition or affect the condition of locally designated sites?	The first assessment question under the biodiversity SEA objective will be updated as suggested.

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35	Natural England	Proposed SEA objectives and assessment - Biodiversity Objectives	The reference to BAP habitats is more strictly referred to as Section 41 of the NERC act habitats and species of principal importance for the purpose of conserving biodiversity.	The wording referring to BAP habitats will be updated in line with the NERC Act
36	Natural England	Proposed SEA objectives and assessment - Biodiversity Objectives	In line with the advice above (question 3) – an additional biodiversity objective could be including regarding the needs of wildlife to adapt to climate change. For example an objective could be framed along the lines of: "Does the option enable or reduce the potential of water dependent wildlife to adapt to climate change". Inclusion of climate change adaptation for wildlife in assessment is supported by Government and water sector policy: The Defra 25 Year Environment Plan aspires to "take all possible action to mitigate climate change, while adapting to reduce its impact". WISER (page 54) states "a priority for all should be to work together to build an evidence-based understanding of the likely effects of climate change and identifying and implementing low carbon solutions that address any negative environmental impacts that may arise".	An additional assessment question/sub-theme under the biodiversity objective will be added to cover this issue.
37	Natural England	High-Level screening RAG criteria and definitions/ SEA objectives scoring criteria - Table 7.1	The table is not completely consistent with legislative tests and information and has not fully had regards to Natural England's comments in our letter of the 30th July 2020 to Nick Price acting on behalf of WRSE.	The RAG screening is not part of the HRA legislative process and is not the Stage 1 Test of Likely Significance. It was included to ensure the water companies unconstrained to constrained list screening was consistent and picked up 'show stoppers'. Due to delays getting option information the RAG screening is now less prominent in our approach. The HRA process

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		Section		starts with the Stage 1 Test of Likely Significance following the proposed method set out in HRA Method Statement in Appendix F of the Scoping Report.
38	Natural England	High-Level screening RAG criteria and definitions/ SEA objectives scoring criteria - Assessment of SPAs, Sacs and European sites	The first line with regards to impacts on SPAs, SACs and Ramsar sites needs to be rewritten with regards to the tests of the Habitats Regulations. Both still refer to criteria related to these sites that are not related to their conservation objectives and refer to adverse effects which have a specific meaning in the legislation with respect to sites covered by the Conservation of Habitats and Species Regulations 2017 (as amended). The 400 m distance selected is explicitly related to bird disturbance and in particular to the Thames Basin Heaths SPA. Other impacts from further away will be adverse for other features and impacts. In addition adverse effects can only be assessed as part of an appropriate assessment in light of the sites conservation objectives. The statements in table 7.1 do not refer to the legislative tests nor the conservation objectives and therefore are not compliant with the legal assessment of plans or projects. In addition this table (7.1) is not consistent with the HRA methodology in Appendix F – and the SEA of a plan cannot assess the impacts of plan options on SACs, SPAs and Ramsar sites differently to the HRA. Natural England recommends that the first line simply refers to the HRA and the SEA matrices compile the data from the HRA screening set out in appendix F but subject to the amendments listed in Annex 1 A above.	Please see response to comment 37. The SEA will use the results of the HRA to inform the SEA objective on biodiversity in relation to effects on Natura 2000 sites.

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39	Natural England	High-Level screening RAG criteria and definitions/ SEA objectives scoring criteria - Assessment of SPAs, Sacs and European sites	SEA objectives Assessment Scoring criteria Appendix E - This table does not appear to be related to the legislative tests for biodiversity or landscapes. Links to National Planning Policy Framework polices are unclear. This should be rectified.	SEA scoring for Natura 2000 sites will be in line with the HRA and the HRA results will be used as evidence for the assessment under the biodiversity objective. Links to the NPPF policies will be made clearer.
40	Natural England	High-Level screening RAG criteria and definitions/ SEA objectives scoring criteria - Other designated sites wider biodiversity and landscape	Marine conservation zones are not referred to in Table 7.1. Natural England welcomes reference to the SSSI IRZs but we do not agree with the wording of assessment for the red category. Our IRZs are the filter we recommend for more detailed assessment.	Due to options information delays the RAG assessment will not be used to screen options. MCZs and SSSIs will be covered as part of the SEA assessment and effects on these sites from options will be considered.

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41	Natural England	High-Level screening RAG criteria and definitions/ SEA objectives scoring criteria - Other designated sites wider biodiversity and landscape	Impacts on protected landscapes of options use single distance criteria – these distance criteria are not related to the likely impact of the options. A new large reservoir may have landscape impacts several kilometres away and small pipelines may not affect a designated landscape unless inside the landscape or in a very obvious location in the context or setting. The concept of "context and setting" of protected landscapes are not referred to and should be in landscape assessment criteria. The concept of major development in a protected landscapes which should be avoided based on policies in the NPPF is not referred to. Natural England recommend the landscape criteria are amended to better reflect the legislative tests and policy tests for impacts on landscape.	Due to options information delays the RAG assessment will not be used to screen options. Effects of options on landscape will be considered as part of the SEA which will include looking at landscape designations and effects on the setting and character of the landscape. It is agreed that distances don't provide an effective assessment which is why the SEA looks at wider effects on setting and character.
42	Natural England	High-Level screening RAG criteria and definitions/ SEA objectives scoring criteria - Other designated sites wider biodiversity and landscape	In the more detailed options assessment describes how the final assessment will provide an assessment of the residual effects with embedded mitigation. Natural England strongly recommends that the impact matrices include a version without mitigation and then the final residual impacts matrix. In Natural England's experience there is a tendency in SEAs to overestimate the efficacy of mitigation especially with regards to protected habitats and landscapes. This can lead SEAs to provide false "positives" where options are seen as low risk but at the project scale cannot be delivered as the mitigation is shown to be ineffective. In Natural England's experience this has proven very costly to companies in the WRSE region and lead to significant delays in implementing schemes.	The SEA assessment will look at the effects of options both pre and post mitigation. The pre- mitigation will include anything that is inherently part of the project and is costed for, so essential it is the option not mitigation. Anything additional will be considered as mitigation and will be included in the residual effects assessment.

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43	Natural England	Any other comment	Pg. 12 states "Supply options may include transfers, desalination, water reuse, conjunctive use, aquifer storage and recovery, reservoirs and trading". Natural England recommends adding in nature based solutions, to improve aquifer recharge and water retention in this list.	Nature-based solutions will be added to the list as potential option types.
44	Environment Agency	Additional plans or programmes relevant to the WRSE regional plan SEA	 There is a comprehensive coverage of relevant international, national or regional plans to inform the scoping report. Specific points for consideration: The Environment Agency's National Framework and supporting Guiding Principles for Environmental Destination The draft Water Resources Planning Guidelines and supporting technical notes that are out for consultation Any documents relating to OxCam development Consider EA Strategic and Local Outcome Plans. These are currently being developed but may be worth noting. Consideration of other regional groups' publications – Water resources East, water west, Our catchment management strategies have been renamed as abstraction licensing strategies. These documents set out the policy framework under which abstraction decisions including water company proposals will be considered. These constraints and availability of new volumes of water will be outlined in these documents. There is often a tendency to use or develop new conceptual tools and models to consider potential implications, and water availability. These tools cannot automatically replace existing and trusted applications. The outcome of these new tools will need to be compared with these existing tools to understand any differences. It is these existing tools that have been used to format the policies position under which these proposals will be considered. 	The suggested plans, programmes and guidance documents will be included where appropriate and available.

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45	Environment Agency	Baseline information	 With regards to the climatic factors, how will sunshine, snowfall and wind climatic data be used in the SEA assessment? It is good to see use of GIS to help evaluate the number of options being considered by WRSE, but this should not replace local assessment which may provide more detailed information to enable well-informed and integrated assessment of effects of options. Flood risk, page 27- What are the impacts of flood risk to the security of water supply security (i.e. water quality problem) and are there any measures to reduce the flood risk on natural environmental and water supplies? Future baseline, page 37 – this section could be expanded more, and justification provided on how these key trends are identified and whether there are other elements that are missing from the assessment. Each individual main river should have been set an Ecological Flow objective. This data will be critical when comparing if a new water company proposal is indeed compatible with the SEA objections. Existing ALF/AMP/Sustainability Reductions changes will all need to be understood. These licensing changes will help to identify existing sensitivities and/or where resources have already been changed for environmental reasons. 	Climate change scenarios will be incorporated into the assessment process. A proportionate approach will be undertaken but recommendations for more detailed assessments will be proposed for the WRMP24 SEAs. Other work streams are looking at water supplies with regard to flood risk and resilience this will be incorporated into the SEA. Future climate change scenarios and trends will be modelled these will use the latest NE and EA guidance and the results will inform the SEA. EFI and EF objectives will be used to inform the environmental ambition, a review of potential licence changes will be undertaken.

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46	Environment Agency	section Key issues and opportunities identified	 Table 5.1: The impacts of climate change on habitats and ecosystem should be covered too. Also monitor sustainability and reduce impacts on Chalk groundwater or Chalk streams should be included. Stakeholders' participation in catchment management schemes could be mentioned. Will there be any links between SE SEA and new ELM (Environmental Land Management) scheme in regard to land/ soil management? The report recognises the area is already water-stressed with a growing population base that equally has a disproportionately high demand for water. The statistics provided show how climatic factors could have a significant influence both on future water availability and will need to be incorporated when deciding on environmental safeguards. The environmental needs to today might be considerably different in 50-75 years-time. These themes will be central in deciding if and where new resources might be available. This availability is not just about now but in the future with the lowest environmental implications. The report does set some high aspirations with regard no adverse environmental implications by stating no effect on surface water and/or ground water quality or quantity. It will be interesting to see how going through SEA methodology within a water stressed area that these principles can be adhered to. Surface water and groundwater sources already have limited capacity to supply additional sources of water with the need to safeguard (or improve) environmental standards. Table 6.3 highlights the potential conflict between protecting biodiversity and meet all resource requirements. The issue will be 	Agreed - this will be addressed by incorporating the results from other workstreams, such as resilience, catchment mapping and environment destination into the assessment process. Trade offs and the wider importation issues will be considered as part of the assessment process.
			biodiversity and meet all resource requirements. The issue will be how the process can deal with many negative outcomes.	

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		section	• Environmental gain versus environmental cost – likelihood is that at least a proportion of new water supplies will need to be imported. These imports will need not just to supply additional water but may have to replace existing damaging sources of water. These imports will have an environmental cost which also needs to be considered and compared against the environmental gain. This trade-off to meet the aspirations mentioned will need to neutralise (wherever possible) the imported environmental costs (e.g. carbon costs and new infrastructure). It would be useful to make these comparison as there will need to be trade-off somewhere.	

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4	7 Environment Agency	Proposed SEA objectives and assessment questions/ sub- themes	The report has not highlighted strong linkages between SEA and Natural Capital element. Would there be any implication and opportunities that NC can provide within the WRSE SEA objectives?	Acknowledged that a great link could be highlighted in the report. As stated in section 6.1 "The SEA assessment will also consider the impacts on natural capital stocks that cannot be incorporated within the Natural Capital metric".
4	8 Environment Agency	Proposed SEA objectives and assessment questions/ sub- themes	 Table 6.2 Page 50 does not reflect the synergies between different objectives but only shows comparisons of compatibility and non-relevancy. "The WRSE environmental assessments including the SEA will support the environmental destination by assessing and informing the long-term resilience of the regional plan and aiming to achieve a plan that provides environmental net gain against the four environmental metrics." The text in yellow is taken from Page 3 Section 2.3 and indicates potentially that the selected options might not be able to achieve the aspirations indicated by the SEA methodology. 	Noted. Potential synergies between objectives will discussed. Wording on 'aiming to achieve' will be amended as the regional plan should be developed to achieve environmental net gain.
4	9 Environment Agency	Proposed SEA objectives and assessment questions/ sub- themes	• Future direction with regard to legislation. The robustness of a proposal would be subject to modelling and assessment linked to changing climatic factors but environmental legislation is also likely to further development. There could be scope to consider how selected proposals would fair if additional environmental objectives were established to safeguard flora and fauna.	The ongoing guidance and legislation development is being closely monitored. The catchment mapping work will look at additional options to support environmental improvements such as river restoration projects. The overarching objectives for the regional plan or the WRMP24 SEA should reflect this.

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50	Environment Agency	High-level screening RAG Criteria and Definitions and/or the SEA objectives scoring criteria	 There is a general risk of simplification of qualitative information and actual negative or positive effects in SEA scoring mechanisms. However, we recognise that this is a high level screening, but screening decisions should be sense-checked with stakeholders and regulators. Any screening approach which involves a level of professional judgment is open to an element of interpretation. The RAG criteria only deals with a small aspect of the potential environmental implications. The Water criteria solely highlights SPZ, NVZ and flood risk. These criteria do not deal with the traditional water resource considerations which will need to be covered by other assessment methodology to assess the implications of individual resource options. The outcome from this exercise should be explained through further consultation highlighting where professional judgement has been used. 	The RAG assessment is not part of any of the statutory assessment and was meant to be used a validation of the water companies own unconstrained to constrained list screening and potentially identify any 'show- stoppers' that had come through. However, due to options information delays the RAG assessment will not be used to screen options.
51	Environment Agency	Other comments on the scoping report	Further details on how the numerical valuation of effects will be incorporated into the decision making modelling?	Details on how numerical values will be included in the investment model are provided in the WRSE method guidance document. The environmental assessment results will be translated into four metrics: SEA positive, SEA negative, BNG and natural capital, which will then go into the investment model. These SEA values are purely for comparison of options within the investment model and are not part of the formal SEA process. Further information on how the metrics

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				will be developed from the environmental assessment results can be provided and/or discussed with the EA for clarification.
52	Environment Agency	Other comments on the scoping report	We recognise that producing an assessment covering the whole of the south east presents challenges in ensuring an appropriate level of detail. Will there be any consideration through SEA of the geological differences across WRSE Area that lead to the WR pressures/ benefits? For example, an emphasis on protecting chalk groundwater resources where aquifer is present for riverine baseflow (whilst acknowledging the need to prevent unsustainable abstraction) and looking to assess winter storage/ NFM capacity in those areas with more spatey river flow that don't have the baseflow buffer element. Solutions and risks need to be mapped and assessed according to the nature of the environment, not just to the efficacy of the built infrastructure of the "water grid".	There will be additional work undertaken with regard to vulnerable catchment and chalk rivers. streams and groundwater this will form part of the environmental ambition which will contribute to the SEA. The combination of the various other workstreams such as: options appraisal, catchment mapping, catchment resilience and environmental destination will support the SEA
53	Environment Agency	Uncertainties	The scope doesn't seem to consider uncertainty much (beside the appendix on the Habitats Regulations Assessment Method) – how will the uncertainty in assessments be dealt with?	Noted - we will review the potential for quantification of uncertainty within the SEA, Natural Capital and BNG. Uncertainty is considered within the WFD assessments and INNS.
54	Environment Agency	Consideration of multi-purpose schemes	How has multi-purpose of options including social and environmental benefits to wider communities/stakeholders been considered? Active inclusion of stakeholders in development and monitoring development and implementation on larger water schemes will be good.	There is considerable consultation being undertaken with regard to catchment management and the development of options that include NBS and those that are

Ref	Organisation	Topic / Report	Feedback	Response
		section		socially beneficial. This work will support the environmental assessments and catchment portfolio options development.
55	Environment Agency	Natural Capital	 In previous documents it was stated that the ecosystem services metrics may be limited to 5 services. We would suggest that further services should be considered. In regard to the habitats to be assessed would recommend that due to the local significance that chalk streams to be included as a specific habitat 	The Five ecosystem services were suggested in line with the WRMP24 supplementary guidance on environment and society in decision making. Following scoping we will be assessing 3 additional services - food production, recreation & amenity and air pollutant removal. Additionally impacts of natural capital stocks that are not captured here will be assessed in the SEA assessment. Agreed that chalk streams should be mapped and considered as a unique habitat. This was raised during consultation
56	Environment Agency	Baseline Maps	• Mapping with multiple layers could be used to highlight potential areas with multi-purpose environmental benefits for future investments? Will this be considered as well as using mapping to assess impacts?	This will not be considered within the environmental assessment as this focuses on developed options however this has been addressed within the WRSE catchment workshops and subsequent Blue green option development.

Ref	Organisation	Topic / Report section	Feedback	Response
57	Environment Agency	Drinking Water Protections zones	Expected impacts of drinking water protected areas would need to be considered	Assume this is referring to Drinking water safeguard zones. If so these are designated areas in which use of certain substances such as fertilisers, pesticides and other chemicals must be carefully managed to prevent pollution of water that is abstracted for use as drinking water. It is not considered that the options will affect use of fertiliser and pesticides, apart from potentially catchment management options. Chemicals may be used to treat water but discharges would be within licence and water quality requirements
58	Environment Agency	Section 1.3	 Pg. 11. Amendment to bullet four: Decide on the scope for the SEA, ensuring that it covers all the likely significant environmental effects and identification of designated and environmentally sensitive sites of the WRSE regional plan 	Wording to the bullet point will be amended
59	Environment Agency	Section 1.3	Pg. 11. Amendment to bullet five: • Provide sufficient opportunity to engage and collaborate with the Consultation Bodies and wider stakeholders. Would also recommend that you would need to include specific regard to local government – councils / planning authorities particularly around population impacts / housing developments / demand measures / water efficient technologies.	Wording to the bullet point will be amended

Ref	Organisation	Topic / Report section	Feedback	Response
60	Environment Agency	Section 2.2	Pg. 12. Amendment to bullet four (replace):Mitigate the impacts of climate change through demand and supply interventions to ensure water is available for society and the environment	The wording in the bullet points is taken from the WRSE aims on its website. This comment will be fed back to WRSE for discussion and update if agreed.
61	Environment Agency	Section 2.2	 Pg. 12/13 Paragraph under bullets: Supply options may include transfers, desalination, water reuse, conjunctive use, aquifer storage and recovery, rainwater harvesting, catchment management schemes, reservoirs and trading. Demand management options may include leakage reduction, water metering, seasonal water rates, targeted restrictions, behavioural measures and water efficiency measures. 	The wording will be amended
62	Environment Agency	Section 2.3	Pg. 13. Paragraph 1:The terms refers to the consideration of actions to enhance the environment and build resilience to future challenges	The wording will be amended
63	Environment Agency	Section 2.3	 Pg. 13. Paragraph 2: Water quality and availability requirements for the environment. The forecast will be based on current adverse environmental impacts, previous investigations, river basin management plans, regional policies and a range of flow-based targets where no other evidence exists. 	The wording will be amended
64	Environment Agency	Section 2.3	•Last paragraph on page 13 talks about plan aiming to provide environmental net gain against the four environmental metrics. What are those?	The environmental metrics are those proposed to translate the environmental assessment results into metrics for the investment model: SEA positive, SEA negative, BNG and Natural capital as set out in the WRSE methodology guidance document

Ref	Organisation	Topic / Report	Feedback	Response
65	Environment Agency	Section 3.2	 Pg. 16. Bullet Point List: Points to be added Carbon sequestration with the aim of net zero carbon emissions by 2050 as per Paris Climate Agreement (and legislation passed by UK govt. in 2018) Habitat creation and safeguarding ecosystem services (Woodland Carbon Guarantee scheme in line with the Woodland Carbon Fund) Catchment management / nature based solutions working to enhance natural processes (existing work through CaBA) Reduce water waste and leakage (Ofwat targets and penalties) Improve resilience to extreme droughts ensuring consistency with WRMP24 (1/500 year resilience) 	The suggested bullet points will be included in themes and messages from the plans and programme review listed in Section 3.2.
66	Environment Agency	Table 4.1	• Ecological sites in the WRSE – taking account of the current interest in chalk streams, it would be useful to specifically mention chalk streams; not all of them are protected areas. Those outside SPA/ SAC/SSSI designation are simply NERC priority habitats included in UK BAP (like those in Herts and North London Area). If not specifically chalk streams (as some of those will be accounted under other protected areas, UK BAP priority sites should be added to the list.	Noted - all chalk streams will be considered where appropriate.
67	Environment Agency	Section 4.2.2	• Since this is an SEA for WR plans it would be useful to recognise role of abstraction in limiting flows to reach GES/P and causing poor status of groundwater bodies. Physical modifications and pollution might be top three but it's the water resources situation driving strategic resource options because of significant deficits in the region at present and into the future.	Section 4.2.2 will be updated to reference the role of abstraction in limiting flows to reach GES/P and causing poor status of groundwater bodies along the with the other sources identified.
68	Environment Agency	Table 4.10	• This doesn't seem to recognise the significance of drought/ prolonged dry weather – their consequences, recent frequency and duration of dry periods that led to increased public interest and concerns of the state of chalk rivers especially but also raised questions over resilience of public water supplies.	Table 4.10 will be updated to include more reference to drought and prolonged dry weather

Ref	Organisation	Topic / Report section	Feedback	Response
69	Environment Agency	Table 4.14	• Some more details on water environment would be welcomed, like chalk streams, wetlands featuring in the AONB	Table 4.14 will be updated to include additional details on features within the identified AONB such as chalk streams
70	Environment Agency	Section 4.22	2015 classifications used – 2019 classifications now available	The baseline will be updated with the 2019 classifications
71	Environment Agency	Section 4.2.10	 Natural capital section doesn't provide information on services provided by the environment in the WRSE region. What is the state of these natural capital assets? Is it overall good/ poor/ at risk? It seems also that groundwater is missing from the list and would assume that's a critical natural capital asset for the SEA? 	The current state of groundwater stocks and the likely impacts of the proposed regional plan on these stocks will be captured in the Environmental ambition assessment. A Natural Capital baseline will be provided in the environmental report, a baseline could not be established before the zone of influence for the plan has been finalised.
72	Environment Agency	Section 4.3	• Again future considerations for groundwater are missing. It would be useful to include maybe separate consideration for groundwater and surface water as the response to climatic conditions/ human activity/ pollution and remediation has different timeframe and potentially consequences. Risks also will vary.	The future baseline section will be updated to include groundwater and surface water.
73	Environment Agency	Section 5.1	Table 5.1:Biodiversity, Flora and Fauna – should clearly state no adverse impacts to internationally designated sites.	The key issues and opportunities will be updated to include the suggestions

Ref	Organisation	Topic / Report section	Feedback	Response
74	Environment Agency	Section 5.1	 Table 5.1: How do we understand cost-effective in this context? o (Biodiversity section) Wetland and marsh habitat rely on water, the WRSE regional plan should ensure that it does not affect these areas through over abstraction and should look for opportunities to reduce abstraction pressure where cost effective and possible. 	The key issues and opportunities will be updated to include the suggestions proposed by the catchment mapping workstream this will combine NDS with abstraction reduction scenarios to determine best value outcomes.
75	Environment Agency	Section 5.1	 Water – should clearly state protection of flow regimes and compliance with EFI and CSMG where applicable. CSMG targets for Water Quality also of relevance, alongside WFD improvements. As opposed to saying the 'The WRSE regional plan has the opportunity to improve the environment by leaving more water in the region's rivers, streams and underground sources. It should state: 'The WRSE regional plan will take account of compliance with EFI and CSMG flow targets for designated sites, and non-designated sites where applicable. The WRSE regional plan will leave ensure more water is available in the environment to mitigate impacts from climate change and help achieve biodiversity net gains.' Important to recognise here another significant pressure: abstraction. Many of the waterbodies are failing GES/P due to abstraction having detrimental impact (among other pressures of course) on flows. There are also groundwater bodies (like chalk aquifers) at risk or already at poor WFD quantitative status. Drought and prolonged dry weather detrimental impact on water environment exacerbated further by abstraction is also omitted here. 	Noted

Ref	Organisation	Topic / Report	Feedback	Response
76	Environment Agency	Section 5.1	 Soil – promote regenerative agricultural practices and implement catchment management schemes to reduce water quality impacts, and enhance ecosystem services for the benefit of the environment and society. To be included / amended: o Promote regenerative agricultural practices o Prioritise the implementation of catchment management solutions to help manage soils and reduce impacts of waterbodies o Ensure measures are taken to prevent soil erosion o Ensure the sustainable use of land o Reduce nutrient loads within surface water and groundwater bodies 	The key issues and opportunities will be updated to include the suggestions
77	Environment Agency	Section 5.1	• Air – Opportunity isn't entirely clear? Needs more detail – planting of trees, reduced emissions from Water Treatment Works?	The key issues and opportunities will be updated to include the suggestions
78	Environment Agency	Section 5.1	 Climatic Factors – To also include alongside hotter and drier summers and warmer and wetter winters, short duration 'extreme weather events' such as thunderstorms and heatwaves. To be added to implications – increased demand due to extreme events (i.e. heatwaves). Greater risks to rapid responding catchments (i.e. North Sussex clay catchments). To add the following bullets: Ensure zero net emissions Promote nature based solutions and restore habitats to offset and sequester carbon within the WRSE region, while also achieving biodiversity net gains 	The key issues and opportunities will be updated to include the suggestions
79	Environment Agency	Section 5.1	• Population, Communities and Human Health – Ensure an economically sustainable water supply for customers. This may see the economic value of water increase and require a greater value to be assigned to water through increased charges and / or seasonal water rates.	The key issues and opportunities will be updated to include the suggestions

Ref	Organisation	Topic / Report section	Feedback	Response
80	Environment Agency	Section 5.1	 Landscape - Amend bullets Ensure the protection of landscape character Enhance landscapes by working with stakeholders through habitat creation, implementation of catchment based solutions and safeguarding existing habitats. 	The key issues and opportunities will be updated to include the suggestions
81	Environment Agency	Section 5.1	 Material Assets – Nothing on leakage? Achieve required leakage reduction targets Reduce unplanned outages 	The key issues and opportunities will be updated to include the suggestions
82	Environment Agency	Section 6.1, Table 6.1	 Soil Will the option promote the sustainable use of land? Will the option prevent nutrient loading in water bodies? 	The suggested assessment questions will be added
83	Environment Agency	Section 6.1, Table 6.1	 Water: Flood: Will the option mitigate flood risk? (I.e. attenuation of flows through NFM, catchment storage etc.) Protect and enhance: Will the option comply with flow targets (i.e. EFI, CSMG)? Deliver reliable and resilient water supplies: Does the option reduce the presence of containments in waterbodies, and make more water available to the environment? 	The suggested assessment questions will be added
84	Environment Agency	Section 7.1, Table 7.1	Water: Rag criteria should also include: - Drinking water protected areas – integration of surface water safeguard zones - WFD waterbody status (flagging system for no impacts (green), potential impacts (medium), expected impacts (red))	The RAG assessment is not part of any of the statutory assessment and was meant to be used a validation of the water companies own unconstrained to constrained list screening and potentially identify any 'show- stoppers' that had come through. However, due to options information delays the RAG assessment will not be used to

Ref	Organisation	Topic / Report section	Feedback	Response
				screen options. The SEA and WFD will cover the criteria suggested.
85	Environment Agency	Proposed RAG criteria and definitions	 Whilst it includes SSSI impact zones, it also just looks at distance as a criteria for assessment purposes for priority habitat. Distance doesn't of course determine whether an action or plan/project will necessarily impact on it. So this doesn't seem an appropriate method to use. In the Appendix, the assessment scoring criteria uses the level of impact to determine the scale of the effect, which is better. However it doesn't really provide a clear basis for assessing what a 'major' or 'moderate' impact would be. As this will vary depending on what is impacted on. It isn't clear how impacts on species would be determined for example, as this would be reliant on having sufficient population data to determine impacts, which is unlikely. A lot of the assessment criteria actually would not assess watercourses either, as most are not a priority habitat, or locally or nationally designated. WFD only looks at a waterbody scale and so does not consider smaller impacts. It would be useful to understand the definition of the criteria and the level of detail that will be provided to inform these judgements. Also need some further explanation on how detailed considerations for biodiversity will fit into a plan covering the whole of the south east. 'Green corridors' and migration routes have been included, so to some extent river corridors might be covered, but need further confirmation. We don't have any guidance on how to specifically include streams and rivers other than as a generic habitat type, Only chalk streams, SSSI rivers and a handful of less modified rivers meet the criteria of priority river habitat. 	The RAG assessment is not part of any of the statutory assessment and was meant to be used a validation of the water companies own unconstrained to constrained list screening and potentially identify any 'show- stoppers' that had come through. However, due to options information delays the RAG assessment will not be used to screen options. The SEA will look at more than just distances when considering effects of an option. Further clarity will be provided on the SEA scoring definitions for major and moderate and how these will be assessed. The regional plan is a high-level assessment therefore, local level data won't be included and this should be covered as part of WRMP24. The level of detail of the assessment will also be proportionate to a regional plan level strategic assessment. The HRA and WFD assessments will

Ref	Organisation	Topic / Report section	Feedback	Response
				provide more specific information which will also feed into the SEA assessment under the relevant objectives.
86	Environment Agency	Figure 7.1	Figure should be updated to demonstrate how potentially mitigated options go back into the options mix for detailed assessment?	Noted, figure will be updated.
87	Environment Agency	Section 7.3	Multi-criteria analysis uses some subjectivity. Who and how will be deciding what constitutes major positive/ negative effects? Will there be weighting applied to different types of habitats if trade-offs occur?	Major effects are defined in the SEA scoring definitions in Appendix E. The SEA will just report the findings of the assessment. It is up to WRSE decision-makers to agree on decisions regarding trade-offs.

Ref	Organisation	Topic / Report section	Feedback	Response
				For SEA results will be simplified into a metric for each options but the metric should reflect the degree of effects, although there will be trade-off within this. Therefore, the SEA results themselves should be used alongside the metrics to provide a full picture of effects of an option.
88	Environment Agency	Section 7, resilience to climate change	The assessment will also look into resilience to climate change of options. It is not clear whether this includes habitats/ecosystems. Clarification on this would be helpful.	Noted - this will include habitats and ecosystems and included in the catchment
89	Environment Agency	Appendix E Page 108	Shouldn't there be added an objective: water environment more resilient to drought/ prolonged dry weather?	This will be included as an assessment question under the water environment objective

Annex C: Policies, Plans and Programmes Review

A review of the policies, plans, and programmes relevant to the WRMP was undertaken as part of the SEA Scoping process. The aim was to determine how the emerging WRMP may be affected by these external factors. Furthermore, the WRMP must aim to support current relevant policies, plans, programmes, and environmental protection legislation at international, national, and local levels. The WRMP must aim to support, and where possible, strengthen the objectives of other local plans and strategies within the Thames Water region.

A review of these documents is required to identify potential inconsistencies or constraints, and consistencies between these documents and the draft WRMP to inform the development of the SEA Framework. Table 3.2 lists current relevant policies, plans, and programmes which were considered during the SEA scoping stage and updated following scoping consultation.

Table C.1: Policies, Plans and Programme Review

Document Name	Key Objectives, Requirements, and Guidance
International	
Berne Convention on the Conservation of European Wildlife and Natural Habitats (1979)	The aims are to conserve wild flora and fauna and their natural habitats and to promote European cooperation. Particular importance is placed on the need to protect endangered natural habitats and endangered vulnerable species, including migratory species.
Bonn Convention on the Conservation of Migratory Species of Wild Animals (1979)	The Convention aims to conserve terrestrial, aquatic, and avian migratory species throughout their range.
Charter for the Protection and Management of the Archaeological Heritage (1990)	The charter lays down principles relating to the different aspects of archaeological heritage management. These include the responsibilities of public authorities and legislators, principles relating to the professional performance of the processes of inventorisation, survey, excavation, documentation, research, maintenance, conservation, preservation, reconstruction, information, presentation, public access and use of the heritage, and the qualification of professionals involved in the protection of the archaeological heritage. The Charter states that policies for the protection of archaeological heritage should constitute an integral component of policies relating to land use, development, and planning as well as of cultural, environmental and educational policies.
Commitments arising from the World Summit on Sustainable Development (WSSD), Johannesburg (2002)	Adopted at the World Summit on Sustainable Development in 2002 and built upon earlier declarations made at previous conferences and summits. It commits nations to take a collective responsibility to build a human, equitable and caring global society cognisant of the need for human dignity for all. The Declaration also reinforces the three pillars of sustainable development: environmental, economic and social development at the local, national, regional and global level.
Convention on Biological Diversity (1992)	The Biodiversity Convention has three main aims which are to conserve biological diversity; to ensure the sustainable use of the components of biological diversity; and the fair and equitable sharing of the benefits arising out of the utilization of genetic resources.

Document Name	Key Objectives, Requirements, and Guidance
Convention for the Protection of the Architectural Heritage of Europe (2009)	The aim of this Convention is to protect the archaeological heritage as a source of the European collective memory and as an instrument for historical and scientific study. Sources are considered to be elements of the archaeological heritage all remains and objects and any other traces of mankind from past epochs, the preservation and study of which help to retrace the history of mankind and its relation with the natural environment, for which excavations or discoveries and other methods of research into mankind and the related environment are the main sources of information, and which are located in any area within the jurisdiction of the Parties. The archaeological heritage shall include structures, constructions, groups of buildings, developed sites, moveable objects, monuments of other kinds as well as their context, whether situated on land or under water.
Convention on Access to Information, Public Participation in Decision- making and Access to Justice in Environmental Matters (Aarhus Convention) (1998)	The Aarhus Convention was created to give empowerment to citizens and civil society organisations in relation to environmental matters and is founded on the principles of participative democracy. It provides for access to environmental information; public participation in environmental decision making; and access to justice.
Kyoto Protocol on Climate Change (1997)	The Kyoto Protocol was adopted in 1997 and ratified in 2005. It commits its parties to limit climate change by setting internationally binding targets for emission reductions. Covering the six main GHGs, it required the UK to reduce emissions by 12.5% in the first commitment period (2008-2012). This was successfully achieved, and a second commitment period has been agreed whereby European Union (EU) countries will aim to achieve a joint 20% reduction compared to 1990 levels.
Paris Agreement (2015)	The Paris Agreement came out of the COP21 and aims to limit global temperature rises to 1.5°C to 2°C above pre- industrial levels. It brings together 196 parties from across the world into a common cause and requires all parties to put forward nationally determined contributions to strengthen efforts in the years ahead. It also aims to strengthen the ability of countries to deal with the impacts of climate change.
Ramsar Convention on Wetlands of International Importance especially as Wildfowl Habitat (1971)	Provides the framework for national action and international cooperation for the conservation and wise use of wetlands and their resources. The aim is 'the conservation and wise use of all wetlands through local and national actions and international cooperation, as a contribution towards achieving sustainable development throughout the world'. The Convention uses a broad definition of the types of wetlands covered, including lakes and rivers, swamps and marshes, wet grasslands and peatlands, oases, estuaries, deltas and tidal flats, near-shore marine areas, mangroves and coral reefs, and human-made sites such as fishponds, rice paddies, reservoirs, and salt pans.

Document Name	Key Objectives, Requirements, and Guidance
UN Framework Convention on Climate Change (1992)	The stated objective is to achieve stabilisation of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system. The parties should protect the climate system for the benefit of present and future generations of humankind, on the basis of equity and in accordance with their common but differentiated responsibilities and respective capabilities.
European	
A Clean Planet for all: A European strategic long-term vision for a prosperous, modern, competitive and climate neutral economy (2018)	The long-term strategy sets out Europe's commitment to lead in global climate action and to present a vision that can lead to achieving net-zero greenhouse gas emissions by 2050 through a socially-fair transition in a cost efficient manner. It looks into the portfolio of options available for Member States, business and citizens, as well as into how these can contribute to the modernisation of our economy and improve the quality of life of Europeans, protect the environment, and provide for jobs and growth.
Ambient Air Quality Directive (2008/50/EC)	It establishes ambitious, cost-effective targets for improving human health and environmental quality up to 2020. The EU objective on air quality is 'to achieve levels of air quality that do not result in unacceptable impacts on, and risks to, human health and the environment'.
Blueprint to Safeguard Europe's Water Resources (2012)	The Blueprint outlines actions in relation to improved implementation of current water legislation and the integration of water policy objectives into other policies, and also aims to fill the gaps in regard to water quantity and efficiency. The objective is to ensure that a sufficient quantity of good quality water is available for people's needs, the economy and the environment throughout the EU. It is closely linked to EU's 2020 Strategy and the 2011 Resource Efficiency Roadmap, however the analysis spans up to 2050 and is therefore expected to drive EU water policy over the long term.
Council Directive concerning Urban Waste Water Treatment (91/271EEC)	The objective of this Directive is to protect the environment from the adverse effects of urban waste water discharges and discharges from certain industrial sectors. The Directive concerns the collection, treatment, and discharge of such waste water.
Council Regulation No. 1100/2007 of 18 September 2007 establishing measures	Updated 2019. Advice from the International Council for the Exploration of the Sea (ICES) in 2006 indicated that the stock of the European eel (<i>Anguilla anguilla</i>) is outside safe biological limits across European waters. The population has declined significantly, reducing to 5% of the original 1980s stock levels. In response to this advice, the European Union adopted Council Regulation (EC) No 1100/2007, which requires Member States to undertake a series of measures aimed at the recovery of eel stock. The goal is to achieve 40% escapement of adult eels, relative to that in

Document Name	Key Objectives, Requirements, and Guidance
for the recovery of the stock of European eel	absence of anthropogenic factors, to sea to spawn. The EU Regulation was transposed into UK law under The Eels (England and Wales) Regulations 2009.
	Eleven Eel Management Plans have been prepared, one for each River Basin District identified in England and Wales. The plans outline the current situation and how we intend to achieve the targets required by the European Regulation. Such measures include a reduction in fishing pressure, improving access and habitat quality, and reducing the impacts of entrainment. The measures that will require the installation of passes at obstructions and screens at abstraction and discharge points that prevent the migration of eels.
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)	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)
Directive on Bathing Water (76/160/EEC); and Directive 2006/7/EC repealing Directive 76/160/EEC (from 2014)	The overall objective of the Directive remains the protection of public health whilst bathing, but the revised Directive also offers an opportunity to improve management practices at bathing waters and to standardise the information provided to bathers across Europe and aims to set more stringent water quality standards and also puts a stronger emphasis on beach management and public information.
Directive on the Assessment and Management of Flood Risks (2007/60/EC)	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
Directive on the assessment of the effects of certain plans and programmes on the environment (2001/42/EC)	The Directive, known as the SEA Directive, sets out the requirement for the assessment of certain plans and programmes on the environment. An SEA is mandatory for plans/programmes which are prepared for agriculture, forestry, fisheries, energy, industry, transport, waste/ water management, telecommunications, tourism, town & country planning or land use and which set the framework for future development consent of projects listed in the EIA Directive. SEA is also required where plans/programmes have been determined to require an assessment under the Habitats Directive.

Document Name	Key Objectives, Requirements, and Guidance
Directive on the Conservation of Natural Habitats and of Wild Flora and Fauna (92/43/EEC)	The main aim of the Habitats Directive is to promote the maintenance of biodiversity, taking account of economic, social, cultural and regional requirements. While the Directive makes a contribution to the general objective of sustainable development; it ensures the conservation of a wide range of rare, threatened or endemic species, including around 450 animals and 500 plants. Some 200 rare and characteristic habitat types are also targeted for conservation in their own right. The Directive provides for a ban on the downgrading of breeding and resting places for certain strictly protected animal species. Exceptions to the strict protection rules can be granted under very specific conditions. The Habitats Directive also establishes the EU wide Natura 2000 ecological network of protected areas. For these areas it provides a high level of safeguards against potentially damaging developments. Together with the Birds Directive, the Habitats Directive forms the backbone of EU nature protection legislation
Directive on the Conservation of Wild Birds (79/409/EEC) (as amended)	 Directive 2009/147/EC of the European Parliament and of the Council of 30 November 2009 on the conservation of wild birds (this is the codified version of Directive 79/409/EEC as amended). This Directive ensures far-reaching protection for all of Europe's wild birds, identifying 194 species and sub-species among them as particularly threatened and in need of special conservation measures. There are a number of components to this scheme: Member States are required to designate SPAs for 194 particularly threatened species and all migratory bird species. SPAs are scientifically identified areas critical for the survival of the targeted species, such as wetlands. They are part of the Natura 2000 ecological network set up under the Habitats Directive 92/43/EEC. A second component bans activities that directly threaten birds, such as the deliberate killing or capture of birds, the destruction of their nests and taking of their eggs, and associated activities such as trading in live or dead birds (with a few exceptions). A third component establishes rules that limit the number of bird species that can be hunted (82 species and subspecies) and the periods during which they can be hunted. It also defines hunting methods which are permitted (e.g. non-selective hunting is banned)
Drinking Water Directive (1998/83/EC)	 The Drinking Water Directive sets out the following objectives: Sets quality standards for drinking water quality at the tap (microbiological, chemical and organoleptic parameters) and the general obligation that drinking water must be wholesome and clean Obliges Member States to regular monitoring of drinking water quality and to provide to consumers adequate and up-to-date information on their drinking water quality

Document Name	Key Objectives, Requirements, and Guidance
	 Member States may exempt water supplies serving less than 50 persons or providing less than 10 m3 of drinking water per day as an average and water in food-processing undertakings where the quality of water cannot affect the wholesomeness of the foodstuff in its finished form.
EC Directive on Bathing Water (76/160/EEC); and Directive 2006/7/EC repealing Directive 76/160/EEC (from 2014)	The overall objective of the Directive remains the protection of public health whilst bathing, but the revised Directive also offers an opportunity to improve management practices at bathing waters and to standardise the information provided to bathers across Europe and aims to set more stringent water quality standards and also puts a stronger emphasis on beach management and public information.
EC Directive on the Conservation of Natural Habitats and of Wild Flora and Fauna (92/43/EEC)	The main aim of this Directive is to promote the maintenance of biodiversity, taking account of economic, social, cultural, and regional requirements. While the Directive makes a contribution to the general objective of sustainable development; it ensures the conservation of a wide range of rare, threatened or endemic species, including around 450 animals and 500 plants. Some 200 rare and characteristic habitat types are also targeted for conservation in their own right. The Directive provides for a ban on the downgrading of breeding and resting places for certain strictly protected animal species. Exceptions to the strict protection rules can be granted under very specific conditions. The Habitats Directive also establishes the EU wide Natura 2000 ecological network of protected areas. For these areas it provides a high level of safeguards against potentially damaging developments. Together with the Birds Directive, the Habitats Directive forms the backbone of EU nature protection legislation.
EC Directive on the Conservation of Wild Birds (79/409/EEC)	Directive 2009/147/EC of the European Parliament and of the Council of 30 November 2009 on the conservation of wild birds (this is the codified version of Directive 79/409/EEC as amended). This Directive ensures far-reaching protection for all of Europe's wild birds, identifying 194 species and sub-species among them as particularly threatened and in need of special conservation measures. There are a number of components to this scheme:
	Member States are required to designate Special Protection Areas (SPAs) for 194 particularly threatened species and all migratory bird species. SPAs are scientifically identified areas critical for the survival of the targeted species, such as wetlands. They are part of the Natura 2000 ecological network set up under the Habitats Directive 92/43/EEC.
	A second component bans activities that directly threaten birds, such as the deliberate killing or capture of birds, the destruction of their nests and taking of their eggs, and associated activities such as trading in live or dead birds (with a few exceptions).

Document Name	Key Objectives, Requirements, and Guidance
	A third component establishes rules that limit the number of bird species that can be hunted (82 species and subspecies) and the periods during which they can be hunted. It also defines hunting methods which are permitted (e.g. non-selective hunting is banned).
EC Drinking Water Directive (98/83/EC)	The Drinking Water Directive sets out the following objectives:
	Sets quality standards for drinking water quality at the tap (microbiological, chemical, and organoleptic parameters) and the general obligation that drinking water must be wholesome and clean
	Obliges Member States to regular monitoring of drinking water quality and to provide to consumers adequate and up- to-date information on their drinking water quality
	Member States may exempt water supplies serving less than 50 persons or providing less than 10m3 of drinking water per day as an average and water in food-processing undertakings where the quality of water cannot affect the wholesomeness of the foodstuff in its finished form
EC Freshwater Fish Directive (2006/44/EC)	Updated 2013. The Freshwater Fish Directive is to be repealed in 2013 by the EC Water Framework Directive. The EC Freshwater Fish Directive (2006/44/EC) was originally adopted on 18 July 1978 but consolidated in 2006. The Directive seeks to protect those fresh water bodies identified by Member States as waters suitable for sustaining fish populations. For those waters it sets physical and chemical water quality objectives for salmonid waters and cyprinid waters.
EC Groundwater Directive (2006/118/EC)	This directive establishes a regime which sets underground water quality standards and introduces measures to prevent or limit inputs of pollutants into groundwater. The directive establishes quality criteria that takes account local characteristics and allows for further improvements to be made based on monitoring data and new scientific knowledge.
	The directive thus represents a proportionate and scientifically sound response to the requirements of the Water Framework Directive (WFD) as it relates to assessments on chemical status of groundwater and the identification and reversal of significant and sustained upward trends in pollutant concentrations. Member States will have to establish the standards at the most appropriate level and take into account local or regional conditions. The groundwater directive complements the Water Framework Directive. It requires:
	Groundwater quality standards to be established by the end of 2008

Document Name	Key Objectives, Requirements, and Guidance
	Pollution trend studies to be carried out by using existing data and data which is mandatory by the Water Framework Directive (referred to as 'baseline level' data obtained in 2007-2008)
	Pollution trends to be reversed so that environmental objectives are achieved by 2015 by using the measures set out in the WFD
	Measures to prevent or limit inputs of pollutants into groundwater to be operational so that WFD environmental objectives can be achieved by 2015
	Reviews of technical provisions of the directive to be carried out in 2013 and every six years thereafter
	Compliance with good chemical status criteria (based on EU standards of nitrates and pesticides and on threshold values established by Member States)
EC Marine Strategy Framework Directive (2008/56/EEC)	The aim of the Marine Strategy Framework Directive is to protect more effectively the marine environment across Europe. It aims to achieve Good Environmental Status (GES) of the EU's marine waters by 2020 and to protect the resource base upon which marine-related economic and social activities depend. The Directive enshrines in a legislative framework the ecosystem approach to the management of human activities having an impact on the marine environment, integrating the concepts of environmental protection and sustainable use.
EC Nitrates Directive (91/676/EC)	The Nitrates 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. This Directive forms integral part of the Water Framework Directive and is one of the key instruments in the protection of waters against agricultural pressures.
EC Water Framework Directive (2000/60/EC)	 The WFD has the following key aims: Expanding the scope of water protection to all waters, surface waters and groundwater Achieving 'good status' for all waters by a set deadline Water management based on river basins 'Combined approach' of emission limit values and quality standards Getting the prices right Getting the citizen involved more closely Streamlining legislation

Document Name	Key Objectives, Requirements, and Guidance
	There are a number of objectives in respect of which the quality of water is protected. The key ones at European level are general protection of the aquatic ecology, specific protection of unique and valuable habitats, protection of drinking water resources, and protection of bathing water. Member States must aim to reach good chemical and ecological status in inland and coastal waters by 2015.
Energy Act 2013	The Act makes provides a framework for delivering secure, affordable and low carbon energy. It includes provisions for decarbonisation and the duties in relation to it.
Establishing measures for the recovery of the stock of European eel 2007 (1100/2007)	Advice from the International Council for the Exploration of the Sea (ICES) in 2006 indicated that the stock of the European eel (<i>Anguilla anguilla</i>) is outside safe biological limits across European waters. The population has declined significantly, reducing to 5% of the original 1980s stock levels. In response to this advice, the European Union adopted Council Regulation (EC) No 1100/2007, which requires Member States to undertake a series of measures aimed at the recovery of eel stock. The goal is to achieve 40% escapement of adult eels, relative to that in absence of anthropogenic factors, to sea to spawn. The EU Regulation was transposed into UK law under The Eels (England and Wales) Regulations 2009. Eleven Eel Management Plans have been prepared, one for each River Basin identified in England and Wales. The plans outline the current situation and how we intend to achieve the targets required by the European Regulation. Such measures include a reduction in fishing pressure, improving access and habitat quality, and reducing the impacts of entrainment. The measures that will require the installation of passes at obstructions and screens at abstraction and discharge points that prevent the migration of eels.
EU Air Quality Directive (2008/50/EC)	It establishes ambitious, cost-effective targets for improving human health and environmental quality up to 2020. The EU objective on air quality is 'to achieve levels of air quality that do not result in unacceptable impacts on, and risks to, human health and the environment.'
EU Biodiversity Strategy for 2030: Our life insurance, our natural capital (2011)	 Strategy to halt the loss of biodiversity and ecosystem services in the EU by 2030 and the strategy aims to build societies' resilience to future threats such as: The impacts of climate change Forest fires Food insecurity Disease outbreaks – including by protecting wildlife and fighting illegal wildlife trade.

Document Name	Key Objectives, Requirements, and Guidance
	As part of the strategy, the following actions will be taken: establishing a larger EU-wide network of protected areas on land and at sea, launching an EU nature restoration plan, introducing measures to enable the necessary transformative change and introducing measures to enable the necessary transformative change.
EU Directive 2007/60/EC on the Assessment and Management of Flood Risks	Its aim is to reduce and manage the risks that floods pose to human health, the environment, cultural heritage, and economic activity. The Directive requires Member States to first carry out a preliminary assessment by 2011 to identify the river basins and associated coastal areas at risk of flooding. For such zones they would then need to draw up flood risk maps by 2013 and establish flood risk management plans focused on prevention, protection, and preparedness by 2015. The Directive applies to inland waters as well as all coastal waters across the whole territory of the EU.
EU Directive on the assessment of the effects of certain plans and programmes on the environment (SEA Directive) (2001/42/EC)	The SEA Directive aims to ensure a high level of environmental protection and that environmental considerations are considered when preparing, adopting and implementing plans and programmes. It has applied since 2001 and been law in EU countries since 2004. This directive applied to the public plans and programmes which have been prepared and/or adopted by a competent authority and which are subject to legislative, regulatory and administrative rules. The directive sets out a number of steps to follow when assessing a plan or programme that it applies to:
	 Scoping Preparing the Environmental Report Public consultation and participation Decision-making Monitoring
	EU countries may provide for coordinated or joint procedures in order to avoid duplication of environmental assessment in respect of plans and programmes for which the obligation to carry out assessments arises simultaneously from this directive. From July 2006, and every 7 years from this date, the European Commission will continue to submit reports in the application of the directive to the European Parliament and the Council.
EU Directive on the Promotion of the use of energy and renewable sources (2009/28/EC)	This Directive has applied since 2009 and became law in EU countries in 2010. It creates a common set of rules for the use of renewable energy in the EU so as to limit greenhouse gas emissions and promote cleaner transport. It sets nationally binding targets for all EU countries with the overall aims of making renewable energy sources account by 2020 for 20% of EU energy and 10% of energy specifically in the transport sector. Key points include:
	EU countries should build the necessary infrastructure for using renewable energy sources in the transport sector

Document Name	Key Objectives, Requirements, and Guidance
	 Each EU country must be able to guarantee the origin of electricity from renewable sources Each EU country is to make a national action plan for 2020, setting out how to achieve the national target for renewables in gross final energy consumption as well as the 10% target for renewable energy sources in transport. EU countries can exchange sources energy from renewable sources and to count toward their action plans, EU countries can also receive renewable energy from countries outside the EU provided the energy is used inside the EU.
EU Directive on transmissible animal diseases and amending and repealing certain acts in the areas of animal health ('EU Animal Health Law') (2016/429/EU)	Since April 2021 this directive has replaced the 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). The aim of the new directive is to prevent and control animal diseases that can be transmitted to other animals or humans. The EU animal health law is part of a package of measures proposed by the European Commission in May 2013 to strengthen the enforcement of health and safety standards for the entire agri-food chain. The direction prioritises 5 main points:
	 Clearer responsibilities for farmers Simplified administration for international trade in certain live animals and animal products A clearer legal basis and better tools for veterinary authorities to fight diseases More flexibility to adjust rules to local circumstances and emerging issues such as climate and social change Reducing adverse effects on animal and human health and the environment.
European Charter for the Protection and Sustainable Management of Soil (2003)	 The Charter sets out to protect soil as a complex natural resource which is fundamental to life. It recognises that: Soil is a precious asset Soil is a limited resource which is easily destroyed Land has a wide variety of uses and a proper planning policy is needed by Governments for urban development and civil engineering projects Farmers and foresters must preserve the soils quality Soil must be protected from erosion and pollution Further research and collaboration is required to ensure the wise use and conservation of soil.

Document Name	Key Objectives, Requirements, and Guidance
European Commission Environmental Liability Directive (2004/35/EC)	The Directives relates to the prevention and remedying of environmental damage (ELD) and establishes a framework based on the polluter pays principle to prevent and remedy environmental damage. The Directive defines "environmental damage" as damage to protected species and natural habitats, damage to water and damage to soil.
Fresh Water Fish Directive (2006/44/EC)	The Directive concerns the quality of fresh waters and shall apply to those waters designated by the Member States as needing protection or improvement in order to support fish life. This directive shall not apply to waters in natural or artificial fishponds used for intensive fish-farming.
Groundwater Directive (2006/118/EC)	This directive establishes a regime which sets underground water quality standards and introduces measures to prevent or limit inputs of pollutants into groundwater. The directive establishes quality criteria that takes account local characteristics and allows for further improvements to be made based on monitoring data and new scientific knowledge. The directive thus represents a proportionate and scientifically sound response to the requirements of the WFD as it relates to assessments on chemical status of groundwater and the identification and reversal of significant and sustained upward trends in pollutant concentrations. Member States will have to establish the standards at the most appropriate level and take into account local or regional conditions. The groundwater directive complements the WFD. It requires:
	Groundwater quality standards to be established by the end of 2008
	Pollution trend studies to be carried out by using existing data and data which is mandatory by the WFD (referred to as 'baseline level' data obtained in 2007-2008)
	Pollution trends to be reversed so that environmental objectives are achieved by 2015 by using the measures set out in the WFD
	Measures to prevent or limit inputs of pollutants into groundwater to be operational so that WFD environmental objectives can be achieved by 2015 Reviews of technical provisions of the directive to be carried out in 2013 and every six years thereafter
	Compliance with good chemical status criteria (based on EU standards of nitrates and pesticides and on threshold values established by Member States)
Limiting Global Climate Change to 2 Degrees Celsius:	This a set of binding legislation to ensure the EU meets its climate and energy targets for the year 2020. The targets are:
Document Name	Key Objectives, Requirements, and Guidance
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The Way Ahead for 2020 and Beyond (2007)	 20% reduction in GHGs 20% of EU energy from renewables 20% improvement in energy efficiency.
Mainstreaming Sustainable Development into EU Policies (2009) including Johannesburg Declaration on Sustainable Development (2002) and Renewed EU Sustainable Development Strategy (2006)	The aim of the Marine Strategy Framework Directive is to protect more effectively the marine environment across Europe. It aims to achieve Good Environmental Status of the EU's marine waters by 2020 and to protect the resource base upon which marine-related economic and social activities depend. The Directive enshrines in a legislative framework the ecosystem approach to the management of human activities having an impact on the marine environment, integrating the concepts of environmental protection and sustainable use
Marine Strategy Framework Directive (MSFD) (2008/56/EEC)	The MSFD has applied since 2008 and became law in Member States in 2010. The MSFD sets out a common EU approach and objectives for the prevention, protection, and conservation of the marine environment in view of the pressures and impacts of damaging human activities by means of an ecosystem-based approach. The MSFD requires members to:
	 Develop strategies to achieve a 'good environmental status' (GES) by 2020 Draw up and implement programmes of measures to achieve GES Draw up a monitoring programmes to measure and assess the progress made toward these targets Ensure the EC assesses whether the marine strategies constitute an appropriate framework to meet the directive's requirements and provides guidance accordingly.
Our life insurance, our natural capital: an EU biodiversity strategy to 2020 (2011)	 Strategy to halt the loss of biodiversity and ecosystem services in the EU by 2020. There are six main targets and 20 actions to help Europe reach its goal. The six targets cover: Full implementation of EU nature legislation to protect biodiversity Better protection for ecosystems, and more use of green infrastructure More sustainable agriculture and forestry Better management of fish stocks
	Tighter controls on invasive alien species

Document Name	Key Objectives, Requirements, and Guidance
	A bigger EU contribution to averting global biodiversity loss
	The strategy is in line with two commitments made by EU leaders in March 2010. The first is the 2020 headline target: 'Halting the loss of biodiversity and the degradation of ecosystem services in the EU by 2020, and restoring them in so far as feasible, while stepping up the EU contribution to averting global biodiversity loss'; the second is the 2050 vision: 'By 2050, European Union biodiversity and the ecosystem services it provides – its natural capital – are protected, valued and appropriately restored for biodiversity's intrinsic value and for their essential contribution to human wellbeing and economic prosperity, and so that catastrophic changes caused by the loss of biodiversity are avoided'.
Promotion of the use of energy and renewable sources Directive (2009/28/EC)	The Directive sets ambitious targets that the EU will reach a 20% share of energy from renewable sources by 2020 and a 10% share of renewable energy specifically in the transport sector. It also sets out to improve the legal framework for promoting renewable energy.
The Assessment and Management of Environmental Noise Directive (2002/49/EC)	This Directive was applied in 2002 and became law in EU countries in 2004. The Environmental Noise Directive aims to provide a common basis for combating the harmful effects of exposure to environmental noise across the EU. It seeks to control noise in built-up areas, public parks, quiet country areas, and near schools and hospitals. It does not apply to noise caused from domestic activities, in workplaces, inside transportations, or from military activities.
The Convention for the Protection of the Architectural Heritage of Europe (Granada Convention) (1985)	The Convention sets out to reinforce and promote policies for the conservation and enhancement of Europe's heritage. It also affirms the need for European solidarity with regard to heritage conservation and is designed to foster practical co-operation among the Parties. It establishes the principles of "European co-ordination of conservation policies" including consultations regarding the thrust of the policies to be implemented.
The Environmental Noise Directive (2002/49/EC)	The Directive is the EU's main instrument to identify noise pollution levels and covers the following three key action areas: the determination of exposure to environmental noise; ensuring that information on environmental noise and its effects is made available to the public; and preventing and reducing environmental noise where necessary and preserving environmental noise quality where it is good. It applies to noise to which humans are exposed, particularly in built-up areas, in public parks or other quiet areas in an agglomeration, in quiet areas in open country, near schools, hospitals and other noise-sensitive buildings and areas. It does not apply to noise that is caused by the exposed person himself, noise from domestic activities, noise created by neighbours, noise at workplaces or noise inside means of transport or due to military activities in military areas.

Document Name	Key Objectives, Requirements, and Guidance
The European Convention on the Protection of Archaeological Heritage (Valletta Convention) (1992)	The Convention aims to protect the archaeological heritage as a source of the European collective memory and as an instrument for historical and scientific study.
The European Landscape Convention (2004)	The Convention is also known as the Florence Convention and it aims to promotes the protection, management and planning of European landscapes and organises European co-operation on landscape issues.
The Nitrates Directive (91/676/EEC)	The Nitrates 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. This Directive forms integral part of the Water Framework Directive and is one of the key instruments in the protection of waters against agricultural pressures.
The Water Framework Directive (WFD) (2000/60/EC)	 The WFD has the following key aims: Expanding the scope of water protection to all waters, surface waters and groundwater Achieving 'good status' for all waters by a set deadline Water management based on river basins 'Combined approach' of emission limit values and quality standards Getting the prices right Getting the citizen involved more closely Streamlining legislation There are a number of objectives in respect of which the quality of water is protected. The key ones at European level are general protection of the aquatic ecology, specific protection of unique and valuable habitats, protection of drinking water resources, and protection of bathing water. Member States must aim to reach good chemical and ecological status in inland and coastal waters by 2015.
Thematic Strategy for Soil Protection (2006)	The Strategy aims to protect soil and promote its sustainable use. It is based on the following guiding principles:
	Preventing further soil degradation and preserving its functions
	Restoring degraded soils to a level of functionality consistent at least with current and intended use, thus also considering the cost implications of the restoration of soil.

Document Name	Key Objectives, Requirements, and Guidance
Thematic Strategy on Air Pollution (2005)	The Strategy recognises the impact of air pollution on human health and the environment. It establishes interim objectives for air pollution in the EU and proposes appropriate measures for achieving them.
Urban Wastewater Treatment Directive (91/271/EEC)	The objective of this Directive is to protect the environment from the adverse effects of urban wastewater discharges and discharges from certain industrial sectors. The Directive concerns the collection, treatment and discharge of such wastewater.
National	
A Green Future: Our 25 Year Plan to Improve the Environment, UK Government (2018)	The 25 Year Plan sets out the Governments actions for improving the health of the natural environment. It includes six actions in order achieve clean air, plentiful and clean water, thriving plants and wildlife, reduced harm from environmental hazards, sustainable resource use and enhanced beauty, heritage and engagement with the natural environment:
	 Using and managing land sustainably Recovering nature and enhancing the beauty of landscapes Connecting people with the environment to improve health and wellbeing Increasing resource efficiency, reducing pollution and waste Securing clean, productive and biologically diverse seas and oceans Protecting and improving the global environment
A Narrative for Conserving Freshwater and Wetlands in England, Natural England (2016)	Provides a narrative as to why the natural ecosystem system function is important for freshwater and wetland wildlife and recognises the ecosystem service benefits. It aims to provide a strategic framework for decision making for conserving these important habitats.
Ancient Monuments & Archaeological Areas Act (1979)	An Act to consolidate and amend the law relating to ancient monuments; to make provision for the investigation, preservation and recording of matters of archaeological or historical interest and (in connection therewith) for the regulation of operations or activities affecting such matters; to provide for the recovery of grants under section 10 of the Town and Country Planning (Amendment) Act 1972 or under section 4 of the Historic Buildings and Ancient Monuments Act 1953 in certain circumstances; and to provide for grants by the Secretary of State to the Architectural Heritage Fund.

Document Name	Key Objectives, Requirements, and Guidance
Ancient Woodland and Veteran Trees: Protecting them from development, Forestry Commission and Natural England (2014) (Updated 2017)	Sets out guiding principles for considerations when developments affect ancient woodlands or veteran trees. Ancient woodland is defined as an irreplaceable habitat which is important for wildlife, soils, recreational value and cultural, historical and landscape value. Ancient tree is one which attributes include the following: great age, size, condition, biodiversity, cultural heritage and value. The guidance also states that all ancient trees are veteran trees but not all veteran trees are ancient. A veteran tree may not be very old, but it has decay features, such as branch death and hollowing which contribute to its biodiversity, cultural and heritage value. When making decisions the following should be considered:
	Conserving and enhancing biodiversity
	Reducing the level of impact of the proposed development on ancient woodland and ancient and veteran trees.
Biodiversity 2020: A Strategy for England's Wildlife and Ecosystems (2011)	The Strategy builds on the Natural Environment White Paper and sets out how the UK is implementing the international and EU commitments. The mission for this strategy is as follows: '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'.
Climate Change – UK Programme (2006)	As the key UK document on Climate Change it contains a very broad range of issues covering the UK's strategy for climate change, actions to reduce emissions and adaptation to climate change.
	The UK's legally binding target under the Kyoto Protocol to reduce its greenhouse gas emissions to 12.5% below 1990 levels by 2008-2012 and its domestic goal of a 20% reduction in carbon dioxide emissions below 1990 levels by 2010.
	Emissions reductions are focussed in the following sectors:
	Energy supply
	Business
	Transport
	Domestic
	Agriculture, forestry, and land use

Document Name	Key Objectives, Requirements, and Guidance
	Public sector
Climate Change Act 2008	The Act sets out a legal framework to commit the Government to tackling climate change and climate change adaptation is also covered in the Act as it provides a legal framework for adaptation policy. The Act sets out a target of net zero by 2050 based on 1990 levels.
Climate Change and the Historic Environment, English Heritage (2008)	The statement recognises the climate change impacts the UK is facing and how this poses a risk to the historic environment.
Climate change approaches in water resources planning – Overview of new methods, Environment Agency (2013)	The water resources management and planning framework used in England and Wales has developed considerably over the past decade. Methods for incorporating climate change into the analysis have become more advanced over this time, at a cost of time and complexity that may not always have been proportionate to the situation faced by individual water companies. This document is only relevant to England and Wales.
Conservation 21 - Natural England's Conservation Strategy for the 21st Century, Natural England (2016)	The Strategy sets out how Natural England aim to contribute to the ambition set out the in Defra's strategy to 2020 and how they can work together with others to deliver this shared ambition. The Strategy is based on the following three principles:
	Creating resilient landscapes and seas
	Putting people at the heart of the environment
	Growing natural capital
Countryside Council for Wales (CCW) (2003) Priority Habitats of Wales	Gives information about Wales' priority habitats, as identified by UK Biodiversity Action Plans.
Creating a better place: Our ambition to 2020 (2016)	This aims to protect and improve natural resources in the UK and sits alongside Defra's 25 Year Environment Plan. It sets out the Environment Agency's vision, principles and purpose until 2020 as well as how they aim to deliver against the 25 Year Environment Plan.

Document Name	Key Objectives, Requirements, and Guidance
Creating a Great Place for Living: Defra's Strategy too 2020 (2016)	The Defra group sets out make air purer, water cleaner, land greener and food more sustainable, and their mission is to restore and enhance the environment for the next generation, and to leave the environment in a better state. There are 10 goals which underpin this mission and include:
	1. Sustainable farming and food
	2. Pure air, clean rivers and a resilient water supply
	3. Healthy seas and oceans
	4. Beautiful landscapes, flourishing wildlife and native species
	5. Thriving rural economies and communities
	6. Efficient resource use and reduced waste
	7. Protecting animals and plants from health risks
	8. Resilient communities and economies
	9. Great places for living for people and animals
	10. Green global Britain.
Defra (2015) The government's response to the Natural Capital Committee's third State of Natural Capital report	This provides a number of recommendations such as:
	 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.

Document Name	Key Objectives, Requirements, and Guidance
Delivering a healthy natural environment. Ecosystem approach action plan, Defra (2010)	Known as the "Ecosystems Approach Action Plan" (EAAP)), it was first published in 2007 and was then updated in 2010. It sets out the concept and framework of ecosystem services, and describes how this could be translated into "an ecosystems approach" to policy and decision making that could be applied at all levels of Government.
Draft National Policy	Draft National Policy Statement for Water Resources (November 2017)
Statement for Water Resources (2017)	The government recognises the need for a 'twin track' approach to improve the resilience of water supplies. This means further ambitious action to reduce the demand for water alongside new water resources. The government wants to make sure that where new large infrastructure is needed, it can be delivered in a timely manner to a high standard. To help achieve this, NPS will streamline the process of gaining planning consents for nationally significant water resource infrastructure projects.
	The government intends to support infrastructure that:
	Secures long-term resilience to the impacts of drought and climate change as set out in the strategic policy statement (SPS)14 to Ofwat and supports the aims of the government's national adaptation programme (NAP) on climate change
	Supports both an increase in population and economic growth across England, in line with the aims of the Industrial Strategy
	Supports the achievement of sustainability goals and enhances the environment, in line the Environment Agency's water industry national environment programme (WINEP) and in a way that will be set out in the government's 25-year environment plan
	Offers best value for customers so that water needs can be met in an affordable way both now and in the future, in line with the strategic objective set out in the SPS.
Draft National Policy Statement for Water Resources Infrastructure, Defra (2018)	The draft National Policy Statement for Water Resources Infrastructure (NPS) sets out the need and government's policies for the development of nationally significant infrastructure projects relevant to water resources in England. It is aligned with the goal of clean and plentiful water as set out in the UK Government's 25 Year Environment Plan and recognises that a twin track approach is required to secure resilient water supplies.

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Draft Water Resources Planning Guideline, Environment Agency (2020)	This document will an updated version of the above row's 2016 guideline. Currently, it has just surpassed the consultation phase.
Drought response: our framework for England, Environment Agency (2017)	The document outlines the national framework for how drought is managed by the Environment Agency, the government and water companies to reduce the effects on the people, business and the environment. It sets out how drought affects different areas of England, who is involved in management drought and how those stakeholders, and how drought is manged, monitored and reported on.
Environment Act 1995	The Act set out provisions for the creation of a number of government agencies including the Environment Agency and the Scottish Environment Protection Agency (SEPA). It also set out new standards for environmental protection.
Environment Agency (2014) Thames Catchment Abstraction Management Strategy	Sets out how much water is available for abstraction within the Thames catchment taking into account the needs of the environment and existing abstractors
Environment Agency Area Drought Plans (various)	Identifies the measures that will be taken by the Environment Agency to plan for and manage droughts.
Environment Agency Catchment Abstraction Management Strategies (CAMS)	CAMS is 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) are:
	 Arun and western streams Bristol Avon, Axe and North Somerset Streams Cherwell, Thame and Wye Colne Darent Hampshire Avon Kennet and Vale of White Horse Upper Lee

Document Name	Key Objectives, Requirements, and Guidance
	 Loddon London Medway Mole Roding, Beam and Ingrebourne Severn corridor Severn Vale Test and Itchen Thames Corridor Upper and Bedford Ouse Warwickshire Avon Wey Cotswolds Additional areas: Shropshire Middle Severn Staffordshire Trent Valley Tame Anker and Mease Warwickshire Avon
	 The aims of the CAMS are to: 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.
Environment Agency National Framework (2017)	Sets out how the Environment Agency will work with the Department for Environment Food and Rural Affairs

Document Name	Key Objectives, Requirements, and Guidance
Environment Protection Act (1990)	The Act aims to set out provisions for the control of pollution to the environment (air, water and land) by regulating the management of waste and emissions. It places a duty of care on any business or person who produces waste to do so carefully and in line with requirements.
Environmental Assessment of Plans and Programmes Regulations 2004	The regulations transpose the SEA Directive into UK law which requires an assessment of the effects of certain plans and programmes on the environment. Article 3 (2b) states that SEA is required for plans and programmes which are prepared for water management, set the framework for development consents, and/or are likely to have a significant environmental effect
Environmental Protection Act 1990	The Environmental Protection Act 1990 establishes in England, Scotland and Wales businesses' legal responsibilities for the duty of care for waste, contaminated land and statutory nuisance.
Fixing the foundations: Creating a more prosperous nation, HM Government (2015)	The reports sets out the importance of productivity and the Government's vision to delivering a UK economy which is the richest of all major economies by 2030. It includes two pillars for raising productivity: 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.
Flood and Water Management Act 2010	The Act seeks to address the threat of flooding and water scarcity. The Act takes forward a number of recommendations from the Pitt Review into the 2007 floods and places new responsibilities on the Environment Agency, local authorities and others to manage the risk of flooding. Climate projections suggest extreme weather will happen more frequently in the future and this Act is central to reducing the flood risk associated with extreme weather.
FRA Climate Change Guidance – Flood risk assessments: climate change allowances (2016)	 This guidance is for local planning authorities preparing risk assessments and for developers and their agents preparing flood risk assessments for planning applications. The document provides guidance for: Climate change allowances Peak river flow allowances Sea level allowances Offshore wind speed and wave height allowances.

Document Name	Key Objectives, Requirements, and Guidance
Future Water: The Government's Water Strategy	The Strategy sets out how the Government wants the water sector to look by 2030 and the steps required to get there. The Vision for water policy and management is one where, by 2030 at the latest, the Government has:
for England (2008)	 Improved the quality of our water environment and the ecology which it supports 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 water charges Cut greenhouse gas emissions Embedded continuous adaptation to climate change and other pressures across the water industry and water users
Government Statement on the Historic Environment	The historic environment is an asset of enormous cultural, social, economic and environmental value. It makes a very real contribution to our quality of life and the quality of our places. This document is intended to help government to realise its vision for the historic environment, and to assist us in working jointly with others to achieve our aims. In it we set out our understanding of the value of the historic environment, and the many roles that government and others can play.
Groundwater protection technical guide, Environmental Agency (2017)	If you're carrying out an activity that could lead to the input of substances to the ground, which could go on to affect the quality or quantity of groundwater, then you will need a permit. The Environment Agency will consider the geological characteristics of the location when assessing for a permit so this should be of importance to the permit application. This guide includes the discernability of hazardous substances and the geological formations that are permanently unsuitable for other purposes.
Groundwater Protection: Policy and Practice (GP3) 2013	Groundwater is important. It supplies about one third of mains drinking water in England and around three per cent in Wales. It also supports numerous private supplies. But pollution and demands for water puts the resource under pressure. The Environment Agency's core groundwater policy is: 'To protect and manage groundwater resources for present and future generations in ways that are appropriate for the risks that we identify'. Nine themes support this policy, with number four being: reducing flood risk. GP3 states that groundwater flooding is a significant but localised issue and in recent years, there has been considerable concern about the risk of flooding from groundwater. Groundwater flooding is a problem partly because it happens very infrequently. Memories or information about previous floods may have been lost. Developments may have taken place in areas susceptible to the break-out of new

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	springs or the appearance of lakes fed by groundwater. These 'new' groundwater features can flood property and land for many weeks because of the large storage potential of groundwater. Rising groundwater can also inundate sewers. This can cause serious problems for sewage treatment works, overloading their flow capacity and polluting surface water. The EA use a series of guiding principles to ensure a consistent approach to the assessment and management of
	groundwater. These are:
	 To secure the proper use of water resources for all purposes, including environmental need To protect the environment by:
	 Identifying a minimum flow or groundwater level below which abstraction may be curtailed or flows augmented Protecting flow and water-level variability across the full range of seasonal regimes from low to high water flow/level conditions
	 Protecting the critical aspects of the water environment including, where relevant, habitats that are dependent upon river flows or water levels, and recognising that some watercourses or wetlands are more sensitive than others to the impact of flow or level changes
	To ensure no reduction in existing protected rights To protect the interacts of other logitimate water users
	 To protect the interests of other regitimate water users To take account of existing and future local requirements that are currently not considered. These could be protecting or changing flows from rivers into estuaries in order to provide protection for the estuarine environment
	 To take account of water quality considerations throughout the catchment in both surface waters and groundwater
Making Space for Nature - A review of England's Wildlife Sites and Ecological Network (2010)	The report aims to answer the following questions: Do England's wildlife sites comprise a coherent and resilient ecological network? If not, what needs to be done? The report concludes that the approaches required to achieve a coherent and resilient ecological network are varied, and 24 wide-ranging recommendations are presented. Five themes unite them:
	We need to continue the recent progress in improving the management and condition of wildlife sites, particularly our SSSIs. We also make recommendations for how these should be designated and managed in ways that enhance their resilience to climate change.

Document Name	Key Objectives, Requirements, and Guidance
	We need to properly plan ecological networks, including restoration areas. Restoration needs to take place throughout England. However, in some areas, both the scale of what can be delivered to enhance the network, and the ensuing There are a large number of surviving patches of important wildlife habitat scattered across England outside of SSSIs, for example in Local Wildlife Sites. We need to take steps to improve the protection and management of these remaining wildlife habitats. 'Protection' will usually be best achieved through incentive-based mechanisms, but at times may require designation.
	We need to become better at deriving multiple benefits from the ways we use and interact with our environment. There are many things that society has to do that may seem to have rather little to do with nature conservation, but could have, or even should have if we embrace more radical thinking; flood management by creating wetlands is an obvious example. We need to exploit these 'win-win' opportunities to the full. Being better at valuing a wider range of ecosystem services would help this process.
	We will not achieve a step-change in nature conservation in England without society accepting it to be necessary, desirable, and achievable. This will require strong leadership from government and significant improvements in collaboration between local authorities, local communities, statutory agencies, the voluntary and private sectors, farmers, landowners and other land-managers and individual citizens.
Making Space for Nature - A review of England's Wildlife Sites and Ecological Network (Lawton, 2010)	The report aims to answer the following questions: Do England's wildlife sites comprise a coherent and resilient ecological network? If not, what needs to be done?
	The report concludes that the approaches required to achieve a coherent and resilient ecological network are varied, and 24 wide-ranging recommendations are presented. Five themes unite them:
	We need to continue the recent progress in improving the management and condition of wildlife sites, particularly our SSSIs. We also make recommendations for how these should be designated and managed in ways that enhance their resilience to climate change
	We need to properly plan ecological networks, including restoration areas. Restoration needs to take place throughout England. However, in some areas, both the scale of what can be delivered to enhance the network, and the ensuing There are a large number of surviving patches of important wildlife habitat scattered across England outside of SSSIs, for example in Local Wildlife Sites. We need to take steps to improve the protection and management of these

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	Recommendation 4 is relevant for Thames Water and states:
	 'Public bodies and statutory undertakers planning the management of water resources should: Make space for water and wildlife along rivers and around wetlands Restore natural processes in river catchments, including in ways that support climate change adaptation and mitigation Accelerate the programme to reduce nutrient overload, particularly from diffuse pollution'
Managing Water Abstraction, Environment Agency (2021)	This document explains how to make sure there is enough water for the future needs of people and the environment. The policy paper includes advice on river basin management, water abstraction plans, catchment abstraction management systems, the national framework, the EA drought plans, the water industry national environment programme, and water company plans.
Marine and Coastal Areas Access Act 2009	The Marina and Coastal Access Act 2009 gained Royal Assent on 12th November 2009 and provides the legal mechanism to help ensure clean, healthy, safe, productive and biologically diverse oceans and seas by putting in place a new system for improved management and protection of the marine and coastal environment. The Marine Act, which mainly affects England and Wales, comprised eight key elements: A Marine Management Organisation (MMO), a Strategic Marine Planning System, a Streamlined Marine Licensing System, Marine Nature Conservation,

Document Name	Key Objectives, Requirements, and Guidance
	Fisheries Management and Marine Enforcement, Migratory and Freshwater Fisheries, Coastal Access, Coastal and Estuarine Management.
Marine Plans – South East Inshore, South Inshore, South Offshore (Marine Management Organisation)	 A marine plan: Sets out priorities and directions for future development within the plan area Informs sustainable use of marine resources Helps marine users understand the best locations for their activities, including where new developments may be appropriate. Each of the 11 marine plan areas will have a marine plan with a long-term (20 years) view of activities and will be reviewed every three years. There will be ten marine plans as the North West will have a single plan following requests to have a single process and one plan for these areas. All marine plan areas are scheduled to have a plan by 2021.
National Infrastructure Delivery Plan 2016-2021, Infrastructure and Projects Authority (HM Government) (2016)	 Sets out the Government's plans for economic infrastructure over the next 5 years to support delivery of housing and social infrastructure. The Plan recognises that water services are likely to come under increasing pressure because of population growth and a changing climate. The Plan sets out the following key objectives for water: Start of construction on the Thames Tideway Tunnel Reductions in average bills of about 5% in real terms Further expenditure from 2020 with the start of Asset Management Period 7
National Parks and Access to the Countryside Act (1949)	An Act to make provision for National Parks and the establishment of a National Parks Commission; to confer on the Nature Conservancy and local authorities powers for the establishment and maintenance of nature reserves; to make further provision for the recording, creation, maintenance and improvement of public paths and for securing access to open country, and to amend the law relating to rights of way; to confer further powers for preserving and enhancing natural beauty; and for matters connected with the purposes aforesaid.
National Planning Policy Framework (NPPF) (updated July 2021)	The updated NPPF sets out government's planning policies for England and how these are expected to be applied. Achieving sustainable development is at the heart of the NPPF whereby it has three overarching objectives in the social, economic and environmental spheres.
National Policy Statement for Wastewater (2012)	This National Policy Statement (NPS) sets out Government policy for the provision of major wastewater infrastructure. It will be used by the decision maker as the primary basis for deciding development consent applications for wastewater developments that fall within the definition of Nationally Significant Infrastructure Projects (NSIP) as

Document Name	Key Objectives, Requirements, and Guidance
	defined in the Planning Act 2008. The policy set out in this NPS is, for the most part, intended to make existing policy and practice in consenting nationally significant wastewater infrastructure clearer and more transparent, rather than to change the underlying policies against which applications are assessed.
Natural Environment White Paper (2012)	This White Paper recognises that a healthy, properly functioning natural environment is the foundation of sustained economic growth, prospering communities and personal well-being. It aims to mainstream the value of nature across society, including across government departments by:
	 Facilitating greater local action to protect and improve nature 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 Strengthening the connections between people and nature to the benefit of both Showing leadership in the European Union and internationally, to protect and enhance natural assets globally
Natural Resources Wales, Drought Plan	Natural Resources Wales produces a drought plan – it describes indicators used to classify different stages of a drought.
Our Waste, Our Resources: A Strategy for England, HM Government (2018)	The Strategy recognises that natural capital is one of our most valuable assets and sets out how the Government plans to preserve the stock of material resources by minimising waste, promoting resource efficiency and moving towards a circular economy. They also set out how they aim to minimise damage to the natural environment and is aligned to the Government's 25 Year Environment Plan. This is our blueprint for eliminating avoidable plastic waste over the lifetime of the 25 Year Plan, doubling resource productivity, and eliminating avoidable waste of all kinds by 2050.
Planning (Listed Building & Conservation areas) Act 1990	An Act of Parliament that altered the laws on granting of planning permission for building works, notably including those of the listed building system in England and Wales
Planning Act (2008)	An Act to establish the Infrastructure Planning Commission and make provision about its functions; to make provision about, and about matters ancillary to, the authorisation of projects for the development of nationally significant infrastructure; to make provision about town and country planning; to make provision about the imposition of a Community Infrastructure Levy; and for connected purposes.
Preparing for a drier future: England's water infrastructure	Sets out the National Infrastructure Commission's advice on how to address England's water supply challenges and deliver the appropriate level of resilience for the long term. It recognises that water shortages is a risk in England and

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needs, National Infrastructure Commission (2018)	that climate change alongside an increasing population A (especially in the drier south and east) and the need to protect the environment will result in further challenges.
Protect groundwater and prevent groundwater pollution, Environment Agency (2017)	This guidance document aims to help one apply for a permit or licence to discharge or abstract from groundwater. The document explains what groundwater is, how to prevent groundwater pollution, how to prevent hazardous substances from entering groundwater, how to limit non-hazardous substances from entering groundwater, how to consider the geological characteristics of the location, groundwater vulnerability, the restrictions within groundwater sensitive locations, any sensitive groundwater locations, and saline intrusion.
Safeguarding our Soils – A strategy for England, Defra (2009)	The Strategy recognises that soil is fundamental resource and sets out a 2030 vision for the sustainable management of soil where degradation threats are tackled successfully. It aims to improve the quality of England's soils and safeguard their ability to provide essential services for future generations.
Salmon and Fresh Water Fisheries Act (1975)	The Act sets out the legal framework in which salmon and freshwater fisheries are regulated. It covers regulation on fishing methods and related offences, obstructions to fish passage, salmon and freshwater fisheries administration and law enforcement.
Securing the future – Delivering UK Sustainable Development Strategy (2005)	The Strategy for sustainable development aims to '…enable all people throughout the world to satisfy their basic needs and enjoy a better quality of life without compromising the quality of life of future generations.' Guiding principles: Living within environmental limits Ensuring a strong, healthy, and just society Achieving a sustainable economy Promoting good governance Using sound science responsibly UK priorities for immediate action: Sustainable consumption and production Climate change and energy Natural resource protection and environmental enhancement Sustainable communities

Document Name	Key Objectives, Requirements, and Guidance
Site Improvement Plans for England's Natura (IPENS) 2000 sites: East, Natural England	Special Areas of Conservation (SAC) and Special Protection Areas (SPA) are collectively known as Natura 2000 sites and are protected under European legislation for their important wildlife and habitats. In England there are 338 sites covering 2,076,875 hectares. A wide range of organisations and individuals own, manage or have an interest in Natura 2000 sites. This includes government agencies, voluntary bodies, private companies and individuals who collectively have a wealth of knowledge and experience. The improvement programme for England's Natura 2000 sites (IPENS) is working with these partners, and other stakeholders to develop a strategic approach to achieving favourable condition on these sites by reviewing:
	 The risks and issues that are impacting on and/or threatening the condition of the site Which actions and measures could be used to address them How much it will cost and where the money could come from This will be the first time that this information will have been drawn together for all of England's Natura 2000 sites. It will provide Natural England and our partners with: An improved understanding of the issues affecting the sites and how to address them A clear plan of action for improving their condition and how much it may cost Recommendations to improve gaps in funding and evidence.
Standing Advice on Protected Species, Natural England (2022)	Provides guidance on reviewing planning applications which might have an affected on protected species.
State of Natural Capital Annual Report 2020. Natural Capital Committee (2020)	The Nature Capital Committee's seventh annual report on the state of natural capital. The report recognises the importance that nature-based interventions will have on achieving net zero by 2050 targets. The report makes recommendations for the Government to take forward and outlines key points for inclusion within the Environment Bill.
Strategic Environmental Assessment, Sustainability Appraisal and the Historic Environment, Historic Environment (2016)	This advice note aims to support all those involved in assessing the effects of certain plans on the historic environment. It offers advice on heritage considerations during the Sustainability Appraisal and Strategic Environmental Assessment Process, and on implementing historic environment legislation, the relevant National Planning Policy Framework and the related guidance given in the Planning Practice Guidance as well as the Marine Policy Statement. This advice note supersedes the 2013 publication on the same matter.

Document Name	Key Objectives, Requirements, and Guidance
Sustainable Farming and Food Strategy – Forward Look (2006)	 The Strategy sets out the Government's priorities for delivering a sustainable farming and food sector. It is structured around five priority themes, which are closely inter-related. The themes are: Succeeding in the market Improving the environmental performance of farming Sustainable consumption and production Climate change and agriculture Animal health and welfare.
The Ancient Monuments and Archaeological Areas Act 1979	This Act is concerned with the provisioning, investigation, recording and the preservation and protection of archaeological sites and ancient monuments.
The Conservation of Habitats and Species (Amendment) (EU Exit) (Regulations 2019)	This instrument provides changes to those parts of the 2017 conservation of habitats and species regulations which would no longer work when the UK leaves the EU.
The Conservation of Habitats and Species Regulations (2010) (amended 2011)	The Conservation of Habitats and Species Regulations 2010 apply in the terrestrial environment and in territorial waters out to 12 nautical miles. The EU Habitats and Wild Birds Directives are transposed in UK offshore waters by separate regulations. The new regulations do not make any substantive changes to existing policies and procedures other than the establishment of the Marine Management Organisation. The Marine Management Organisation takes on certain licensing functions from Natural England to ensure consistency with the approach in the Marine and Coastal Access Act 2009. The objective of the Habitats Directive is to protect biodiversity through the conservation of natural habitats and species of wild fauna and flora. The Directive lays down rules for the protection, management and exploitation of such habitats and species.
The Countryside and Rights of Way (CROW) Act 2000	The Act was introduced in 2000 with the intention to give greater freedom for people to explore open countryside and contains provisions to introduce a new statutory right of access for open-air recreation to mountain, moor, heath, down and registered common land. It also includes a power to extend the right to coastal land by order and enables landowners voluntarily to dedicate irrevocably any land to public access.
The draft Environment Bill 2020	The Bill was first introduced to parliament in October 2019 and then reintroduced in January 2020. The Bill is currently under review by a Public Bill Committee. The Environment Bill will support the 25 Year Environment Plan and brings about urgent and meaningful action to combat the environmental issues that the UK is facing. It sets out a requirement

Document Name	Key Objectives, Requirements, and Guidance
	for biodiversity net gain which includes at least a 10% improvement in biodiversity value for new development. It also includes details on:
	 Creating a new governance framework for the environment A new direction for resources and waste management Improving air quality Securing our water services Enhancing our green spaces Updating laws on chemicals (REACH)
The Eels (England and Wales) Regulations 2009 (as amended)	Transposed from the European Directive (1100/2007) into UK law, the Regulations aim to establish measures for the recovery of the stock of European eel. The Regulations will help implement delivery Eel Management Plans.
The Environment Act 2021	This Act comprises of two halves: a legal framework for environmental governance, and the provision of making specific improvement of the environment. They key need for this Act was to redesign the environmental elements of law post the UK's EU exit, thus fulfilling a legal obligation set out in section 16 of the European Union Withdrawal Act 2018. The measures published at that time related only to environmental principles and governance and placing the previous government's 25 Year Plan on statutory footing. The Environment Act was carried over from the 2019-21 Parliamentary sessions into the following session due to the COVID-19 pandemic.
The Environment Agency's approach to groundwater protection, Environment Agency (2018)	This document updates the 'Groundwater Protection: Principles and Practice'. It contains position statements which provide information about the Environment Agency's approach to managing and protecting groundwater. This document will be of interest to developers, planners, environmental permit applicants and holders, abstractors, operators and anyone whose current or proposed activities have an impact on or are affected by groundwater. Each section is focused on different activities or sectors.
The Environmental Assessment of Plans and Programmes Regulations 2004 (also known as the SEA Regulations)	These regulations implement Directive 2001/42/EC on the assessment of effects of certain plans and programmes on the environment as regards plans and programmes relating solely to any part of England it also implements Council Directive 85/337/EC which is to be referred to as the SEA Directive.

Document Name	Key Objectives, Requirements, and Guidance
The Environmental Damage (Prevention and Remediation) (England) Regulations 2015	The Regulations seek to ensure action is taken put any environmental damage right and are based on the 'polluter pays principle'. It transposes the European Commission Environmental Liability Directive into UK law. The Regulations require action in response to the most significant cases, covering specific types of: damage to species and habitats; damage to water; or risks to human health from contamination of land
The Great Britain Invasive Non-Native Species Strategy, Defra (2015)	The Strategy builds on the first which was published in 2008 and sets out a series of aims and objectives to underpin action until 2020. It aims to address the issues of INNS in the UK to protect biodiversity, quality of life and economic interests.
The Invasive Alien Species (Enforcement and Permitting) Order 2019	The Order brings into force the EU Invasive Alien Species Regulation (1143/2014) on the prevention and management of invasive alien plant and animal species in England and Wales, including the relevant licenses, permits and rules for keeping invasive alien species
The National Adaptation Programme and the Third Strategy for Climate Adaptation Reporting, Defra (2018)	This is the second National Adaptation Programme (NAP) and sets out the Government's response to the second Climate Change Risk Assessment (CCRA). It also outlines the actions that will be taken to address the climate change issues identified in the CCRA across the following key sectors: Natural environment; Infrastructure; People and the built environment; Business and industry; and Local government.
The Natural Choice: Securing the Value of Nature, Defra (2011)	The White Paper outlines the Government's vision for the natural environment for the next 50 years
The Natural Environment and Communities Act 2006 (NERC Act)	The Natural Environment and Rural Communities Act is designed to help achieve a rich and diverse natural environment and thriving rural communities through modernised and simplified arrangements for delivering Government policy. It is about conserving and enhancing places and nature and helping people to enjoy them – taking a wider view, pursuing environmental management which encompasses access and recreation, and aiming where possible to achieve economic and social outcomes alongside conservation goals.
The Setting of Heritage Assets, Historic Environment Good Practice Advice in	Sets out guidance on managing change within the settings of heritage assets, including archaeological remains and historic buildings, sites, areas, and landscapes, against the backdrop of the NPPF. It gives general advice on understanding setting, and how it may contribute to the significance of heritage assets and allow that significance to be appreciated, as well as advice on how views contribute to setting.

Document Name	Key Objectives, Requirements, and Guidance
Planning 3 Second Edition, Historic Environment (2017)	
The UK's shared framework	The priority areas for immediate action, shared across the UK are:
for sustainable development (2005)	Sustainable Consumption and Production – Sustainable consumption and production is about achieving more with less. This means not only looking at how goods and services are produced, but also the impacts of products and materials across their whole lifecycle and building on people's awareness of social and environmental concerns. This includes reducing the inefficient use of resources, which is a drag on the economy, so helping boost business competitiveness and to break the link between economic growth and environmental degradation.
	Climate Change and Energy –The effects of a changing climate can already be seen. Temperatures and sea levels are rising, ice and snow cover are declining, and the consequences could be catastrophic for the natural world and society. Scientific evidence points to the release of greenhouse gases – such as carbon dioxide and methane – into the atmosphere by human activity as the primary cause of climatic change. We will seek to secure a profound change in the way we generate and use energy, and in other activities that release these gases. We must set a good example and will encourage others to follow it.
	Natural Resource Protection and Environmental Enhancement – Natural resources are vital to our existence and that of communities throughout the world. We need a better understanding of environmental limits, environmental enhancement and recovery where the environment is most degraded to ensure a decent environment for everyone, and a more integrated policy framework.
	Sustainable Communities – Our aim is to create sustainable communities that embody the principles of sustainable development at the local level. This will involve working to give communities more power and say in the decisions that affect them; and working in partnership at the right level to get things done. The UK uses the same principles of engagement, partnership, and programmes of aid in order to tackle poverty and environmental degradation and to ensure good governance in overseas communities.
The Water Environment (Water Framework Directive) (England and Wales)	The Regulations transpose the EC WFD in UK law. They will help implement the WFD requirement in England and Walos. They aim to protect and enhance the quality of:
	Wales. They aim to protect and emilance the quality of.
Regulations 2003	 Surrace treshwater (including lakes, streams, and rivers) Groundwaters

Document Name	Key Objectives, Requirements, and Guidance
	 Groundwater dependant ecosystems Estuaries Coastal waters out to one mile from low-water
The Wildlife and Countryside Act 1981 (as amended)	The Wildlife and Countryside Act is the main Act which protects animals, plans and habitats in the UK. It implements the Bern Convention and the Birds Directive and contains details of European and national designated sites, protection for designated species.
UK Climate Change Risk Assessment, Defra (2017)	 Identifies the key climate change risks and opportunities for the UK which are as follows: Flooding and coastal change risks to communities, businesses and infrastructure Risks to health, well-being and productivity from high temperatures Risks of shortages in the public water supply for agriculture, energy generation and industry Risks to natural capital including terrestrial, coastal, marine and freshwater ecosystems, soils and biodiversity Risks to domestic and international food production and trade New and emerging pests and diseases and invasive non-native species affecting people, plants and animals.
UK Climate Projections 18, Met Office (2018)	This document is primarily intended to underpin messages for the interested public and media. It also serves as a summary for users of UKCP18 including the guidance and science reports expected to get more detailed information from other sources, including the UKCP18 website. The UK Climate Predictions 2018 are based on the latest developments in climate science and were subject to an independent peer review to assess the science that underpins it.
UK Flood risk and coastal erosion Policy Statement (2020)	This policy statement sets out the government's long-term ambition to create a nation more resilient to future flood and coastal erosion risk. This means to reduce the risk of harm to people, the environment, and the economy. This policy statement forms part of the government's wider commitment to tackle climate change. It has been informed by the Environment Agency's consultation exercise on the updated National Flood and Coastal Erosion Risk Management Strategy, the results of the government's Call of Evidence 2019, and advice from the National Infrastructure Commission and the Committee on Climate Change. The Policy Statement sets out 5 areas to drive this:
	 Upgrading and expanding our national flood defences Managing the flow of water more effectively Harnessing the power of nature to reduce flood and coastal erosion risk and achieve multiple benefits Better preparing our communities

Document Name	Key Objectives, Requirements, and Guidance
	Enabling more resilient places through a catchment-based approach.
UK Marine Policy Statement (2011)	This Marine Policy Statement (MPS) is the framework for preparing Marine Plans and taking decisions affecting the marine environment. It will contribute to the achievement of sustainable development in the United Kingdom marine area. It has been prepared and adopted for the purposes of section 44 of the Marine and Coastal Access Act 2009.
	The MPS will facilitate and support the formulation of Marine Plans, ensuring that marine resources are used in a sustainable way in line with the high-level marine objectives and thereby:
	 Promote sustainable economic development Enable the UK's move towards a low-carbon economy, in order to mitigate the causes of climate change and ocean acidification and adapt to their effects Ensure a sustainable marine environment which promotes healthy, functioning marine ecosystems and protects marine habitats, species and our heritage assets Contribute to the societal benefits of the marine area, including the sustainable use of marine resources to address local social and economic issues
UK National Ecosystem Assessment Follow-on Reports (2014)	The 2011 UK National Ecosystem Assessment (UK NEA) which identified that the natural world and its ecosystems are important to our well-being and economic prosperity, however they are consistently undervalued. This follow on provides new information and tools to help decision makers integrate the value of ecosystems into decision making.
UK Post-2010 Biodiversity Framework (2012)	 The purpose of the Framework is to set a broad enabling structure for action across the UK between now and 2020: To set out a shared vision and priorities for UK-scale activities, in a framework jointly owned by the four countries, and to which their own strategies will contribute To identify priority work at a UK level which will be needed to help deliver the Aichi targets and the EU Biodiversity Strategy To facilitate the aggregation and collation of information on activity and outcomes across all countries of the UK, where the four countries agree this will bring benefits compared to individual country work To streamline governance arrangements for UK-scale activity
UK Post-2010 Biodiversity Framework, JNCC and Defra (2012)	 The purpose of the Framework is to set a broad enabling structure for action across the UK between now and 2020: To set out a shared vision and priorities for UK-scale activities, in a framework jointly owned by the four countries, and to which their own strategies will contribute

Document Name	Key Objectives, Requirements, and Guidance
	 To identify priority work at a UK level which will be needed to help deliver the Aichi targets and the EU Biodiversity Strategy To facilitate the aggregation and collation of information on activity and outcomes across all countries of the UK, where the four countries agree this will bring benefits compared to individual country work To streamline governance arrangements for UK-scale activity.
Understanding the Risks, Empowering Communities, Building Resilience: The National Flood and Coastal Erosion Risk Management Strategy for England (2011)	The Strategy's overall aim is to: 'ensure that flooding and coastal erosion risks are well managed and coordinated, so that their impacts are minimised'. The Strategy was published by the Environment Agency and the Department for Environment, Food, and Rural Affairs (Defra) to ensure that government, the Environment Agency, local authorities, water companies, internal drainage boards and other organisations that have a role in flood and coastal erosion risk management (FCERM) understand each other's roles and co-ordinate how they manage these risks.
	 Manage the risk of flooding and coastal erosion to people and their property. Over time, the Government will be able, where possible, to improve standards of protection Help householders, businesses and communities better understand and manage the flood and coastal erosion risks they face Respond better to flood incidents and during recovery, and to coastal erosion Move the focus from national government-funded activities towards a new approach that gives more power to local people, either at an individual, community or local authority level. Local innovations and solutions will be encouraged, too Invest in actions that benefit communities who face the greatest risk, but who are least able to afford to help themselves Put sustainability at the heart of the actions we take, so that we work with nature and benefit the environment, people and the economy
Water Act 2003 (as amended)	The Act amends the Water Resources Act and Regulations 1991 and the Water Industry Act 1991. The Act has the following four broad aims:
	 The sustainable use of water resources Strengthening the voice of consumers A measured increase in competition

Document Name	Key Objectives, Requirements, and Guidance
	The promotion of water conservation
Water for Life White Paper, Defra (2011)	This White Paper sets out a vision for future water management in which the water sector is resilient; water companies are more efficient and customer focused; and water is valued as the precious and finite resource it is. It explains that everyone has a part to play in the realisation of this vision. It sets out the principles and timetable for an overhaul of the abstraction regime, which governs how and when water can be taken from the environment for use by business, agriculture and the public; and explains how improved interconnections between water catchments will allow water to be moved more easily around the country to areas of need. It details Government policy on charging for water and providing help to those who struggle to afford their bills.
Water Industry Act 1991	The Act sets out the main powers and duties of the water and sewerage companies, thus replacing those set out in the Water Act 1989, and defined the powers of the Director General of Water Services (now the Water Services Regulation Authority (Ofwat)).
Water industry strategic environmental requirements (WISER) (2022)	A strategic steer to water companies on the environment, resilience, and flood risk for business planning purposes.
Water Resources Act 1991	The Act sets out the functions of National Rivers Authority (now the Environment Agency) and introduced water quality classifications and objectives for the first time.
Water Resources Management Plan Regulations 2007	The National Assembly for Wales in relation to water undertakers whose areas are wholly or mainly in Wales, and the Secretary of State in relation to all other water undertakers, in exercise of the powers conferred upon them by sections 37B(3)(a) and (c), (5), (6) and (8)(a), 213(2)(e) and (f) and 219 of the Water Industry Act 1991, and after consultation with each other to make the WRMP regulations.
Water Resources Planning Framework (2015-2065), Water UK (2016)	In accordance with the Water Industry Act 1991, each water company must produce a Water Resources Management Plan (WRMP). These plans are updated every 5 years with the aim of ensuring that there is a sufficient supply of water to meet the anticipated demands of its customers over a minimum 25-year planning period, even under conditions where water supplies are stressed, that is, under dry conditions where supplies are stretched and demand for water tends to be higher than normal. Water companies are also required to produce Drought Plans. These demonstrate how each water company would manage the security of supplies in the event of impending or actual drought events, which are normally of short duration (typically affecting water supplies over a period of one to two years). The Drought

Document Name	Key Objectives, Requirements, and Guidance
	Plan describes the company's tactical and operational responses during a drought event, whereas the WRMP is a strategic plan setting out the planned investments required over a 25-year period.
Water Resources Planning Guideline, Environment Agency (2016)	This Planning Guideline is relevant to England and Wales and those producing regional plans. Your WRMP sets out how you intend to achieve a secure supply of water for your customers and a protected and enhanced environment. This guideline recommends using adaptive planning within the preferred planning. A preferred programme is reference to the most likely future and the pathway through it. This guideline instructs on how to write a plan that complies with all the relevant statutory requirements and government policy.
Water Supply (Water Quality) Regulations 2016 (as amended)	The regulations consolidate legislation concerning the quality of water supplies for human consumption in England. They also apply in Wales where the water undertaker or licensee is primarily based in England.
Water White Paper (2011)	This White Paper sets out a vision for future water management in which the water sector is resilient; water companies are more efficient and customer focused; and water is valued as the precious and finite resource it is. It explains that everyone has a part to play in the realisation of this vision.
Well-being of Future Generations (Wales) Act 2015	 This puts in place a sustainable development principle and places a well-being duty on public bodies. Public bodies will set and publish wellbeing objectives. There are seven well-being goals: A prosperous Wales; An innovative, productive and low carbon society which recognises the limits of the global environment and therefore uses resources efficiently and proportionately (including acting on climate change); and which develops a skilled and well-educated population in an economy which generates wealth and provides employment opportunities, allowing people to take advantage of the wealth generated through securing decent work. A resilient Wales; A nation which maintains and enhances a biodiverse natural environment with healthy functioning ecosystems that support social, economic and ecological resilience and the capacity to adapt to change (for example climate change). A healthier Wales; A society in which people's physical and mental well-being is maximised and in which choices and behaviours that benefit future health are understood. A more equal Wales; A society that enables people to fulfil their potential no matter what their background or circumstances (including their socio economic background and circumstances). A Wales of cohesive communities; Attractive, viable, safe and well-connected communities.

Document Name	Key Objectives, Requirements, and Guidance
	 A Wales of vibrant culture and thriving Welsh language; A society that promotes and protects culture, heritage and the Welsh language, and which encourages people to participate in the arts, and sports and recreation. A globally responsible Wales. A nation which, when doing anything to improve the economic, social, environmental and cultural well-being of Wales, takes account of whether doing such a thing may make a positive contribution to global well-being.
Wildlife and Countryside Act 1981 (as amended)	The Act makes it an offence (subject to exceptions) to intentionally kill, injure, or take, possess, or trade in any wild animal listed in Schedule 5, and prohibits interference with places used for shelter or protection, or intentionally disturbing animals occupying such places. The Act also prohibits certain methods of killing, injuring, or taking wild animals. The Act requires surveying authorities to maintain up to date definitive maps and statements, for the purpose of clarifying public rights of way.
Regional	
Welsh Government, (2015) A Water Strategy for Wales	 This strategy sets out the strategic direction for water policy in Wales for the next 20 years and beyond. Key themes are: Water for nature, people and business – how quality and quantity of water resources will be sustainably managed, meeting society's needs and offering opportunities for green growth whilst protecting and enhancing the natural environment. Improving the way we plan and manage our water services – ensuring water services remain robust, sustainable and support high quality services now and in the future. Delivering excellent services to customers – ensure people and businesses have access to affordable water and sewerage services that are sustainable, safe, secure and dependable. Protecting and improving drinking water quality – ensuring compliance with the Drinking Water Directive and ensuring that any quality problems are effectively dealt with. 21st century sewerage and drainage system – both waste water and surface water managed in a sustainable way. Supporting delivery.
	Under each theme is a range of actions to address the challenges set out in the strategy and to assist in meeting wellbeing goals and sustainable development principle.

Document Name	Key Objectives, Requirements, and Guidance
Welsh Assembly Government (2014) National Strategy for Flood and Coastal Erosion Risk Management	 The objectives are: Reducing the consequences for individuals, communities, businesses and the environment from flooding and coastal erosion. Raising awareness of and engaging people on flood and coastal erosion risk. Providing an effective and sustained response to flood and coastal erosion events Prioritising investment in the most at risk categories.
Welsh Assembly Government (consultation document 2012), Sustaining a Living Wales: a green paper on a new approach to natural resource management	This consultation document sought views on proposed changes to the governance and delivery of the management and regulation of the environment in Wales based on the ecosystem approach.
Welsh Assembly Government (2012), State of the Environment Report – Wales	This bulletin presents an overview of progress against the Welsh Assembly Government's Environment Strategy. It summarises the latest information on the indicators monitoring the progress. The results for individual indicators are presented in a series of electronic reports.
Welsh Assembly Government (2008) Wales Spatial Plan	 The Wales Spatial Plan provides the framework for future collaborative action between the Welsh Assembly Government and its partners to achieve sustainable economic growth across the whole of Wales. The plan emphasises the need for coordinated action at national, regional and local levels. The Spatial plan sets out a range of objectives under five headings: Building sustainable communities Promoting a sustainable economy Valuing our environment Achieving sustainable accessibility Respecting distinctiveness
Welsh Assembly Government (2009) One Wales: One Planet – a new sustainable	One Wales One Planet sets out proposals to promote sustainable development and how WAG will make sustainable development a reality for people in Wales, and outlines the benefits that people will see from this, particularly in less well-off communities.

Document Name	Key Objectives, Requirements, and Guidance
development scheme for Wales	
Welsh Assembly Government (2010) Climate Change Strategy for Wales	 Climate Change Strategy and associated Delivery Plans confirm WAG's commitment to tackling issues of future climate change. Strategy addresses: The vision for 2050, and how this Strategy supports our Sustainable Development Scheme, One Wales: One Planet. Key target to cut greenhouse gas emissions by 3% per year in areas of devolved competence Climate change impacts for Wales. How to tackle Wales's climate vulnerability.
Welsh Assembly Government (2011) Strategic Policy Position Statement on Water	In March 2009, the first Strategic Policy Position Statement on Water was published. The Policy Statement outlined WAG priorities for water. The Statement contained key issues and actions to be taken. This revised Statement updates the current position. It reflects developments that have happened and highlights future priorities in relation to water policy in Wales.
Welsh Assembly Government (2009) Technical Advice Note 5. Nature Conservation and Planning	 The TAN provides advice for local planning authorities on: The key principles of positive planning for nature conservation Nature conservation and Local Development Plans Nature conservation in development management procedures Development affecting protected internationally and nationally designated sites and habitats Development affecting protected and priority habitats and species
Welsh Assembly Government (2010), Technical Advice Note 6: Planning for Sustainable Rural Communities	 Technical Advice Note (TAN) 6 supports national planning policy on sustainable rural communities. This guidance provides advice on: Sustainable rural communities Sustainable rural economies Rural affordable housing Rural enterprise dwellings One Planet Developments Sustainable rural services

Document Name	Key Objectives, Requirements, and Guidance
	Sustainable agriculture
Welsh Assembly Government (1997), Technical Advice Note 13: Tourism	 The Technical Advice Note (Wales) (TAN) should be read in conjunction with Planning Guidance (Wales): Planning Policy. Planning Guidance. This TAN provides advice on: Hotel development; Holiday and touring caravans; Seasonal and holiday occupancy conditions.
Welsh Assembly Government (2004), Technical Advice Note 15: Development and Flood Risk	 Technical Advice Note (TAN) 15 provides technical guidance which supplements the policy set out in Planning Policy Wales in relation to development and flooding. Advice is given on: Development advice maps Nature of development or land use Justifying the location of built development Assessing flooding consequences Surface water run-off from new development Action through Development Plans Development Control
Welsh Assembly Government (2009), Technical Advice Note 16: Sport, Recreation and Open Space	 This revised TAN provides advice for communities, developers and local planning authorities in Wales preparing local development plans and taking decisions about planning applications. The Note contains advice about: Preparing Open Space Assessments Keeping existing facilities The provision of new facilities Topics related to water based recreation, off- road recreational vehicles, allotments and spaces for children's and young people's play
Welsh Assembly Government (2006) Environment Strategy for Wales	 Purpose is to provide the framework within which to achieve an environment which is clean, healthy, biologically diverse and valued. Focuses on key environmental themes:

Document Name	Key Objectives, Requirements, and Guidance
	 Addressing climate change - mitigation and adaptation, including reduced emissions, improved resilience, managing increased flood risk on key assets such as schools, hospitals, housing stock, businesses, land management Sustainable resource use - covers materials consumption and waste, water, soils, minerals aggregates. Waste generation should be minimised. Reduce, reuse, recycle to become universally accepted. Water resources should be effectively managed. Soil functionality should be recognised, including carbon sequestration and flood risk management. Distinctive biodiversity landscapes and seascapes - covers biodiversity, the marine environment, landscapes and seascapes, and their historic component. To involve sustainable land/sea use and management to ensure they can support environmental social and economic needs while maintaining ecosystem function. Aim to halt biodiversity loss and recover from losses that have occurred. Focus will include habitat fragmentation effects, and increased habitat extent/connectivity. Local environment - built environment and access to green space, environmental nuisances, walkability in urban areas and access to the countryside and coast, and flood risk management. Focus on the distinctiveness of buildings in Wales. Recognises the spectrum which must contribute to flood risk management - land management, development control, emergency planning, improved property resilience. Environmental hazards - pollution, chemicals and radioactivity. Recognises the importance of WFD standards
Welsh Assembly Government (2013) Wales Marine and Fisheries Strategic Action Plan	This plan aims to provide a framework for clean, healthy, safe, productive and biologically diverse areas.
Welsh Assembly Government (2010), Low Carbon Revolution – The Welsh Assembly Government Energy Policy Statement	This statement explains what WAG will do and what they want others to do to make the ambition for low carbon energy a reality. Aim will be to renewably generate up to twice as much electricity annually by 2025 as we use today. By 2050, at the latest, we want to meet almost all of our local energy needs, whether for heat, electrical power or vehicle transport, by low carbon electricity production.

Document Name	Key Objectives, Requirements, and Guidance
Welsh Assembly Government Planning Policy Wales (2016) Edition 8	 National land use policies for local authorities to take into account when compiling their LDPs. Section 12 Infrastructure and Services addresses water supply. Objectives include: To protect and improve water resources through increased efficiency and demand management of water, particularly in those areas where additional water resources may not be available.
Cannock Chase Area of Outstanding Natural Beauty Management Plan 2014-2019	 To achieve the vision by 2034, high level objectives are identified including: Develop the AONB as a special, peaceful and tranquil place for everyone who lives in, works within or visits the area; Conserve and enhance the distinctive and nationally important landscape of the AONB and the locally, nationally and internationally important biodiversity and geodiversity it supports, ensuring links between habitats within the AONB and surrounding landscape; Ensure a safe, clean and tranquil environment that can contribute to a high and sustainable quality of life; Support a balance between a working landscape where prosperity and opportunity increase, biodiversity flourishes and pressure upon natural resources is diminished; Create a place of enjoyment for everyone, providing opportunities for quiet recreation and maintaining ecosystems that contribute positively to physical and mental wellbeing.
Cotswolds AONB Management Plan 2013-2018	Objectives include those associated with conserving and enhancing the AONB.
Kent Downs AONB Management Plan 2014-2019	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.
The North Wessex Downs AONB Management Plan 2014-2019	The objectives of the plan come under the broad headings of Landscape, Land Management; Biodiversity; Historic environment; Natural resources; Development; Communities and Leisure and Tourism
Surrey Hills AONB Management Plan 2014-2019	Policies include those for farming, woodland, biodiversity, historic and cultural heritage, recreation and tourism, land use planning, traffic and transport and community development and the local economy

Document Name	Key Objectives, Requirements, and Guidance
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.
Malvern Hills Area of Outstanding Natural Beauty Management Plan 2014-2019	 Objectives of the management plan include: Conserve and enhance the distinctive landscape elements and features of the AONB, particularly those that are most sensitive or have little capacity for change; Protect important geological and geomorphological sites; Establish and maintain coherent and resilient ecological networks across the AONB and beyond; Conserve and enhance the historic environment and cultural heritage of the AONB through appropriate funding, management and awareness raising.
Shropshire Hills Area of Outstanding Natural Beauty (2014) Management Plan 2014 to 2019	 Six delivery priorities have been established for the plan period: Joining up the conservation effort Valuing the AONB in planning and decisions Encouraging a sustainable land management economy Supporting enjoyment and a visitor economy in harmony with the AONB Raising awareness and participation, especially among young people Local working with communities
Snowdonia National Park, Snowdonia National Park Management Plan 2010 - 2015	 This sets out the vision for the condition of the national park by 2035. To achieve this vision, aims to be facilitated by the National Park and its partners include: A rich and varied landscape, exemplifying aesthetic qualities and notable regional landscape characters. Deliver a landscape responsive to climate change. A hub in the regional ecological framework, essential for National Park and surroundings to adapt to climate change. To include enhancement of designated sites under UK and European legislation. Recreational opportunities for residents and visitors. These activities are not to harm the special qualities and effective management to provide opportunities for those wishing to improve their health and wellbeing. Cultural heritage which is better protected and understood. A varied and robust economy founded on environmental goods and services.

Document Name	Key Objectives, Requirements, and Guidance
Local Authority Plans	
AONB Management Plans (various)	 Producing an area management plan is a statutory requirement for every AONB. Its purpose is to: Highlight the special qualities and significance of the AONB Present a vision for the future of the AONB Set out objectives and policies to secure the vision Identify what needs to be done, by whom and when State the condition of the AONB and how the effectiveness of its management will be monitored Reflect the views and aspirations of a wide range of AONB stakeholders and parties with an interest in it Co-ordinate the work of different partner organisations.
Catchment Flood Management Plans (CFMPs), Defra and Environment Agency (2016)	 CFMPs consider all types of inland flooding from rivers, groundwater, surface water and tidal flooding. Shoreline management plans consider flooding from the sea – these are mentioned above. CFMPs include: The likely impacts of climate change The effects of how we use and manage the land How areas could be developed to meet our present day needs without compromising the ability for future generations to meet their own needs. CFMPs help the Environment Agency and their partners to plan and agree the most effective way to manage flood risk in the future. CFMPs are grouped by river basin district.
Catchment Management Strategies (various)	 A catchment is the area of land drained by a river and its tributaries. The waters within a catchment: Closely reflect in their quality and quantity a wide range of natural processes and human activities across the catchment Are connected Provide a range of benefits or 'ecosystem services' to society. Catchment management is an environmentally friendly and potentially low-carbon method of influencing water quality at its source. Collectively addressing issues affecting our rivers and reservoirs can also help build better relationships with farmers, while preventing pollution and reducing the risk of flooding. Catchment management strategies are the
Document Name	Key Objectives, Requirements, and Guidance
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	most sustainable way to protect the water resources within the UK whilst also putting communities at the heart of protecting and managing their local environment.
Local Nature Recovery Strategies (various, emerging)	Local Nature Recovery Strategies (LNRSs) are a new, England-wide system of spatial strategies that will establish priorities and map proposals for specific actions to drive nature's recovery and provide wider environmental benefits. The requirement for there to be Local Natural Recovery Strategies, what they are and how they will generally work is outlined within the Environment Act 2021. The area covered by each Strategy Plan will be set out by Defra's Secretary of State who will be able to produce regulations on the process for preparing, publishing, reviewing and republication of a LNRS and any guidance on what they should contain.
Natural Character Area Profiles (various)	Areas defined at the national level (which describe the geographical, ecological and historical variations in landscape character) make one area different from another. Their boundaries follow natural lines in the landscape rather than administrative boundaries making them a good decision-making framework for the natural environment. NCAs divide England into 159 distinct natural areas.
River Basin Management Plans (RBMPs), Defra and Environment Agency (2015)	 RBMPs set out how organisations, stakeholders and communities will work together to improve the water environment. RBMPs are used when you need: Information on the plan for the protection and improvement of the water environment To know how future plans may affect an industry sector and its obligations To ensure a development proposal considers the requirements of the RMBP To contribute to the delivery of the plan or maximise potential funding for a project. The Environment Agency must review and update RBMPs every 6 years. Currently, the consultation of the draft RBMPs has occurred and the responses are being analysed.
Environment Agency and Defra, (2015) Thames River Basin District River Basin Management Plan	 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

Document Name	Key Objectives, Requirements, and Guidance
	 The cessation of discharges, emissions and loses of priority hazardous substances into surface waters Progressively reduce the pollution of groundwater and prevent or limit the entry of pollutants.
	Environmental objectives are set for each of the protected areas and water bodies in the river basin district.
Environment Agency and Natural Resources Wales (2015) Severn River Basin District, River Basin Management Plan (2015 proposed update)	 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 loses of priority hazardous substances into surface waters Progressively reduce the pollution of groundwater and prevent or limit the entry of pollutants
	Environmental objectives are set for each of the protected areas and water bodies in the river basin district.
Environment Agency (2015) Humber River Basin District: River Basin Management Plan (updated 2015)	 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 loses of priority hazardous substances into surface waters Progressively reduce the pollution of groundwater and prevent or limit the entry of pollutants.
Environment Agency and Natural Resources Wales	Objectives include:

Document Name	Key Objectives, Requirements, and Guidance
(2016) Severn River Basin District: Flood Risk Management Plan 2015-2021	 Manage flood and coastal erosion risks, taking account of the needs of communities, businesses and the environment and working with natural solutions where possible. Reduce the risk of flooding to people and households. Reduce the risk of flooding from reservoirs to people, property, infrastructure and the environment
Environment Agency (2016) Humber River Basin District Flood Risk Management Plan 2015-2021	 The objectives include: Minimise the impact of flooding to community services and critical infrastructure such as education and health facilities, emergency services, significant transport network and domestic infrastructure taking into account eh potential implications of climate change scenarios. Reduce flood risk and avoid loss of life to people and existing residential properties. Reduce the economic damage of flooding to non-residential properties. Minimise the risk of flooding to key transport links within the river basin such as railway lines, motorways, primary roads and trunk roads. Consider the value of agricultural land and the damage that can occur as a result of flooding within the economic appraisal of maintenance and investment options for flood risk management. Minimise the negative impacts of flooding to designated nature conservation sites throughout the district wherever possible contributing to the enhancement of such sites. Minimise the negative impacts of flooding to heritage assets and landscape value wherever possible enhancing such assets. Avoid loss of life and reduce the risk of flooding from reservoirs to people, property, infrastructure and the environment.
Environment Agency (2016) Thames River Basin District Flood Risk Management Plan 2015-2021	 The objectives include: Reduce the risk of flooding to communities where possible. Enhance recreation and general amenity across the river basin. Ensure development and redevelopment in areas at risk of flooding is appropriate, does not increase flood risk and reduces risk wherever possible. Promote the use of sustainable drainage systems in development to help reduce pressure on existing drainage networks. Protect and enhance biodiversity through flood risk management schemes. Restore naturally functioning river systems where possible.

Document Name	Key Objectives, Requirements, and Guidance
	 Promote sustainable land use management to land owners across the catchment to achieve reductions in flood risk.
Environment Agency, Thames Region Water Industry National Environment Programme (WINEP) (unpublished) 2017	The Water Industry National Environment Programme (WINEP) is the mechanism by which the Environment Agency sets out the measures that it would like water companies to implement to improve the water environment. The WINEP covers both water and wastewater services and the detail in the WINEP enables water companies to include specific measures in their business plans for submission to Ofwat so that the environmental improvements can be funded and delivered in the following Asset Planning Period (AMP). In relation to Water Resources Management Plan 2019, the WINEP sets out a series of investigations for Thames Water to carry out to assess the sustainability of some of its existing water sources and also provides an indication of potential changes to abstraction licence conditions to reduce the reliable supply of water to help protect the water environment (termed "sustainability reductions" in the Water Resources Management Plan 2019).
South East Biodiversity Strategy (2009) South East England Biodiversity Forum	 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. The South East Biodiversity Strategy aims to: 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
	 From the derivery of block end of gets that galde and support an 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.
Environment Agency (2006) River Thames Alliance: Thames Waterway Plan 2006-	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:
2011	1. Creating a better place to play by improving the environment

Document Name	Key Objectives, Requirements, and Guidance
	2. Improving access for all
	3. Making recreation sustainable
	4. Promoting the outdoors
Environment Agency (2007) Water for the Future - Managing Water in the South East of England.	A short paper explaining why water resources are going to become an increasingly important issue 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:
	 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
Environment Agency (2006) Thames Regional Fisheries Strategy: A Bright Future for Our Fish 2006 – 2011.	The regional Fisheries strategy outlines the main issues and pressures for Fisheries across the Thames region and outlines actions to address these issues.
Environment Agency (2011) Enjoying Water - Strategic Priorities for Water Related Recreation in London and South East England	 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 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.

Document Name	Key Objectives, Requirements, and Guidance
	The Steering Group have developed a programme for implementation with measures of success for each of the strategic priorities and related actions. The implementation of the priorities will require local actions by local organisations and communities.
South Downs National Park (2013) Partnership Management Plan, Shaping the future of your south downs national park 2014-2019.	 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 One of the outcomes requires -'More responsibility and action is taken by visitors, residents and businesses to conserve and enhance the special qualities and use resources more wisely.
South East Marine Plan (forthcoming) Marine Management Organisation	The purpose of the Marine Plan is to set out how the UK Marine Policy Statement will be implemented in the South East. Marine plan will cover a 20 year period and will be reviewed regularly. It will provide greater coherence in policy and a forward looking, proactive and spatial planning approach to the management of the marine area, its resources and the activities and interactions that take place within it. They will also seek to take account of social, economic and environmental factors that affect the plan and the communities that have an interest in them.
Thames Waterways Plan 2015 – 2021, EA for the River Thames Alliance (2015)	 Developed by the EA in consultation with members of the River Thames Alliance (RTA). The objectives include: To ensure that the best possible flood risk management procedures are being followed and that resources are sufficient. To conserve, improve and restore a natural and biodiverse river environment wherever possible for the benefit both nature and people, as well as maintaining the character of the urban landscapes and countryside within the River Thames corridor. The River Thames and its corridor should be promoted effectively as a visitor destination for the benefit of visitors and the regional economy. To ensure that the non-tidal River Thames remains as navigable as possible for commercial and recreational boats, that the rules around navigation are enforced, that the supporting infrastructure and facilities are fit for purpose and adequate staff are available.

Document Name	Key Objectives, Requirements, and Guidance
	• To increase the use of the Thames for water-based sport and physical recreation, focussing particularly on better access for people for whom current provision is less readily available.
Environment Agency (2004) Thames Salmon Action Plan (SAP)	 The Plan details a 5 year programme of work. Eight targets are identified. Which includes: An average of 250 adult salmon returning to the river each year Fish passes to be open throughout the fish migration period and operate at greater than 95% efficiency
Thames Water Biodiversity Action Plan	 Thames Water's BAP was first published in 1999. Progress is reported each year in the Corporate Responsibility Report. The Plan has four parts: Action for land and water holdings Our activities and water management Partners in biodiversity Corporate responsibility
Thames Landscape Strategy, 2012 , Our Guidance Document: The Thames Landscape Strategy Review 2012	 Focussed on the river corridor between Hampton and Kew. The purpose of the Action Plan is to set out how the aims of the Thames Landscape Strategy partnership (TLS) will be achieved. The Thames Landscape Strategy Partnership objectives include: To protect and enhance the natural and man-made landscape of the area To protect and improve sites of nature conservation value and create new opportunities for biodiversity and flood risk management in the implementation of the Thames Landscape Strategy. To protect and enhance historic buildings, historic parks and gardens, landscapes and ancient monuments. To encourage and maintain a high level of community commitment to the Thames Landscape Strategy vision and encourage community involvement and action to help realise the Thames Landscape Strategy. To facilitate the creation of partnerships between the public, private
Public Rights of Way Improvement Plans (ROWIP)	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.
The Port of London Act 1968	The Port Authority maintains the Richmond works and the sluices forming part thereof so as to hold the water upstream of the works to a certain height.

Document Name	Key Objectives, Requirements, and Guidance
London Infrastructure Plan 2050	Water is a key element of this plan. A variety of demand and supply-side measures will be required.
London Biodiversity Partnership (2009) London Biodiversity Action Plan.	The London BAP has 26 action plans for habitats and species that are important in London. Of these, key habitats of relevance are Rivers and Streams, Reedbeds and Tidal Thames. The London BAP contains targets to improve the condition and increase the extent of a selected number of habitats found in the capital by 2015.
The London Plan (2016): Spatial Development Strategy for London Consolidated with Alterations since 2011	The London Plan is a Spatial Development Strategy for London and is the responsibility of the Mayor to produce and keep under review. It replaces government's strategic guidance, and borough's development plan documents must be in 'general conformity' with it. The GLA Act 1999 requires that the Plan deals only with matters that are of strategic importance to Greater London, and that it deals with three cross-cutting themes. The overall strategic plan for London, setting out an integrated economic, environmental, transport and social framework for the development of London over the next 20–25 years. The plan brings together the geographic and locational aspects of the Mayor's other strategies – including those dealing with: transport, economic development, housing, culture a range of social issues such as children and young people, health inequalities and food a range of environmental issues such as climate change (adaptation and mitigation), air quality, noise and waste.
	Mayor has put forward a vision for the sustainable development of London over the period covered by this Plan (to 2031) requiring London to "excel among global cities – expanding opportunities for all its people and enterprises, achieving the highest environmental standards and quality of life and leading the world in its approach to tackling the urban challenges of the 21st century, particularly that of climate change".
Mayor of London (2011) Managing Risks and Increasing Resilience The Mayor's Climate Change Adaptation Strategy	This refers to 'security of supply' that is met by withdrawing more water from the environment that can be sustained. Less summer rainfall, greater demand for water and greater restrictions on the amount of water removed from the environment in the future threatens the security of supply. Without action, there will be increased frequency of drought management measures in London.
	London should have a secure supply of water that is affordable and safeguards the environment. Improvements to the sustainability of London's water supply and demand balance to make it more robust to drought by :
	 Promoting measures to enable and sustain long term improvement in water efficiency Lobbying government to integrate water efficiency into housing retrofitting programmes Promoting capturing and using rainwater for non-consumptive purposes

Document Name	Key Objectives, Requirements, and Guidance
	Improving response to drought.
Mayor of London (2011) Securing London's Water Future The Mayor's Water Strategy	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 to invest in a water management and sewerage infrastructure system that's suitable for a world class city this includes:
	 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
	Demand for water will increase due to population increases and higher seasonal rainfall and hotter summers mean water availability will decreased when required the most. London's supply-demand balance will become increasingly unsustainable and therefore action is required to balance supply and demand.
Environment Agency (2011) Water Resources Strategy – A Regional Action Plan for Thames Region.	Explains how the aims of the Environment Agency 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:
	 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

Document Name	Key Objectives, Requirements, and Guidance
Shoreline Management Plans (various)	Shoreline management plans in England and Wales are developed by the Coastal Groups with members of the Environment Agency. They identify the most sustainable approach to managing the flood and coastal erosion risks to the coastline in the short-term (0-20 years) medium-term (20-50 years), and long-term (50-100 years).
WRE Regional Water Resources Plan (in draft, expected publication 2023)	 The RWRP will have 4 key components: Demand management – leakage per capita consumption reduction with multi-sector water efficiency measures Large infrastructure options >10MI/d that have a whole regional or national significance 'Local' non-water company and smaller (<10MI/d) water company infrastructure projects and schemes which requires the specialist, local knowledge of WRE members Supporting, facilitating or overseeing water innovations and exemplars in Eastern England which push the 'art of the possible'. Producing this document by 2023 will require many trade-offs and compromises.
Local Development Plans and Core Strategies (various)	A development plan includes local, and neighbourhood plans, and any spatial development strategies produced by the local authority. LDPs should plan for infrastructure, homes, and jobs for residents. The land use policies contained within the LDP are used when making decisions on planning applications. They help us decide where to allocate land for residential use. At a distance the LDP will:
	 Guide local development within the borough Set out the long-term future for the borough Outline how that growth will be delivered Outline how the growth will take into account the needs of the local communities.
	To be effective plans need to be kept up-to-date. The NPPF states policies in local plans and spatial development strategies, should be reviewed to assess whether they need updating at least once every 5 years, and should then be updated as necessary. Under regulation 10A of the Town and Country Planning (Local Planning) (England) Regulations 2012 (as amended) local planning authorities must review local plans, and Statements of Community Involvement at least once every 5 years from their adoption date to ensure that policies remain relevant and effectively address the needs of the local community. Therefore planning policy and local development plans should be regularly reviewed to ensure up to date and relevant policy is considered in relation to development and proposed Schemes.

Document Name	Key Objectives, Requirements, and Guidance
Central Bedfordshire Council Local Plan (adopted 2021)	The Central Bedfordshire Council Local Plan (2015-2035) will guide and support the delivery of new infrastructure, homes and jobs. It sets out the long-term vision and objectives for the area, what is going to happen, where, and how this will be achieved and delivered over the 20 year span. The following policies have been highlighted for their relevance to this SEA:
	Policy EE5: Landscape Character and Value: All major development proposals will be required to demonstrate how they incorporate landscape enhancement, in accordance with the guidelines in the LCA, the Central Bedfordshire Design Guide and other relevant documents for specific areas. This includes the Chilterns AONB, Forest of Marston Vale and the Greensand Ridge Nature Improvement Area. Landscape and visual appraisal will be expected to support planning applications and include the assessment of local landscape character and views.
	Policy CC1: Climate Change and Sustainability: The Council requires that all new development is designed to: 1. Increase its resilience to impacts of climate change; 2. Take full advantage of opportunities to incorporate renewable energy technologies; 3. Reduce carbon emissions; and 4. Achieve the higher water efficiency standard of 110 litres per person per day.
	Policy CC6: Water Supply and Sewage Infrastructure: There is a need to ensure adequate water supply is available, or can be provided, in time to serve the development and existing water resources, and will be safeguarded from the potential impacts of development.
Luton Borough Council Local Plan (adopted 2017)	The Luton Borough Council (2011-2031) sets out a set of policies, development allocations and actions to meet the environmental, social and economic challenges facing the area over the 20-year plan period and out a set of policies, development allocations and actions to meet the environmental, social and economic challenges facing the area over the 20-year plan period. The following policies have been highlighted for their relevance to this SEA:
	Policy LLP28: Biodiversity and Nature Conservation: The Council will work with partner organisations to positively assess, manage, and designate sites and ecological networks including giving support to development proposals that add to the net stock of wildlife habitats or where they help to deliver a net gain in the conservation and enhancement of such sites. The protection given will be commensurate with their status, giving appropriate weight to their importance and the contribution they make to ecological networks.
	Policy LLP36: Flood Risk: The risk and impact of flooding will be minimised through: directing new development to areas with the lowest probability of flooding; ensuring that all new development addresses flood resilience, the effective management of flood risk including opportunities for appropriate dry access for emergency vehicles; ensuring

Document Name	Key Objectives, Requirements, and Guidance
	that development does not increase the risk of flooding elsewhere, including cumulative impact on adjoining and surrounding land and in the wider catchment; and ensuring wider environmental benefits of development in relation to flood risk and contribute towards delivering "good ecological status".
	Policy LLP38: Pollution and Contamination: Evidence on the impacts of development will need to demonstrate whether the scheme (individually or cumulatively with other proposals) will result in any significantly adverse effects with regard to air, land or water on neighbouring development, adjoining land, or the wider environment. Where adverse impacts are identified, appropriate mitigation will be required. This policy covers chemical, biological, and radiological contamination and the effects of noise, vibration, light, heat, fluid leakage, dust, fumes, smoke, gaseous emissions, odour, explosion, litter, and pests.
Royal Borough of Windsor & Maidenhead Local Plan (adopted 2022)	The Royal Borough of Windsor & Maidenhead Local Plan (2013-2033) provides the framework to guide the future development of the Royal Borough of Windsor and Maidenhead. It sets out a spatial strategy and policies for managing development and infrastructure to meet the environmental, social and economic opportunities and challenges facing the area up to 2033. The following policies have been highlighted for their relevance to this SEA:
	Policy SP2: Climate Change: All developments will demonstrate how they have been designed to incorporate measures to adapt to and mitigate climate change. All development shall minimise the impact of surface water runoff from the development in the design of the drainage system, and where possible incorporate mitigation and resilience measures for any increases in river flooding levels as a result of climate change.
	Policy NR1: Managing Flood Risk and Waterways: Flood zones are defined in the National Planning Practice Guidance and the Council's Strategic Flood Risk Assessment (Level 1). Within designated Flood Zones 2 and 3 (and also in Flood Zone 1onsitesof1hectareor more in size and other circumstances as set out in the NPPF)development proposals will only be supported where an appropriate flood risk assessment has been carried out and it has been demonstrated that development is located and designed to ensure that flood risk from all sources of flooding is acceptable in planning terms.
	Policy EP1: Environmental Protection: Development proposals will only be supported where it can be shown that either individually or cumulatively in combination with other schemes, they do not have an unacceptable effect on environmental quality or landscape, both during the construction phase or when completed. Development proposals should seek to conserve, enhance and maintain existing environmental quality in the locality, including areas of

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	ecological value (land and water based), and improve quality where possible, both during construction and upon completion. Opportunities for such improvements should be incorporated at the design stage and through operation.
South Bucks District Local Plan (Adopted 1999)	At the time of writing, the new combined Local Plan for Chiltern and South Bucks is in development therefore the previous Local Plan has been referenced here. The South Bucks District Local Plan (1999-2011) sets out set out above the Council has devised the following aims for planning in the District
	1. To balance the need to protect the environment, especially the Green Belt, for current and future generations whilst meeting local needs over the plan period.
	2. To enhance the quality of life for the District's residents.
	3. To maintain a strong and healthy local economy as a source of jobs and prosperity.
	4. To protect, care for and enhance the District's landscape, heritage and character.
	5. To make the best use of land and other resources. The following policies have been highlighted for their relevance to this SEA:
	Policy GB1: Green Belt Boundaries and the Control over Development in the Green Belt: Within the Green Belt, planning permission will not be granted for development other than for the change of use of existing buildings or land or the construction of new buildings or extensions to existing buildings which fall into defined criteria.
	Policy C1: Development within a Conservation Area: development within a Conservation Area that fails to preserve or enhance its character or appearance will not be permitted. Development will only be permitted where:- a) the proposal would preserve or enhance important features which contribute to the character or appearance of the Conservation Area including:- i) views into or out of the Conservation Area, ii) hedges or trees, iii) walls and other means of enclosure, iv) spaces between buildings, v) roofscape;
	Policy EP4: Landscaping: Development proposals will be expected to:- (a) incorporate appropriate hard and soft landscaping as an integral part of the development proposal; and (b) take account of, and retain, existing planting and landscape features, which are or may become important elements in the character and appearance of the site or the wider area.

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Chiltern District Local Plan (adopted 1997)	At the time of writing, the new combined Local Plan for Chiltern and South Bucks is in development therefore the previous Local Plan has been referenced here. The Chiltern District Local Plan (1997-2011) will aim to regulate these pressures, so as to conserve the attractive characteristics of the District whilst maintaining the local economy and also ensuring adequate provision, as far as practicable, for the needs of local residents and businesses in terms of housing, employment opportunities, transport and various community facilities and services. The following policies have been highlighted for their relevance to this SEA:
	Policy CA2: Views within, out of, or into Conservation Areas: Any proposed development which does not preserve or enhance the important views within, looking out of, or into a Conservation Area, will be refused. Where development proposals are acceptable in accordance with this Policy, the proposals should also comply with other Policies in this Local Plan.
	Policy TW6: Resistance to Loss of Woodland Throughout the District: Planning permission for development which results in the loss of woodland will be refused. Woodland of good quality, or landscape significance, or amenity value will be expected to be retained even where this will restrict or prevent development. This Policy applies throughout the District.
	Policy: NC1: Safeguarding of Nature Conservation Interests Throughout the District: Planning permission for development will be refused where it will significantly harm an acknowledged nature conservation interest of established importance. These interests are:- (i) Statutorily protected sites which are of international or national importance. These include Ramsar Sites, designated or proposed Special Protection Areas, Special Areas of Conservation, National Nature Reserves and Sites of Special Scientific Interest. These will be subject to special scrutiny. and (ii) Sites which are of local or regional importance.
Brentwood Borough Council Local Plan (adopted 2022)	The Brentwood Borough Council Local Plan (2016-2033) sets out the aim to conserve the attractive characteristics of the District whilst maintaining the local economy and also ensuring adequate provision, as far as practicable, for the needs of local residents and businesses in terms of housing, employment opportunities, transport and various community facilities and services. The following policies have been highlighted for their relevance to this SEA:
	Policy BE02: Water Efficiency and Management: All development proposals should have regard to the Water Cycle Study and seek to improve water quality; not cause deterioration in the quality of a water course or groundwater; not lead to adverse impacts on the natural functioning of the watercourse, including quantity, flow, river continuity,

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	groundwater connectivity, or biodiversity impacts; where development is likely to have an impact, proposals must set out how impacts will be mitigated.
	Policy NE03: Trees, Woodlands, Hedgerows: Development proposals that would result in the deterioration or loss of irreplaceable ancient woodland and ancient and veteran trees will not be permitted other than in wholly exceptional circumstances and only if the proposals include a suitable compensation strategy. In all other cases, proposals should, so far as possible and practicable, seek to retain existing trees, woodlands and hedgerows where they make a positive contribution to the local landscape and/or biodiversity or which have significant amenity value.
	Policy NE09: Flood Risk: New development will be required to avoid areas of flood risk by applying the Sequential and, where necessary, the Exception Tests in accordance with national policy and guidance. 2. A site specific Flood Risk Assessment must assess all sources of flooding. It should demonstrate how flood risk will be managed over the development's lifetime, taking climate change into account.
Colchester Borough Council Local Plan (adopted 2022)	The Colchester Borough Council Local Plan (2017-2033) sets out the vision for North Essex, which will be area of significant growth over the period to 2033 and beyond, embracing positively the need to build well-designed new homes, create jobs and improve and develop infrastructure for the benefit of existing and new communities. It will continue to be an attractive and vibrant area in which to live and work, making the most of its rich heritage, town centres, natural environment, coastal resorts, excellent educational facilities and strategic transport links which provide access to the ports, Stansted Airport, London and beyond. Rural and urban communities will be encouraged to thrive and prosper and will be supported by adequate community infrastructure. The following policies have been highlighted for their relevance to this SEA:
	Policy ENV1: Environment: The Local Planning Authority will conserve and enhance Colchester's natural and historic environment, countryside and coastline. The Local Planning Authority will safeguard the Borough's biodiversity, geology, history and archaeology, which help define the landscape character of the Borough, through the protection and enhancement of sites of international, national, regional and local importance. The Local Planning Authority will require development to be in compliance with, and contribute positively towards, delivering the aims and objectives of the Anglian River Basin Management Plan.
	Policy ENV3: Green Infrastructure: The Local Planning Authority will aim to protect, enhance and deliver a comprehensive green infrastructure network comprising strategic green links between the rural hinterland, urban Colchester, river corridors and open spaces across the Borough. It will seek to protect and enhance the existing

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	network of green and blue infrastructure features and to secure the delivery of new green infrastructure where deficiencies and gaps are identified that will benefit communities, wildlife and the environment.
	Policy ENV5: Pollution and Contaminated Land: Proposals will be supported that will not result in an unacceptable risk to public health or safety, the environment, general amenity, or existing uses due to the potential of air pollution, noise nuisance, surface / ground water sources or land pollution.
Epping Forest District Council Local Plan (adopted 2008)	The Epping Forest District Council Local Plan (2008) set out the Council's policies for the control of development (and hence guide most planning decisions) and make proposals for the development and use of land, and allocate land for specific purposes. The following policies have been highlighted for their relevance to this SEA:
	Policy HC7: Development within Conservation Areas: Within conservation areas, all development and materials will be required to be of a particularly high standard to reflect the quality of the environment. Development should be sympathetic to the character and appearance of the conservation area in terms of scale, density, massing, height, layout, building line, landscape and access.
	Policy NC4: Protection of Established Habitat: Development proposals will be expected to make adequate provision for the protection, enhancement and suitable management of established habitats of local significance for wildlife. Such provision may be more stringent when there are known to be protected species either on the site or likely to be affected by the development.
	Policy RP3: Water Quality: The Council, after consultation with the Environment Agency, and, as appropriate, British Waterways and Thames Water, will refuse permission for developments or activities which present an undue risk to the quality and quantity of: groundwater; or water in rivers, canals, lakes, ponds or other water courses.
Harlow Council Local Plan (adopted 2020)	The Harlow Council Local Plan (2013-2033) sets out a long-term vision for Harlow, identifying land where development will be acceptable and where it will be unacceptable. It contains policies which ensure future development is sustainable by meeting the needs of residents, businesses and visitors, while providing the required infrastructure and protecting environmental assets. These policies are material considerations in the determination of planning applications. The following policies have been highlighted for their relevance to this SEA:
	Policy PL9: Biodiversity and Geodiversity Assets: Development should contribute to and enhance biodiversity or geodiversity assets, to ensure a net gain in biodiversity. The potential harm caused by development on these assets and their surroundings will be assessed based on the harm caused by the development. The greater the significance

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Uttlesford District Council Local Plan (adopted 2005)	of the asset, the greater the weight that is given to the asset's protection. Distinction will be made between the hierarchy of international, national and locally designated and non-designated sites so that the level of protection afforded is consistent with their status.
	Policy PL10: Pollution and Contamination: All development proposals must minimise and, where possible, reduce all forms of pollution and contamination. For air quality, the acceptability or otherwise of a proposal will be determined with reference to the relevant limit values or National Air Quality Objectives as they relate to human health or biodiversity.
	Policy PL11: Water Quality, Water Management, Flooding and Sustainable Drainage Systems: All development proposals will be considered against national policies (including application of the sequential test and, if necessary, the exception test) and against the European Water Framework Directive (or any subsequent equivalent). Development must not cause deterioration to water quality, including quality of waterways and other bodies of water, identified Source Protection Zones (SPZ), Aquifers and all other groundwater. Development must aim to improve such water quality.
	At the time of writing, the New Local Plan for Uttlesford District Council is in development therefore the previous Local Plan has been referenced here. The Uttlesford District Council Local Plan (2005) seeks to maintain and improve on Uttlesford's positive attributes. It will preserve the quality of life in the towns and villages. Its policies will help to address concerns within the community about facilities for young people, crime, housing needs, preserving the environment, public transport and access to services, in so far as these can be addressed through the planning system. It will protect the district's environment from inappropriate development, reduce and control noise and air pollution, reduce waste and increase recycling. It will help secure the provision of appropriate high quality leisure facilities and other infrastructure needed to support the level of development proposed in the plan. It will seek to prevent the loss of village shops and post offices. It will seek to ensure that good, affordable housing is available to all residents, especially young people and low paid workers from the District. It will help local companies to grow within appropriate development constraints, creating more jobs locally.
	The following policies have been highlighted for their relevance to this SEA:
	Policy ENV5: Protection of Agricultural Land: Development of the best and most versatile agricultural land will only be permitted where opportunities have been assessed for accommodating development on previously developed sites or

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	within existing development limits. Where development of agricultural land is required, developers should seek to use areas of poorer quality except where other sustainability considerations suggest otherwise.
	Policy ENV7: The Protection of the Natural Environment - Designated Sites: Development proposals that adversely affect areas of nationally important nature conservation concern, such as Sites of Special Scientific Interest and National Nature Reserves, will not be permitted unless the need for the development outweighs the particular importance of the nature conservation value of site or reserve. Development proposals likely to affect local areas of nature conservation significance, such as County Wildlife sites, ancient woodlands, wildlife habitats, sites of ecological interest and Regionally Important Geological/ Geomorphological Sites, will not be permitted unless the need for the development outweighs the local significance of the site to the biodiversity of the District. Where development is permitted the authority will consider the use of conditions or planning obligations to ensure the protection and enhancement of the site's conservation interest.
	Policy ENV12: Protection of Water Resources: Development that would be liable to cause contamination of groundwater particularly in the protection zones shown on the proposals map, or contamination of surface water, will not be permitted unless effective safeguards are provided.
Tendring District Council Local Plan (adopted 2022)	The Tendring District Council Local Plan (2013-2033) is the statutory development plan for Tendring District up to 2033. The National Planning Policy Framework (NPPF) requires all Local Planning Authorities in England and Wales to prepare a Local Plan and ensure it is kept up to date. Without an up-to-date plan, the Council would have limited power to influence the scale, location and quality of new development in the District, making it difficult to bring about the positive changes that the area needs and difficult to resist inappropriate development proposals that will have a detrimental effect on our area. The following policies have been highlighted for their relevance to this SEA:
	Policy HP1: Improving Health and Wellbeing: The Council will work to improve the health and wellbeing of residents in Tendring, including working with stakeholders on projects that provide better service integration, locating services where access can be improved, particularly for vulnerable groups and communities and ensuring increased contact with nature and access to the District's open spaces and offering opportunities for physical activities through the Haven Gateway Green Infrastructure and Open Space Strategies.
	Policy HP3: Green Infrastructure: Green Infrastructure will be used as a way of adapting to, and mitigating the effects of, climate change, through the management and enhancement of existing spaces and habitats and the creation of new spaces and habitats, helping to provide shade during higher temperatures, flood mitigation and benefits to

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	biodiversity, along with increased access. All new development must be designed to include and protect and enhance existing Green Infrastructure in the local area, as appropriate.
	Policy PPL5: Water Conservation, Drainage and Sewerage: Proposals for development must demonstrate that adequate provision exists, or can be provided in time, for sewage disposal to a public sewer and water recycling centre (sewage treatment works)
Dacorum Borough Council Core Strategy (adopted 2013)	The Dacorum Borough Council Core Strategy (2006-2031) has the main purpose to anticipate and manage change in Dacorum over the years to 2031. It needs to balance the need for new development and infrastructure against the need to maintain the environmental assets and unique character of the borough. It is also one of the key tools to help maximise and coordinate new investment in Dacorum and help promote economic regeneration. The following policies have been highlighted for their relevance to this SEA:
	Policy CS5: Green Belt: The Council will apply national Green Belt policy to protect the openness and character of the Green Belt, local distinctiveness and the physical separation of settlements. There will be no general review of the Green Belt boundary through the Site Allocations DPD, although local allocations will be permitted.
	Policy CS24: The Chilterns Area of Outstanding Natural Beauty: The special qualities of the Chilterns Area of Outstanding Natural Beauty will be conserved. The scarp slope will be protected from development that would have a negative impact upon its skyline. Development will have regard to the policies and actions set out in the Chilterns Conservation Board's Management Plan and support the principles set out within the Chilterns Buildings Design Guide and associated technical notes.
	Policy CS31: Water Management: Water will be retained in the natural environment as far as possible. Measures to restore natural flows in the river systems and the water environment will be supported. Supply to the Grand Union Canal will be maintained.
East Hertfordshire District Council Local Plan (adopted 2018)	The East Hertfordshire District Council Local Plan (2011-2033) sets out the overall strategic vision for development in East Herts over the Plan period to 2033. Residents in East Herts enjoy one of the highest qualities of life in rural Britain. In particular residents in East Herts enjoy a good level of health and life expectancy. Educational attainment is also high with students performing better in East Herts than the wider region. The following policies have been highlighted for their relevance to this SEA:

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	Policy NE3: Species and Habitats: Development should always seek to enhance biodiversity and to create opportunities for wildlife and development which would result in the loss or significant damage to trees, hedgerows or ancient woodland sites will not be permitted. Proposals will be expected to protect and enhance locally important biodiversity sites and other notable ecological features of conservation value and reduce disturbance to a minimum.
	Policy CCS: Climate Change Mitigation: Carbon reduction should be met on-site unless it can be demonstrated that this is not feasible or viable. In such cases effective offsetting measures to reduce on-site carbon emissions will be accepted as allowable solutions.
	Policy EQ1: Contaminated Land and Land Instability: The District Council will encourage the remediation of contaminated land to ensure that land is brought back into use, subject to the requirements of this policy. The Council will require evidence, as part of any application, to show that unacceptable risks from contamination and land instability will be successfully addressed through remediation without undue environmental impact during and following the development. In particular, the developer shall carry out an adequate investigation to inform a risk assessment.
Hertsmere Borough Council Local Plan (adopted 2013)	The Hertsmere Borough Council Local Plan (2012-2027) sets out our vision for development in Hertsmere until 2027, addressing national and regional policy requirements, as well as local community needs. The document seeks to strike a balance between the borough's housing and economic development needs, social welfare and protection of the environment. It sets the framework for more detailed planning policies and provides the foundation for decisions on planning applications and development proposals. The following policies have been highlighted for their relevance to this SEA:
	Policy CS12: The enhancement of the natural environment: All development proposals must conserve and enhance the natural environment of the Borough, including biodiversity, habitats, protected trees, landscape character, and sites of ecological and geological value, in order to maintain and improve environmental quality, and contribute to the objectives of the adopted Greenways Strategy and the Hertsmere Green Infrastructure Plan. Proposals should provide opportunities for habitat creation and enhancement throughout the life of a development. In the case of the highest quality agricultural land (Grades 1, 2 and 3a) and Preferred Areas of mineral extraction, proposals will only be permitted where there is no likelihood of the land being sterilised for future agriculture or mineral extraction.
	Policy CS14: Promotion or enhancement of historic heritage assets: All development proposals must conserve or enhance the historic environment of the Borough in order to maintain and where possible improve local environmental quality. Development proposals should be sensitively designed to a high quality and not cause harm to identified,

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	protected sites, buildings or locations of heritage or archaeological value including Conservation Areas, Listed Buildings, Historic Parks and Gardens, Scheduled Ancient Monuments or their setting, and identified and as yet unidentified Archaeological Remains.
	Policy CS17: Energy and CO2 reductions: The Council will further encourage all new development or major refurbishment to incorporate energy from decentralised and renewable or low carbon sources. All large scale development will be required to incorporate on-site renewable energy generation, unless it is not feasible or viable or alternative decentralised and renewable, low carbon sources can be identified.
North Hertfordshire Council Proposed Local Plan (adopted 2016)	The North Hertfordshire Council Proposed Local Plan (2011-2031) seeks to address the key issues facing North Hertfordshire and will set a strategic vision and spatial strategy for the District over the period 2011 to 2031. It sets out the spatial strategy and vision for the future of the District and links this to the strategic policies which provide the guidance on the main issues that the Plan seeks to address. The following policies have been highlighted for their relevance to this SEA:
	Policy SP5: Countryside and Green Belt: Support the principles of the Green Belt and recognise the intrinsic value of the countryside and will only permit development proposals in the Green Belt where they would not result in inappropriate development.
	Policy SP10: Healthy Communities: Provide and maintain healthy, inclusive communities for our residents, such as support the retention of existing community, cultural, leisure or recreation facilities and protect, enhance and create new physical and green infrastructure to foster healthy lifestyles.
	Policy SP11: Natural and Historic Environment: Meet the challenges of climate change and flooding, through: supporting proposals for renewable and low carbon energy development in appropriate locations; taking a risk based approach to development and flood risk, directing development to areas at lowest risk in accordance with the NPPF and ensuring the provision of Sustainable Drainage Systems (SuDS) and other appropriate measures; supporting the principles of the Water Framework Directive and seek to protect, enhance and manage the water environment; and giving consideration to the potential or actual impact of land contamination and support proposals that involve the remediation of contaminated land.
Three Rivers District Council Core Strategy (adopted 2011)	The Three Rivers District Council Core Strategy (2011-2026) is the vision for Three Rivers over the next 15 years or so. In seeking to deliver this vision, the Council is preparing a new type of development plan for the District called the Local Development Framework. This will replace the existing Local Plan with a suite of new planning documents, the

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	first of which is the Core Strategy. It will link with other strategies such as the Sustainable Community Strategy and set out the long term vision for Three Rivers, along with the spatial strategy and policies to deliver the vision. The Core Strategy sets out in broad terms how we plan to deliver new homes, jobs and infrastructure over the period to 2026 and how we can manage development effectively. The following policies have been highlighted for their relevance to this SEA:
	Policy DM2: Green Belt: Within the Green Belt, except in very special circumstances, approval will not be given for new buildings other than those specified in national policy and other relevant guidance. Further guidance on the factors that will be considered in assessing applications for agricultural or forestry dwellings in the Green Belt.
	Policy DM6: Biodiversity, Trees, Woodland and Landscaping: Development that would affect a Site of Special Scientific Interest, Local Nature Reserve, Local Wildlife Site or protected species under UK or European law, or identified as being in need of conservation by the UK Biodiversity Action Plan or the Hertfordshire Biodiversity Action Plan , will not be permitted where there is an adverse impact on the ecological, geological or biodiversity interests of the site, unless it can be demonstrated that: i) The need for the development would outweigh the need to safeguard the biodiversity of the site, and where alternative wildlife habitat provision can be made in order to maintain local biodiversity; and ii) Adverse effects can be satisfactorily minimised through mitigation and compensation measures to maintain the level of biodiversity in the area.
	Policy DM8: Flood Risk and Water Resources: Development will only be permitted where it would not be subject to unacceptable risk of flooding; and would not unacceptably exacerbate risk of flooding elsewhere. Where practicable existing flood risks should be reduced. New development will not be permitted in Flood Zone 3b, as defined by the SFRA. Redevelopment of existing built development in that Zone will only be permitted if the proposals are of a compatible use class and would not increase flood risk elsewhere.
Watford Borough Council Local Plan (adopted 2013)	The Watford Borough Council Local Plan (2006-2013) sets out sets out the key elements of the council's planning vision and spatial strategy for the borough. The Core Strategy is the central part of the Local Plan, and establishes the direction for other documents that will set out our planning strategy and policies in more detail. The following policies have been highlighted for their relevance to this SEA:
	Policy SD2: Water and Wastewater: The council aims to minimise water consumption, surface water run-off and non- fluvial flooding whilst also protecting water quality.

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	Policy SD3: Climate Change: All new developments (and associated infrastructure) will maximise the use of energy efficiency and energy conservation measures in their design, layout and orientation to reduce the overall energy demand and; reduce CO2 emissions. mitigate climate change. adapt to the effects of climate change. maximise the use of previously developed land and the efficient use of land.
	Policy GI3: Biodiversity: Proposals must seek to conserve and enhance the unique natural landscape, biodiversity and habitat in and around the town, including the protection of County Wildlife Sites and the appropriate management and expansion of wildlife corridors, such as along water courses and railway lines. Proposals for new development should protect, maintain and enhance the quality of biodiversity habitat and improve access to important biodiversity areas in Watford and the surrounding area.
Welwyn Hatfield Borough District Plan (adopted 2005)	At the time of writing, the New Local Plan for Welwyn Hatfield Borough is in development therefore the previous District Plan has been referenced here. The Welwyn Hatfield Borough District Plan (2005-2011) The overall aim of the District Plan is to improve quality of life in the district by providing for sustainable development. This is now the central theme of national and strategic planning policy and it has been identified as a key issue in Welwyn Hatfield through consultation with the community in preparing the Plan. The concept of sustainable development is fundamental to the future of people's lives. It is concerned with ensuring a better quality of life for everyone, both now and for generations to come. The following policies have been highlighted for their relevance to this SEA:
	Policy GBSP3 - Area Of Special Restraint and Structural Landscape Area: The area of land at Panshanger Aerodrome in Welwyn Garden City, as defined on the Proposals Map, will be safeguarded against potential future growth needs beyond the period of this Plan. Any release of this land for development, in whole or in part, will be a matter for determination in future reviews of this Plan. In addition, no development should take place until structural landscaping has been provided within the area defined for that purpose on the Proposals Map.
	Policy RA1: Development in the Green Belt: in very special circumstances, permission will only be given for development for the following purposes: Agriculture, forestry or mineral extraction; Small scale essential facilities for outdoor sport and outdoor recreation or for cemeteries and for other uses of the land which preserve the openness of the Green Belt and which do not conflict with the purposes of including land within it.
	Policy RA10: Landscape Regions and Character Areas: Proposals for development in the rural areas will be expected to contribute, as appropriate, to the conservation, maintenance and enhancement of the local landscape character of the area in which they are located, as defined in the Welwyn Hatfield Landscape Character Assessment.

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Barnet Council Local Plan (adopted 2012)	The Barnet Council Local Plan will contribute to achieving the vision and objectives of Barnet's Sustainable Community Strategy and will help our partners and other organisations to deliver relevant parts of their programmes. It will cover the physical aspects of location and land use traditionally covered by planning. It also addresses other factors that make places attractive and distinctive as well as sustainable and successful. It will help to shape the kind of place that Barnet will be in the future, balancing the needs of residents, businesses and future generations.
	The following policies have been highlighted for their relevance to this SEA:
	Policy DM06: Barnet's heritage and conservation: All heritage assets will be protected in line with their significance and all development will have regard to the local historic context. b. Development proposals must preserve or enhance the character and appearance of 16 Conservation Areas in Barnet.
	Policy DM15: Green Belt and open spaces:
	Policy DM16: Biodiversity:
Brent Council Local Plan (adopted 2022)	The Bent Local Plan (2019-2014) sets the vision for Brent's development. It includes London Borough of Brent's policies towards housing, town centres, open space, employment, community facilities, the built and natural environment and transport – all of which contribute to making Brent a vibrant place to live and work. The following policies have been highlighted for their relevance to this SEA:
	Policy BHC1: Brent's Heritage Assets: Including demonstrating a clear understanding of the archaeological, architectural or historic significance and its wider context and providing a detailed analysis and justification of the potential impact (including incremental and cumulative) of the development on the heritage asset and its context as well as any public benefit.
	Policy BGI2: Trees and Woodlands: Including in the case of major development to make provision for the planting and retention of trees on site. Where retention is agreed to not be possible, developers shall provide new trees to achieve equivalent canopy cover or a financial contribution for off-site tree planting of equivalent canopy cover will be sought and in the case of minor development which results in the loss of trees provision of appropriate replacements on site;
	Policy BUI3: Managing Flood Risk: Proposals requiring a Flood Risk Assessment must demonstrate that the development will be resistant and resilient to all relevant sources of flooding including surface water. Proposed development must pass the sequential and exceptions test as required by national policy.

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Ealing Council Local Plan (adopted 2012)	The Ealing Council Local Plan (2011-2026) sets out how Ealing will be a borough of opportunity where people enjoy: • Health – improving public health and supporting those with specific needs to achieve well-being and independence. • Safety – working with communities to ensure that everyone is safe and has the support they need. • Prosperity – securing Ealing as a place where people are able, and want, to live and work. • High quality of life – making Ealing a place where people enjoy a high quality of life in clean, green and cohesive neighbourhoods. The following policies have been highlighted for their relevance to this SEA:		
	Policy 5.1: Protect and Enhance Metropolitan Green Belt: he council in seeking to enhance the network of Green Belt in the borough. In addition to projects and management matters referred to above, all Green Belt sites will be managed for informal recreation uses, the protection of nature conservation interests and the council will seek to enhance pedestrian and cycle links.		
	Policy 5.4: Protect the Natural Environment – Biodiversity and Geodiversity: To protect and promote the network of Nature Conservation sites in the borough, through enhancing the natural value of existing sites, and improving access particularly in areas of deficiency. Biodiversity will be considered in the management of all green spaces and the network of waterways, including parks, gardens, private amenity space, cemeteries, green corridors and other incidental areas, and where development is proposed in or adjacent to such spaces.		
	Policy 6.1: Physical Infrastructure: The Infrastructure Delivery Plan will identify and promote improvements in the following categories of physical infrastructure required to support the planned development of the borough to 2026.		
Harrow Council Local Plan (adopted 2012)	The Harrow Council Local Plan (2011-20226) sets out the long-term vision of how Harrow, and the places within it, should develop by 2026 and sets out the Council's strategy for achieving that vision. In particular, it identifies the broad locations for delivering housing and other strategic development needs such as employment, retail, leisure, community facilities and other uses. The following policies have been highlighted for their relevance to this SEA:		
	Policy CS1 C: Proposals that would harm identified views or impede access to public viewpoints will be resisted.		
	Policy CS1 D: Proposals that would harm the significance of heritage assets including their setting will be resisted. The enhancement of heritage assets will be supported and encouraged.		
	Policy CS1 U: Development will be managed to achieve an overall reduction in flood risk and increase resilience to flood events. The capacity of the functional flood plain within greenfield sites will be maintained and opportunities to		

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	enhance or re-instate the functional floodplain on previously-developed sites will be sought. Proposals which risk contaminating ground water will be resisted		
Hillingdon Council Local Plan (adopted 2012)	The Hillingdon Council Local Plan (2012-2026) is the key strategic planning document for Hillingdon and will support the delivery of the spatial elements of the Sustainable Community Strategy. It sets out the long-term vision and objectives for the Borough, what is going to happen, where, and how this will be achieved. The Hillingdon Local Plan is consistent with the Sustainable Community Strategy, which focuses on three key components that together make up Hillingdon now and in the future: People, Place and Prosperity. Emerging from these three components are the six priority themes of the Sustainable Community Strategy, i.e. improving health and wellbeing; strong and active communities; protecting and enhancing the environment; making Hillingdon safer; a thriving economy; and improving aspiration through education and learning. The following policies have been highlighted for their relevance to this SEA:		
	Policy DMHP 1: Historic Assets: The Council will expect development proposals to avoid harm to the historic environment. Development that has an effect on heritage assets will only be supported where: i) it sustains and enhances the significance of the heritage asset and puts them into viable uses consistent with their conservation; ii) it will not lead to a loss of significance or harm to an asset, unless it can be demonstrated that it will provide public benefit that would outweigh the harm or loss, in accordance with the NPPF; iii) it makes a positive contribution to the local character and distinctiveness of the area; iv) any extensions or alterations are designed in sympathy, without detracting from or competing with the heritage asset.		
	Policy DMEI 2: Reducing Carbon Emissions: All developments are required to make the fullest contribution to minimising carbon dioxide emissions in accordance with London Plan targets.		
	Policy DEMI 7: Biodiversity Protection and Enhancement: The design and layout of new development should retain and enhance any existing features of biodiversity or geological value within the site. Where loss of a significant existing feature of biodiversity is unavoidable, replacement features of equivalent biodiversity value should be provided on-site. Where development is constrained and cannot provide high quality biodiversity enhancements on-site, then appropriate contributions will be sought to deliver off-site improvements through a legal agreement.		
Elmbridge Borough Council Local Plan (adopted 2011)	The Elmbridge Borough Council Local Plan (2011-2026) sets out a plan for the future development of the Borough in the period 2011 to 2026. Its role is to provide a delivery strategy to deal with particular challenges and issues that have been identified as being of local importance. The Core Strategy co-ordinates the delivery of development and accompanying infrastructure. It is a key Council document where big decisions have been made in order to deliver a high quality of life in the most sustainable way possible. Its role is to set out what sort of changes we need to plan for,		

Document Name	Key Objectives, Requirements, and Guidance		
	where they should take place, when they should happen and how they will be delivered. Importantly, given the current economic climate, it also addresses the 'what if' scenario should development and infrastructure delivery fail to come forward as predicted. The following policies have been highlighted for their relevance to this SEA:		
	Policy CS14: Green Infrastructure: The Council will protect, enhance and manage a diverse network of accessible multi-functional green infrastructure by: 1. Continuing to give a high level of protection to and improving the Borough's green infrastructure assets including Suitable Accessible Natural Greenspace (SANG) and those sites designated for their biodiversity value. Ensuring new development protects and enhances local landscape character (2), strategic views and key landmarks, and takes account of their setting, intrinsic character and amenity value		
	Policy CS15: Biodiversity: The Council will seek to avoid loss and contribute to a net gain in biodiversity across the region by The Council will seek to avoid loss and contribute to a net gain in biodiversity across the region Support the implementation of the Regional Forestry and Woodland Framework and managing and maintaining a mosaic of habitats and rich variety of wildlife across the Council's landholdings in accordance with the Elmbridge Countryside Strategy.		
	Policy CS26: Flooding: Development must be located, designed and laid out to ensure that it is safe; the risk from flooding is minimised whilst not increasing the risk of flooding elsewhere; and that residual risks are safely managed.		
Guildford Borough Council Local Plan (adopted 2019)	The Guildford Borough Council Local Plan (2015-2034) sets out a plan which makes provision to meet the identified growth needs of the borough in terms of housing, employment, and retail and leisure. This is achieved by maintaining the extent and function of the Green Belt in such a way as to protect the existing character of the borough through maintaining the clear distinction between urban and rural areas and safeguarding the natural, built and historic environment. All new development will be of exemplary design and bring with it the necessary infrastructure and services required to enable future and existing communities to live sustainable lives. The following policies have been highlighted for their relevance to this SEA:		
	Policy P4: Flooding, flood risk and groundwater protection zones: All development proposals are required to demonstrate that land drainage will be adequate and that they will not result in an increase in surface water run-off. Development proposals in the 'developed' flood zone 3b will also only be approved where the footprint of the proposed building(s) is not greater than that of the existing building(s) and there will be no increase in development vulnerability. Proposals within these areas should facilitate greater floodwater storage.		

Document Name	Key Objectives, Requirements, and Guidance		
	Policy D2: Climate change, sustainable design, construction and energy: The energy and waste hierarchies should be followed except where it can be demonstrated that greater sustainability can be achieved by utilising measures further down the hierarchy. All developments should be fit for purpose and remain so into the future. Proposals for major development are required to set out in a sustainability statement how they have incorporated adaptations for a changing climate and changing weather patterns in order to avoid increased vulnerability and offer high levels of resilience to the full range of expected impacts.		
Policy ID4: Green and blue infrastructure: Permission will not be granted for development proposals demonstrated that doing so would not give rise to adverse effects on the integrity of European sites, in combination with other development. Any development with a potential impact on SPA or SAC sit to a Habitats Regulations Assessment. Permission will only be granted for development proposals w national sites where it can be demonstrated that doing so would not be harmful to the nature conse the site and its function as an ecological unit.			
Runnymede Borough Council Local Plan (adopted 2020)	The Runnymede Borough Council Local Plan (2020-2030) is the key document that provides the framework to guide the future development in the Borough of Runnymede. It sets out an ambitious vision and objectives, followed by a clear and focussed spatial strategy. It includes policies for managing development and infrastructure to meet the identified social, environmental, and economic challenges facing the area up to 2030 which will ensure that the Local Plan's vision is met. Ultimately, the Runnymede 2030 Local Plan is used to make decisions on planning applications. The following policies have been highlighted for their relevance to this SEA:		
	Policy EE2: Environmental protection: Covering the following environmental topics: air quality, noise, land contamination, light, integrating development with existing uses and construction management.		
	Policy EE3: Strategic Heritage Policy: Development that affects Runnymede's heritage assets should be designed to protect, conserve and enhance the significance and value of these assets and their settings in accordance with national legislation, policy and guidance and any supplementary planning documents which the council may produce. Development proposals likely to affect the significance of a heritage asset, including the contribution made by its setting, should be accompanied by a description of its significance in sufficient detail to allow the potential impacts to be adequately assessed.		
	Policy EE13: Managing Flood Risk: New development will be guided to areas of lowest flood risk from all sources of flooding through the application of the sequential test. A sequential approach to the layout on individual development		

Document Name	Key Objectives, Requirements, and Guidance		
	sites will also be expected to be followed to minimise flood risk. The exception test will continue to be applied where national planning policy advises that this is necessary.		
Spelthorne Borough Council draft Local Plan (2020)	The Spelthorne Borough Council draft Local Plan (2022-2037) has been prepared by the Council in consultation with the community, and sets out the policies and allocations that will guide how new development and infrastructure comes forward in the Borough for the next 15 years. The Local Plan supports the sustainable growth of Spelthorne in a planned way, which benefits our communities, environment and economy. The following policies have been highlighted for their relevance to this SEA:		
	Policy E2: Biodiversity: The Council will support development proposals which restore, maintain and enhance habitat connectivity and will seek opportunities for habitat creation particularly within Biodiversity Opportunity Areas. Development proposals will be expected to contribute to biodiversity through clearly demonstrating improvements when submitting a planning application as part of securing biodiversity net-gain.		
	Policy E3: Managing Flood Risk: To reduce the overall and local flood risk and manage water resources development must be located, designed and laid out to ensure that it I safe, the risk from flooding is minimised (whilst not increasing flooding risk elsewhere) and that residual risks ae safely managed.		
	Policy E4: Environmental Protection: Covering the following environmental topics: air quality, water quality, noise, light, development of land affected by contamination.		
Surrey Heath Borough Council Local Plan (adopted 2012)	The Surrey Heath Borough Council Local Plan (2011-2028) sets out how by 2028 residents will continue to enjoy a prosperous and high quality of life based around sustainable growth and a strong economy supporting a healthy, safe and diverse society that enjoys a high quality environment in which the natural heathland environment and character of towns and villages (with their green areas) is protected and enhanced. New development will be climate change resilient and continue to be well designed and of a high quality. This will include housing that meets the needs and aspirations of all sectors of the local community. The community will continue to have good access to high quality employment, healthcare and education. Rates of economic activity will remain high, the local community will be more active with improved access to leisure and recreational facilities and a network of green infrastructure. The following policies have been highlighted for their relevance to this SEA:		
	Policy CP14: Biodiversity and Nature Conservation: The Borough Council will seek to conserve and enhance biodiversity within Surrey Heath. Working with partners, new opportunities for habitat creation and protection will be		

Document Name	Key Objectives, Requirements, and Guidance		
	explored in particular on biodiversity opportunity areas. Development that results in harm to or loss of features of interest for biodiversity will not be permitted.		
	Policy DM8: Stand Alone Decentralised, Renewable and Low Carbon Energy Schemes: Proposals for standalone decentralised, renewable and low-carbon schemes will be supported unless the social, economic and environmental benefits are outweighed by adverse impacts to the immediate and wider environment.		
	Policy DM10: Development & Flood Risk: In order to manage flood risk, the Borough Council will take a sequential approach to the allocation of sites in a Site Allocation DPD and to determining planning applications. Development within flood risk zones 2 & 3 or on sites of 1ha or greater in zone 1 and sites at medium or high risk from other sources of flooding as identified by the Borough Council's SFRA unless certain conditions are met.		
Woking Borough Council Core Strategy (adopted 2012)	The Woking Borough Council Core Strategy (2012-2027) provides a clear vision of what the area will look like by 2027 and the means to achieve that. It responds to the key issues that residents, businesses and visitors have said they want the Council to address, including: the provision of well-designed homes to meet the needs of all sections of the community, the creation of high quality jobs for a sustainable economy and the provision of shops and facilities to meet the day-to-day needs of the community. The Core Strategy also includes policies to address pockets of deprivation in the borough and at the same time, it sets out a robust defence for the protection of the physical and natural environment and the heritage assets of the Borough.		
	The following policies have been highlighted for their relevance to this SEA:		
	Policy CS6: Green Belt: To ensure the Green Belt continues to serve its fundamental aim and purpose, and maintains its essential characteristics, it will be protected from harmful development. Within its boundaries strict control will continue to apply over inappropriate development, as defined by Government policy currently outlined in the NPPF.		
	Policy CS7: Biodiversity and nature conservation: The Council is committed to conserving and protecting existing biodiversity assets within the Borough. It will require development proposals to contribute to the enhancement of existing biodiversity and geodiversity features and also explore opportunities to create and manage new ones where it is appropriate. This will include those habitats and species listed in the Surrey Biodiversity Action Plan (BAP). Any development that will be anticipated to have a potentially harmful effect or lead to a loss of features of interest for biodiversity will be refused.		

Document Name	Key Objectives, Requirements, and Guidance		
	Policy CS20: Heritage and conservation: New development must respect and enhance the character and appearance of the area in which it is proposed whilst making the best use of the land available. New development should also make a positive contribution to the character, distinctiveness and significance of the historic environment, including heritage assets at risk through neglect, decay or other threats.		
Canterbury City Council Local Plan (adopted 2017)	The Canterbury City Council Local Plan (2017-2031) has several functions: To set out a strategy for fulfilling the Government's policy towards land use planning at a District level, including its objective of securing sustainable development; To give an opportunity and invitation to participate in the planning process, through giving people chance to express their views on local planning issues; To set out objectives to ensure the District is an exceller location in which to live, invest, work, learn and visit; To take into account the principal social, economic and environmental influences on the District in the Plan against which planning applications for development will be assessed; by identifying sites for particular purposes, by defining areas to which policies apply and by setting or details of these policies in terms of standards and criteria. The following policies have been highlighted for their relevance to this SEA:		
	Policy CC2: Reducing Carbon Emissions from New Development: Development in the Canterbury District should include proportionate measures to reduce carbon and greenhouse gas emissions. As well as incorporating measures to reduce carbon emissions development proposals shall show how they have taken account of landform, layout, building orientation, massing and landscaping to minimise energy consumption.		
	Policy CC4: Flood Risk: Development proposals within Flood Zones 2 and 3 and sites larger than 1 ha in Flood Zone 1 shall be subject to a Flood Risk Assessment. The Flood Risk Assessment shall be in accordance with the Council's Drainage Impact Assessment Guidance Note and Strategic Flood Risk Assessment, including the requirement for a contribution towards any necessary new flood defence or mitigation measures. Where relevant, the assessment should also address the risk of flooding from surface water, groundwater and ordinary watercourses. Where there is evidence that water from these sources ponds or flows over the proposed site the assessment should state how this will be managed and what the impact on neighbouring sites will be.		
	Policy HE1: Historic Environment and Heritage Assets: The City Council will support proposals which protect, conserve and enhance the historic environment and the contribution it makes to local distinctiveness and sense of place. Proposals that make sensitive use of historic assets through regeneration and reuse, particularly where these bring redundant or under-used buildings and areas into an appropriate use, will be encouraged. Development must conserve and enhance, or reveal, the significance of heritage assets and their settings. Development will not be		

Document Name	Key Objectives, Requirements, and Guidance		
	permitted where it is likely to cause substantial harm to the significance of heritage assets or their setting unless it is necessary to achieve substantial public benefit that would outweigh the harm or loss.		
Dover District Council Local Development Framework (adopted 2010)	The Dover District Council Local Development Framework (2010-2026) sets out how "No change" is not an option. Economic, social and environmental change is part of everyday life. What is considered through the Core Strategy is the degree and type of change that is appropriate, where and when it should happen and how it is to be delivered. The factors that need to be taken into account to help decide this are, the characteristics and potential of the District, and the objectives and policies of other relevant plans and strategies, taking account of Dover's National Growth Point designation in 2008.The following policies have been highlighted for their relevance to this SEA:		
	Policy DM15: Protection of the Countryside: Development which would result in the loss of, or adversely affect the character or appearance, of the countryside will only be permitted if it is: i. In accordance with allocations made in Development Plan Documents, or ii. justified by the needs of agriculture; or iii. justified by a need to sustain the rural economy or a rural community; iv. it cannot be accommodated elsewhere; and v. it does not result in the loss of ecological habitats.		
	Policy DM16: Landscape Character: Development that would harm the character of the landscape, as identified through the process of landscape character assessment will only be permitted if: i. It is in accordance with allocations made in Development Plan Documents and incorporates any necessary avoidance and mitigation measures; or ii. It can be sited to avoid or reduce the harm and/or incorporate design measures to mitigate the impacts to an acceptable level.		
	Policy DM19: Historic Park and Gardens: Permission will not be given for development proposals that would adversely affect the character, fabric, features, setting, or views to and from the District's Historic Parks and Gardens.		
Folkestone & Hythe District Council draft Core Strategy Review (adopted 2020)	The Folkestone & Hythe District Council draft Core Strategy Review will help guide the district through changing pressures. Some of these forces are readily apparent or widely recognised, be it for action to regenerate towns such as Folkestone, or for protection of countryside assets. Yet to plan for the long-term, consideration is needed of the context for development now and in the future. 1.26 Environmental, social and economic change is occurring with increasing rapidity. Places and communities will continue to face pressures, much of which is driven by major structural shifts impacting widely on places and settlements indifferent localities and regions. Whether positive or negative, many of the trends have origins in major national and global transitions. The following policies have been highlighted for their relevance to this SEA:		

Document Name	Key Objectives, Requirements, and Guidance		
	Policy SS8: Sustainability and Health New Town Principles: Water efficiency, and demand management measures to be implemented to minimise water use and maximise the recycling and reuse of water resources (i.e. through the use of 'grey' water) across the settlement, utilising integrated water management solutions.		
	Policy CSD4: Green Infrastructure of Natural Networks, Open Spaces and Recreation: Improvements in green infrastructure (GI) assets in the district will be actively encouraged as will an increase in the quantity of GI delivered by the council working with partners and developers in and around the sub-region, including through pursuing opportunities to secure net gains in biodiversity, and positive management of areas of high landscape quality or high coastal/recreational potential.		
	Policy CSD5: Water and Coastal Environmental Management: Development should contribute to sustainable water resource management which maintains or improves the quality and quantity of surface and ground water bodies, and where applicable, the quality of the coastal environment and bathing waters.		

Annex D: Baseline Review

Introduction

The current environment and socio-economic baseline were reviewed for the WRSE region, during the WRSE Scoping Consultation. Many of the Thames Water options, particularly the SROs are located close to other water company regions. As such, the baseline information from the region has been presented.

Thames Water specific baseline information has also been included, as relevant for the assessment. This environmental baseline review was produced in September 2020 and used throughout the SEA process. In a small number of cases, information has been updated prior to publication of the Environmental Report.

Furthermore, the baseline information is presented under the SEA Directive topics and provides an evidence base which environmental issues or opportunities resulting from the WRSE regional plan can be predicted and assessed. Maps showing key spatial baseline information are presented in Annex C and referenced within this Section. The baseline summarised in this Section is a high-level overview of the baseline conditions for the region. More detailed location specific baseline information has been developed in a GIS database and will be used as part of the options assessment process to identify the effects of each option.

The baseline information in this Section was collected from published sources as referenced in the text below, including but not limited to the following sources:

- Office for National Statistics (ONS)
- Local Authority Health Profiles (Public Health England, 2018)
- Department for Transport
- UK Climate Projections 2018 (UKCP18)
- Historic England
- Natural England
- Department for Environment, Food and Rural Affairs (Defra)
- Environment Agency
- Baseline information
- Biodiversity, flora and fauna
- Designated sites

The WRSE region contains numerous Special Areas of Conservation (SAC), Special Protection Areas (SPA), Ramsar sites, Sites of Special Scientific Interest (SSSI), National Nature Reserves (NNR), Local Nature Reserves (LNR), Marine Protected Areas (MPA) and Marine Conservation Zones (MCZ). The number and type of ecological sites across the WRSE region is presented in Table D.0-1.

Table D.0-1: Ecological sites in the WRSE Region

Designated Site	Total Number	
SAC	298	
SPA	196	
Ramsar	126	
SSSI	1,661	
NNR	86	

LNR	480	
MPA	1	
MCZ	14	

Flora and fauna

The WRSE region is rich in species and habitat diversity. Under the Natural Environment and Rural Communities (NERC) Act 2006, WRSE has a duty to have regard to the conservation of biodiversity in exercising its function. The duties relate to habitats and species of principal importance, some which may be designed Local Wildlife Sites (LWS).

The WRSE region is made up of the following terrestrial land cover types: agriculture (56.5%); urban (23.2%); woodland (13.2%); semi-natural grassland (5.3%); and surface water (1.5%). There is a large stretch of coastline in the WRSE region which supports a wide range of wetland, coastal and estuarine habitats and species.

Priority habitats make up 16.6% of the WRSE region equating to a total of 39,5109ha⁴. Deciduous woodland accounts for the highest percentage of priority habitat in the region. The split of the priority habitat by type across the region is shown in Table D.0-2. The region also contains 1611.2 km of Chalk rivers and streams.

Priority Habitat Type	Hectares (ha)	Percentage
Coastal and floodplain grazing	36,775.01	1.55%
marsh		
Coastal saltmarsh	1,532.99	0.06%
Coastal sand dunes	721.64	0.03%
Coastal vegetated shingle	969.85	0.04%
Deciduous woodland	246,956.09	10.41%
Good quality semi-improved	22,653.33	0.96%
grassland		
Lowland calcareous grassland	14,550.19	0.61%
Lowland dry acid grassland	2,163.03	0.09%
Lowland fens	2,923.69	0.12%
Lowland heathland	12,490.14	0.53%
Lowland meadows	4,483.36	0.19%
Maritime cliff and slope	1,235.04	0.05%
Mudflats	9,832.43	0.41%
No main habitat but additional	33,286.60	1.40%
habitats present		
Purple moor grass and rush	415.03	0.02%
pastures		
Reedbeds	563.45	0.02%
Saline lagoons	364.60	0.02%
Traditional orchard	3,193.23	0.13%

Table D.0-2: Priority habitats in the WRSE Region

⁴ Natural England (2020). Priority Habitat Inventory. Available at:

https://data.gov.uk/dataset/4b6ddab7-6c0f-4407-946e-d6499f19fcde/priority-habitat-inventory-england

Water

The WRSE region is one of the driest areas in the UK and Affinity Water, South East Water, SES, Southern Water and Thames Water are all classed as areas with serious water stress5. Around half of the region's water supply comes from underground sources with some water resource zones relying completely on underground sources⁶. Precipitation during winter months is crucial for these sources meeting higher demand during spring and summer months. The anticipated population and economic growth alongside the projected changes in climate will likely continue to place additional stress on water availability and the natural environment within the WRSE region.

The river basin districts which make up the WRSE region are Thames and the South East. The Thames river basin district covers an area of 16,200km2 and includes 17 management catchments which range from chalk streams and aquifers to tidal and coastal marshes7. These support a rich diversity of species and habitats some of which are of national or European importance. The number of water bodies within the Thames river basin district is presented in Table D.0-3. The current status of the ground and surface water bodies in the Thames district is presented in Table D.0-4 and Table D.0-5. Phosphate followed by physical modifications are the two most common pressures preventing the water bodies in the Thames river basin district from achieving 'Good' status. Pollution from wastewater followed by physical modifications and pollution from towns and cities are reported as the most common significant water management issues affecting the achievement of 'Good' status.

Water body categories	Natural	Artificial	Heavily modified	Total
Rivers, canals and surface water transfers	287	21	106	414
Lake	7	47	19	73
Coastal	0	0	1	1
Estuarine	1	4	5	10
Groundwater	47	0	0	47
Total	342	72	131	545

Table D.0-3: Number of water bodies in the Thames I	river	basin	district
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Source: Thames River Basin Management Plan (RBMP)

⁵ Environment Agency (2013). Water Stressed Areas – Final Classification. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/f ile/244333/water-stressed-classification-2013.pdf

⁶ WRSE (2020). Future water resource requirements for South East England. Available at: https://www.wrse.org.uk/media/anbhm2cb/wrse-future-water-resource-requirements-march-2020-3.pdf

⁷ Defra and Environment Agency (2015). Part 1: Thames River Basin District – River Basin Management Plan. Available at:

https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/f ile/718342/Thames_RBD_Part_1_river_basin_management_plan.pdf
Table D.0-4: Ecological and chemical 2015 classification for surface waters in the Thames river basin district

No. of water bodies	Ecological status or potential						mical tus
	Bad	Poor	Moderate	Good	High	Fail	Good
498	27	112	320	29	0	5	493
-							

Source: Thames RBMP

Table D.0-5: Chemical and quantitative 2015 classification for groundwaters in the Thames river basin district

No. of water bodies	Quantitative status		Chemical status	
	Poor Good		Poor	Good
47	22	25	18	29

Source: Thames RBMP

The South East river basin district covers an area of 10,200km2 and is made up of nine management catchments which range from chalk streams of the Test and Itchen catchments to the modified rivers of the Rother catchment⁸. These also support diverse species and habitats some of which are of national or European importance, including migratory salmon rivers, native white clawed crayfish, and estuaries and coastal waters important for shellfish, wintering wildfowl, breeding gulls and terns. The chalk groundwater provides most of the drinking water within the river basin district at 72%. The number of water bodies in the South East river basin district is presented in Table D.0-6. The current status of the ground and surface water bodies in the South East district is presented in Table D.0-7 and Table D.0-8. Phosphate followed by physical modifications are also the most common water pressures affecting the water bodies in the South East river basin district from achieving 'Good' status. Pollution from wastewater followed by physical modifications and pollution from rural areas are reported as the most common significant water management issues affecting the achievement of 'Good' status.

Water body categories	Natural	Artificial	Heavily modified	Total
Rivers, canals and surface water transfers	138	13	69	220
Lake	2	16	10	28
Coastal	2	0	9	11
Estuarine	1	5	17	23
Groundwater	33	0	0	33
Total	176	37	105	315

Table D.0-6: Number o	of water bodies in	the South East r	iver basin district
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Source: South East RBMP

⁸ Defra and Environment Agency (2015). Part 1: South East River Basin District – River Basin Management Plan. Available at:

https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/f ile/718337/South_East_RBD_Part_1_river_basin_management_plan.pdf

Table D.0-7: Ecological and chemical 2015 classification for surface waters in the South East river basin district

No. of water bodies	Ecologica	status or potential				Chemical status	
	Bad	Poor	Moderate	Good	High	Fail	Good
282	10	60	169	43	0	5	277

Source: South East RBMP

Table D.0-8: Chemical and quantitative 2015 classification for groundwaters in the South East river basin district

No. of water bodies	Quantitative status		Chemical status	
	Poor	Good	Poor	Good
33	16	17	16	17

Source: South East RBMP

The RBMPs for the Thames and South East river basin district highlight significant water management issues which prevent the sustainable management of water within each river basin as presented in Table D.0-9. For both the river basin districts, physical modifications and pollution from wastewater affect the highest proportions of water bodies followed by pollution from rural areas.

Table D.0-9: Water management issues

Water Management Issue	Percentage of water bodies affected		
	Thames	South East	
Physical modifications	44%	43%	
Pollution from wastewater	45%	40%	
Pollution from towns, cities and transport	17%	9%	
Changes to the natural flow and level of water	12%	7%	
Negative effects of invasive non-native species	3%	2%	
Pollution from rural areas	27%	30%	

Source: Thames and South East RBMP

Drinking Water Quality

Data relating to drinking water quality, pollution incidents and air quality, which may have indirect effects on amenity and human health are covered in separate sections of this Scoping Report. The Consumer Council for Water report (2021) on complaints and enquiries for the year 2020-21 shows that overall industry complaints increased by 11% compared to the previous year (from 84,649 to 93,758). This has been the third consecutive year of increasing annual industry complaints since 2017-18. Thames Water reported a 39,530 of written

complaints in 2020-21; an increase of 17.2% from the previous year; making up for 42% of the overall industry complaints for 2020-21. However 73.3% of the total complaints in 2020-21 were billing and charges related with only 14.2% being water supply related.

Flood risk

Flood risk across the WRSE region is diverse and can occur from a wide range of sources including rivers and the sea, groundwater, reservoir and surface water. Climate change, is projected to result in more extreme weather events which alongside projected increases in sea level is likely to have an impact on the future flood risk of the region.

The Thames river basin district has over 227,000 people at high risk of surface water flooding and over 107,000 people are at high risk of flooding from rivers and the sea9. It contains two primary flood risk areas (FRAs)¹⁰, the London and Medway, which are areas with higher risk of surface water flooding. There is also one partial flood risk area, South Essex, which is partly within the Thames river basin district.

The South East river basin district consists of one primary flood risk area, Brighton and Hove, and there are over 31,000 people at high risk of surface water flooding and over 36,000 people at high risk of flooding from rivers and the sea^{11.} There has been notable and severe flooding occurring across the basin in recent years which resulted in significant impacts on communities, businesses and the natural environment.

Soil

The Soil Map of England and Wales identifies dominant soil subgroups and soils capes. In terms of agricultural land quality, planning policy seeks to protect best and most versatile agricultural land (defined as land in Grades 1, 2 and 3a of the Agricultural Land Classification).

The majority of land in the Thames river basin 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. Majority of agricultural land is classified as Grade 3 or higher (with the swathe of agricultural land in the Chilterns being of particularly high quality). 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. The same area also contains pockets of broadleaved, mixed and yew woodland and improved grassland.

The three main soils capes identified for the Thames river basin were very acid loamy upland soils with a wet peaty surface, slowly permeable seasonally wet slightly acid but base-rich loamy and clayey soils, shallow very acid peaty soils over rock with pockets of freely draining slightly acid but base-rich soils.

⁹ Environment Agency (2016). Thames River Basin District Flood Risk Management Plan 2015

^{– 2021.} Available at: https://www.gov.uk/government/publications/thames-river-basin-district-flood-risk-management-plan

¹⁰ Primary FRAs are defined in the River Basin Flood Risk Management Plans as areas where the risk of flooding from local flood risks is significant as designated under the Flood Risk Regulations.

¹¹ Environment Agency (2016). South East River Basin District Flood Risk Management Plan 2015 – 2021. Available at: https://www.gov.uk/government/publications/south-east-river-basin-district-flood-risk-management-plan

Contaminated land is defined as land where substances could cause significant harm to people or protected species; or significant pollution of surface waters or groundwaters. Some types of contaminated land can be designated as special sites for a variety of reasons, including land that seriously affects drinking water, surface waters (e.g., lakes and rivers) and important groundwater sites. Data on contaminated land are compiled by the British Geological Society. Some of the main risks associated with agricultural land is the overflow from compacted and poached fields in the form of organic slurry, dirty water, fertiliser, pathogens and fine sediment all moving in suspension or solution.

Minerals Safeguarding Areas (MSAs) are designated by Mineral Planning Authorities for areas that include known deposits of minerals which are desired to be kept safeguarded from unnecessary sterilisation by non-mineral development.

The WRSE region is a hub for agriculture with cereal and livestock grazing being the most predominant type of farming^{12.} Agricultural land is classified on a scale of 1 to 5 where 1 is the highest quality and 5 is the lowest. The agricultural land classification of the region is predominately of Grade 2 and Grade 3 with pockets of urban and non-agricultural land. There are some areas with Grade 1, particularly around the south and south east coast.

The south east of England and London has the largest area of licensed landfill sites of anywhere else in the country¹³. Currently, there are approximately 400 authorised landfill sites across the WRSE region^{14.}

Air

Options in the WRMP may require construction, the operation of abstraction and treatment operations in new locations and changes to the operation of such processes in existing locations. Therefore, there is the potential for negative effects on air quality through emissions associated with construction requirements or through the operation of the options.

The baseline situation can be best described through reference to the local authorities in the Thames Water WRZs 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 which have declared an AQMA within their boundaries are illustrated in Figure D32. There are 81 AQMAs in total within the Thames River Basin. The figure demonstrates that the two main pollutants of concern are NO2 and PM10. The majority of the AQMAs in the UK have been declared because of emissions from road transport.

This latest air quality strategy 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

¹² Defra (2020). Agricultural facts: overview of agricultural activity in the South East (including London). Available at:

https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/f ile/866815/regionalstatistics_southeast_20feb20.pdf

¹³ Environment Agency (2002). Dealing with contaminated land in England. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/f ile/313967/dealing_with_contaminated_land_i.pdf

¹⁴ Environment Agency (2020). Permitted Waste Sites - Authorised Landfill Site Boundaries. Available at: https://data.gov.uk/dataset/ad695596-d71d-4cbb-8e32-99108371c0ee/permitted-waste-sites-authorised-landfill-site-boundaries

exposure reduction approach and anew ozone (O3) objective to protect ecosystems, in line with the EU target value set out in the Third Daughter Directive.

In April 2015, the Supreme Court ruled that the UK Government must redraft the national nitrogen dioxide (NO2) air quality action plan, as well as 16 regional action plans, including Greater London, with the aim of ensuring that these areas reach compliance with legal NO2 limits as soon as possible. In response, the Mayor of London has been engaging with the Government to highlight priorities for action in London, and provide support, data and other information to support the redrafting of the national and Greater London regional NO2 air quality action plans to achieve relevant EU limit values in Greater London. This has come to be the Air Quality Plan for nitrogen dioxide (NO2) in UK (2017).

Climatic factors

Current climate trends

Current observations indicate that the UK is continuing to warm. In 2019, four new temperature records were set, including a high of 38.7°C and a new winter record of 21.2°C15. The decade between 2010 and 2019 has been on average 0.3°C warmer than the 1981-2010 average and 0.9°C warmer than 1961-1990. Annual precipitation has increased across the UK in the last few decades with 2019 seeing 107% more rainfall than the 1981-2010 average¹⁶. Summers have been 11% wetter on average than 1981-2010 and 13% wetter than 1961-1990. Winters have been 4% and 12% wetter than 1981-2010 and 1961-1990 respectively.

High-level climate observations for regions across the UK are publicly available from the Met Office for the 30-year period between 1981-201017. Those published for Southern England are presented in Table D.0-10.

Climatic Condition	Climate Observation
Temperature	Mean annual temperatures range from around 11.5°C in central London and along the coast to around 9.5°C over higher ground inland. The coldest month is January where daily minimum temperatures range from over 3°C in London and along the coast to 0.5°C over the higher ground. July is the warmest month with daily mean maximum temperatures of 23.5°C, the highest in the UK. Extreme maximum temperatures can occur in July or August and are usually associated with heat waves lasting several days.
Precipitation	The wettest areas in Southern England are the South Downs and the higher parts of Dorset with an average of over 950mm per year. The Thames Valley, London and the north Kent coast usually receive less than 650mm per year and less than 550 around the Thames Estuary. Precipitation is generally well-distributed throughout the year in the region; however, an autumn/early winter maximum is more pronounced in the counties bordering the

	o	- I I	11 1	1 0
Table D.0-10:	Southern	England	climate	observations

15 RMetS (2020). State of the UK Climate. Available at:

16 RMetS (2020). State of the UK Climate.

https://rmets.onlinelibrary.wiley.com/doi/epdf/10.1002/joc.6726

¹⁷ Met Office (2016). UK Regional Climates – Southern England. Available at:

https://www.metoffice.gov.uk/research/climate/maps-and-data/regional-climates/index

Climatic Condition	Climate Observation
	English Channel. In London and the Thames Valley there are also significant amounts in the summer associated with showery, convective rainfall. The region is susceptible to periods of prolonged rainfall which leads to widespread flooding, particularly in winter and early spring. However, the region can also be subject to dry periods, placing demands upon water supplies.
Sunshine	Southern England includes the sunniest places in the mainland UK. The coastal areas of Sussex and Hampshire and also the Isle of Wight features in the list of high sunshine averages. The average annual sunshine durations on the coast can exceed 1800 hours, but 1550-1600 hours is typical of most of the region with a decrease towards the north.
Snowfall	The number of days with snow falling in the Southern England region is around 12-15 per year on average over the lower lying areas. On the higher ground areas of the Chilterns, North Downs and Weald, snow falling days can be around 20 per year on average. The least snow-prone places are those close to the English Channel, with less than 10 days. The number of days with snow lying has a similar distribution, with five days per year in most inland areas but over 10 days on the higher ground particularly to the east and north
Wind	Southern England is one of the most sheltered parts of the UK. The number of days where gale force winds are reached (mean speed of 34 knots) is typically one to two days per year over most inland areas, however exposed places along the coast experience around 10 days per year.

Source: Met Office 2016

Emissions

The predominant greenhouse gas of interest is carbon dioxide (CO_2). National and regional CO_2 emissions totals are provided in D.11 and are apportioned to their source categories in Table D.12.

Area	Options covered	Annual CO ₂ Emissions / million tonnes	Annual CO ₂ Emissions (% of UK total)
South East	Thames Warwickshire Avon	41.0	11.9%
South West	Thames River Severn River Wye	25.5	7.4%
East of England	Thames	33.5	9.7%
Greater London	Thames	41.2	11.9%

Table D.11 - Carbon dioxide emissions by area (2019)

Area	Options covered	Annual CO ₂ Emissions / million tonnes	Annual CO ₂ Emissions (% of UK total)
East Midlands	River Severn Minworth Warwickshire Avon	29.0	8.4%
West Midlands	River Severn Vyrnwy Minworth Warwickshire Avon	30.0	8.7%
Wales	River Severn Vyrnwy River Wye	24.0	7.0%
UK		345	100%

Source: DECC (2021) Local Authority Carbon Dioxide Emissions Estimates 2019: Statistical Release

Table D.12 - Percentage contribution to carbon dioxide emissions by sector (2013)

Area	Options covered	Percentage Contribution by Source Sector				
		Industry & Commercial % (millions tonnes)	Domestic % (millions tonnes)	Road Transport % (millions tonnes)	Land Use Change % (millions tonnes)	
South East	Thames Warwickshire Avon	23.2	32.02	46.04	-4.87	
South West	Thames River Severn River Wye	26.2	29.4	44.1	-3.02	
East of England	Thames	23.5	25.6	39.8	8.3	
Greater London	Thames	27.0	36.9	30.0	-0.25	
East Midlands	River Severn Minworth Warwickshire Avon	36.0	24.2	35.5	1.3	
West Midlands	River Severn Vyrnwy Minworth Warwickshire Avon	29.4	27.4	40.4	-0.82	
Wales	River Severn Vyrnwy River Wye	52.2	20.3	26.3	-1.5	
UK		32.6	27.4	36.1	0.35	

Source: DECC (2019) Local Authority Carbon Dioxide Emissions Estimates 2019: Statistical Release

At 3.2 tonnes per person per year, London's CO_2 emissions are the lowest in the country (on a regional basis), well below the UK average of 5.5 tonnes. This is, in part, due to high usage of the public transport system compared to greater reliance on private cars outside the capital.

Thames Water's absolute GHG emissions in 2014/15 increased by 84.8kTCO₂e compared with 2013/14, an increase of 11.5%. Approximately two thirds of this increase was outside of Thames Waters control, due to unexpected rise in Defra's emission factor for grid electricity (increased 11% compared with 2013/14). The remaining increase was due to increased electricity consumption from new wastewater treatment works that were required to meet higher effluent quality standards.

Emissions associated with delivering a megalitre (MI) of drinking water and wastewater service in 2014/15 have both increased compared to 2013/14 - by 9.2% (295.9 kgCO₂e/MI) and 9.5% (298.4 kgCO₂e/MI) respectively compared to 2013/14. This increase is less than the 11.5% increase in grid emissions factor due to the delivery of energy efficiencies and renewable self-supply.

Climate projections

The Met Office UK Climate Projections (UKCP) were updated for the first time since 2009 in December 2018 (UKCP18)18. The UKCP18 are largely the same as the previous projections where all areas of the UK are projected to be warmer, particularly during summer months. Rainfall is projected to vary seasonally and at a regional scale, however the UK is projected to have wetter winters and drier summers.

The projected changes in temperature and precipitation for the south east of England by the 2050s (2040-2069), under the RCP8.5 scenario (high emissions scenario) are detailed in Table D.3. The 1981-2010 baseline period and the central estimate, representing 'as likely as not' probability of change (50th percentile), was used for the following projections.

Climatic Factor	Climate Projections
Temperature	Annual mean temperatures are projected to increase by 2.0°C. Summer temperatures are projected to see the largest increase by 2.6°C and winter temperatures by 1.7°C. Mean maximum summer temperatures are projected to increase by 2.9°C.
Precipitation	Annual mean precipitation is projected to decrease by 1.1%. Seasonal variability is projected with a 22.9% decrease in precipitation during summer months and an increase of 11.5% during winter months.

Table D.13: Future climate projects by the 2050s under the RCP8.5 scenario

Source: Met Office UKCP18 using the central probability estimate for a RCP8.5 scenario

Population and human health Population

Approximately 19 million people, equating to around 30% of the UK's total population, live within the WRSE region¹⁹. Settlements within the region are diverse and range from large population

¹⁸ Met Office UKCP18. Available at: https://ukclimateprojections-ui.metoffice.gov.uk/

¹⁹ Available at: https://www.wrse.org.uk/the-challenge

centres such as London to small rural hamlets and seaside towns. Long-term population growth in the region is anticipated to be around four million^{20.}

The distribution of age amongst the population in the WRSE region is similar to the UK average where 20% are aged 15 and under, 66% are between 16 and 64, and 14% are over 6521. Those aged 30 to 44 make up the largest proportion of the population at 23% followed by 45 to 59 at 18%.

Ethnicity in the WRSE region is predominately White. There are larger proportions of Black, Asian and Mixed ethnicities in the urban areas of the region compared to rural areas with respective populations of 13%, 8% and 4%22across the WRSE region.

Human health

Life expectancy at birth for both males and females in the WRSE region is better than the England average at around 81 years old and 84 years old respectively^{23.} Against the various indicators included within the Public Health Profiles, the region is generally better than the national average. Where the region is performing worse than the national average is against the following indicators: estimated diabetes diagnosis rate; year 6: prevalence of obesity (including severe obesity); emergency hospital admissions for intentional self-harm; and killed and seriously injured (KSI) casualties on roads^{24.}

The percentage of the population describing their general health as very good, good, fairly good, not good, and very bad is shown in Table D.**0-11**14²⁵. London and South East are similar to one another with slight differences in those describing their health as very good, good and fair, and tend to be aligned to the average for England.

Region	General	General	General	General	General
	health very	health good	health fairly	health	health very
	good (%)	(%)	good (%)	bad(%)	bad (%)
London	51	33	11	4	1

Table D.0-114: Population health by region

20 WRSE (2020). Method Statements. Available at:

https://www.wrse.org.uk/media/jb5nwwx5/wrse-method-statements-summary-document.pdf 21 NOMIS (2011). Age structure (KS102EW) for South East and London. Available at:

https://www.nomisweb.co.uk/census/2011/ks102ew

profiles/data#page/0/gid/1938132701/pat/15/par/E92000001/ati/6/are/E12000004/iid/90323/ag e/201/sex/4/cid/4/page-options/ovw-do-0

24 Public Health England (2019). Public Health Profiles for South East and London.

25 ONS (2013). General Health in England and Wales. Available at:

https://www.ons.gov.uk/peoplepopulationandcommunity/healthandsocialcare/healthandwellbein g/articles/generalhealthinenglandandwales/2013-01-30#general-health-across-the-english-regions-and-wales

²² NOMIS (2011). Ethnic group (QS201EW) for South East and London. Available at: https://www.nomisweb.co.uk/census/2011/qs201ew

²³ Public Health England (2019). Public Health Profiles for South East and London. Available at: https://fingertips.phe.org.uk/profile/health-

Region	General health very good (%)	General health good (%)	General health fairly good (%)	General health bad(%)	General health very bad (%)
South East	47	35	13	4	1
England	47	34	13	4	1

Source: ONS - Census 2011

Economy

The WRSE region contributes around 37% of the total UK economy with London and the South East being the first and second largest contributors respectively²⁶. Gross Domestic Product (GDP) per head is £54,686 in London and £34,083 in the South East both of which are higher than the national UK average of £31,976. The service industry dominates the employment sector across the WRSE region with London having the highest proportion of service jobs compared to anywhere else in the UK²⁷. The South East is made up of a higher proportion of production jobs compared to London.

For the three months ending June 2020, the employment rate (those between ages 16 and 64 in the WRSE region was higher than the UK average. The South East region had the highest employment rate across the whole of the UK at 79.7%, similar to what was recorded the previous year^{28,} and for London it was 76.5% and saw an increase of 1.9% compared to the previous year. Unemployment rates in London for the three months ending June 2020 were higher than the national average (3.9%) at 4.6% and South East was lower at 3.3%, both of which are similar to the previous year.

Tourism is an important sector within the WRSE region's economy attracting visitors from across the UK and internationally. In 2019, there were 15.8 million domestic overnight trips to the South East, making it the most visited place second to the South West, and there were 12.2 million overnight trips to London^{29.} International visits to the WRSE region in 2019 were around 27 million in 2019, up 3% from the previous year, with an average night stay of around 6 nights and total expenditure of £18.3 billion^{30.} These visits are predominately for holidays (48%)

https://www.ons.gov.uk/economy/grossdomesticproductgdp/bulletins/regionaleconomicactivityb ygrossdomesticproductuk/1998to2018

27 (ONS (2020). Labour market in the regions of the UK: August 2020. Available at:

https://www.ons.gov.uk/employmentandlabourmarket/peopleinwork/employmentandemployeety pes/bulletins/regionallabourmarket/august2020

28 ONS (2020). Regional labour market: Headline Labour Force Survey indicators for all regions (HI00). Available at:

https://www.ons.gov.uk/employmentandlabourmarket/peopleinwork/employmentandemployeety pes/datasets/headlinelabourforcesurveyindicatorsforallregionshi00

29 Visit England (2020). Great Britain Tourist Annual Report 2019 – London and South East. Available at: https://www.visitbritain.org/sites/default/files/vb-

corporate/gb_tourist_annual_report_2019.pdf

30 Visit England (2020). Inbound nation, region & county data – London and South East. Available at: https://www.visitbritain.org/nation-region-county-data?area=1800 100

²⁶ ONS (2019). Regional economic activity by gross domestic product, UK: 1998 to 2018. Available at:

followed by visiting friends and relatives (27%) and business (19%), the remainder is for study and miscellaneous.

The Index of Multiple Deprivation (IMD) (2015) for the Lower Super Output Areas (LSOAs) within the region are ranked from 1 to 10 with 1 being the most deprived and 10 being the least. Around 50% of the LSOAs in the region have an IMD ranking of between 3 and 6, 27% have a ranking of 7 or over and the remaining 23% are 2 or below^{31.}

Historic environment

The WRSE region is rich in heritage with listed buildings, scheduled monuments, conservation areas, registered parks and gardens, registered battlefields, protected wrecks and world heritage sites. The total number of each of these assets within the WRSE region is presented in Table D.0-125.

Asset	Description	Number	
Listed Buildings	The statutory responsibility for listed buildings control lies with the individual Local Authorities.	Grade I	2,562
	The Department for Digital, Culture, Media and Sport is responsible for compiling the statutory list	Grade II*	6,235
	interest and each building or structure of interest is classified under one of three Grades; I, II* and II depending on their significance (Grade I assessed as highest significance).	Grade II	103,43 3
Registered Parks and	Historic England maintains a register of historic parks and gardens of special interest in England, these parks and gardens are as equally important	Grade I	65
Gardens	as buildings and settlements and form part of an area's cultural heritage. However, unlike listed	Grade II*	169
	buildings and conservation areas, historical parks and gardens are not afforded legal protection within the UK. The registration of these historic parks and gardens is a 'material consideration' in the planning process, meaning that planning authorities must consider the impact of any proposed development on the landscapes' special character.	Grade II	379
Scheduled Monuments	Scheduled Monuments are protected under the Ancient Monuments and Archaeological Areas Act	3,384	
	1979. The monuments are scheduled and recorded through Historic England, based on national importance and covering a diverse range		
	of archaeological sites. Scheduled monuments are often in a ruinous or semi-ruinous condition or		

Table D.0-125: Historic environment assets

³¹ Ministry of Housing, Communities & Local Government (2015). English indices of deprivation 2015. Available at: https://www.gov.uk/government/statistics/english-indices-of-deprivation-2015

Asset	Description	Number
	take on the form of earthworks. More complete structures of national significance are usually protected as listed buildings.	
Conservation Areas	Conservation Areas are designated by local planning authorities under their powers. The areas are protected to preserve special areas of historical and architectural importance and can range from small villages, town centres and residential areas. Each conservation area will have its own conservation area appraisal, which sets out how it should be protected.	2,649
Protected Wrecks	The Protection of Wrecks Act (1973) allows the Government to designate a wreck to prevent uncontrolled interference. Designated sites are identified as being likely to contain the remains of a vessel, or its contents, which are of historical, artistic, or archaeological importance.	1
Registered Battlefields	Historic England holds a Register of Historic Battlefields. Its purpose is to offer battlefields protection through the planning system, and to promote a better understanding of their significance and public enjoyment.	8
World Heritage Sites	The United Nations Educational, Scientific and Cultural Organization (UNESCO) seeks to encourage the identification, protection and preservation of cultural and natural heritage around the world considered to be of outstanding value to humanity.	10

Source: Historic England

It is likely that most of the Local Authorities in the WRSE region will hold a Historic Environment Record (HER) which is a database of archaeological sites, listed buildings and other historic buildings, and finds of historic objects. There are hundreds of entries on the HERs from churches and houses to roman coin finds and medieval finds. There is also potential for unidentified heritage assets and archaeological remains to be present within the region.

Heritage England publishes an annual register which is a yearly health-check of England's most valued historic places and those most at risk of being lost forever as a result of neglect, decay or inappropriate development. 1,459 buildings and structures were added in England in 2020-21 with an overall of 233 entries removed from the Register for positive reasons.

With Thames Water covering the South East and parts of the London region, according to the Heritage at Risk Register 2021, 20 sites in the South East have been saved and 15 sites have been added to the Risk Register whereas 32 historic buildings and sites across London have been removed from the register to be re-used with 18 historic sites and buildings being added to the Register.

Landscape

The landscape across the WRSE region is diverse and is made up of a mixture of lowlands and small hills. The WRSE region also has a striking stretch of coastline, including the cliffs of Dover, and picturesque seaside villages. Agriculture plays an important role in the landscape, however the WRSE region also has densely populated areas. The Green Belt around London is an important aspect of the WRSE region landscape which exists to prevent urban sprawl.

National Character Areas divide England's landscape into 159 distinct areas and are defined by a unique combination of aspects such as landscape, biodiversity, geodiversity and economic activity^{32.} There are 34 NCAs within the WRSE boundary.

National Parks are designated to protect their outstanding landscape and countryside, wildlife and cultural heritage. There are two National Parks located within the WRSE region, New Forest and South Downs, which became designated in 2005 and 2010 respectively. New Forest National Park covers an area of 566km2 and is made up of ancient woodland, open heathlands and coastline^{33.} South Downs National Park is designated for its rolling hills, picturesque towns and villages, and dramatic cliffs34.

Areas of Outstanding Natural Beauty (AONB) are protected to conserve and enhance their natural beauty and distinctiveness35. There are eight AONB within the WRSE regional which are detailed in Table D.0-136.

AONB	Description
Kent Downs	Kent Downs AONB consists of rolling rural land which meets the sea at the cliffs of Dover. The Kent Downs rise to over 240m and the river valleys of the Darent, Medway and Stour run through it. It supports a variety of wildlife in the unimproved chalk grassland and broadleaved woodlands.
High Weald	High Weald AONB is made up of rolling hills, dissected by steep-sided gill streams and sandstone outcrops. There are small and irregular shaped fields and open heath and there is an abundance of interconnected ancient woodlands. Scattered farmsteads and hamlets also make up the area and there are narrow sunken lanes from the movement of animals.
Surrey Hills	Surrey Hills AONB spans Surrey from east to west which together with the Green Belt prevents the advancing London sprawl. The deciduous woodlands of the AONB have ecological importance alongside the chalk

Table D.0-136: AONB

hampshire.co.uk/explore/areas-to-visit/new-forest

³² Natural England (2014). NCAs. Available at:

https://www.gov.uk/government/publications/national-character-area-profiles-data-for-local-decision-making

³³ Visit Hampshire - New Forest National Park. Available at: https://www.visit-

³⁴ South Downs National Park. Available at: https://www.southdowns.gov.uk/our-history/why-are-we-a-national-park/

³⁵ Natural England (AONBs): designation and management. Available at:

https://www.gov.uk/guidance/areas-of-outstanding-natural-beauty-aonbs-designation-and-management

AONB	Description
	grassland and unimproved heath. The built environment, including villages such as Shere and Abinger, is also part of the quality of the AONB.
Chichester Harbour	Chichester Harbour AONB is one of the few remaining undeveloped coastal areas in Southern England. It is a series of tidal inlets, with a narrow mouth to the sea, and wind-sculptured oaks and hawthorns line the shore. There are saltmarsh and mudflats which are important for wildlife and birds, supporting large flocks of Brent Geese, Dunlin and Little Egrets. The wide expanses and indicate creeks are also important for recreational boating.
Isle Of Wight	Half of the Isle of Wight is designated as an AONB in separate areas and include the principal landscape features of the interior's central and southern downlands and also much of the coastline. The AONB landscape is of considerable scientific and ecological importance and includes exceptional flora-rich chalk grasslands, the north coast's major estuarial habitats and the geologically notable southern cliffs and landslips.
Chilterns	Chilterns AONB is made up of rounded hills which are part of the chalk ridge that crosses England from Dorset to Yorkshire. The characteristic scarp slope looks out north over the panorama of the Vale of Aylesbury and the dip slope curves gently down into the London Basin. The Chilterns AONB is heavily wooded and supports a diversity of habitats ranging from the country's most extensive areas of beech woodland to chalk grassland.
North Wessex Downs	North Wessex Downs AONB was designated to protect one of the largest tracts of chalk downland in southern England and perhaps one of the least affected by development. The AONB meets the Thames and the Chilterns AONB and loops south round the Kennet Valley. The AONB includes ancient woodlands and is of archaeological significance and includes a World Heritage Site.
Cotswolds	Cotswold AONB rises gently west from the broad, green meadows of the upper Thames to crest in a dramatic escarpment above the Severn valley and Evesham Vale. The distinctive character of the AONB is made up of Jurassic limestone. It is nationally important for the rare limestone grassland habitat and for ancient beechwoods with rich flora.

Source: Landscapes for Life³⁶

Tranquillity is recognised as a natural resource and one which is beneficial to health and wellbeing, however infrastructure and development is putting more pressure on this special quality³⁷. The Council for Protection of Rural England (CPRE) advocates for a sustainable, enriching countryside with healthy communities available to as many people as possible. This enables for a countryside that enriches all lives and regenerates wellbeing. CPRE produced a tranquillity map of England in 2007 which determined the South East region occupied by Thames Water to be a mix 30% highly tranquil (undisturbed areas), 50% medium tranquil and

36 Landscape for Life - The UK's AONBs Overview. Available at:

https://landscapesforlife.org.uk/about-aonbs/aonbs/cotswolds

37 CPRE (2015). Give Peace a Chance. Available at: https://www.cpre.org.uk/wp-content/uploads/2019/11/CPRE_-_Give_peace_a_chance_-_May_2015.pdf

20% highly tranquil; and with the areas around London region to be the least tranquil, reflective of the densely populated urban lifestyle. The areas identified as the least tranquil are also considered areas disturbed by noise and visual intrusion, particularly due to urban development and major infrastructure projects which has had a detrimental effect on overall tranquillity.

Material assets

Transport

The WRSE region boasts an extensive transport network which connects people, places and services both within the region and beyond to support the regional and national economy. It supports gateways for international trade with the UK's two busiest airports, Heathrow and Gatwick, and the two busiest UK ports are also located within the region. Southampton is a deep-sea port on the main international shipping line and Dover is where one seventh of the UK's trade passes through and is Europe's busiest ferry port^{38.} The rail link to Europe via the Channel Tunnel Rail Link is also located within the region.

Resource use and waste

In 2018/19 the total amount of local authority managed waste was 25.6 million tonnes. The South East managed the largest tonnage of local authority collected waste in 2018/19 at 4.2 million tonnes and London managed 3.6 million tonnes in the same period³⁹. Incineration accounts for the most common waste disposal method by local authorities in the region with the South East sending 42% of all waste for incineration, and London sending 59% which made it the highest out of all the regions across England. Recycling and composting is the second most common waste disposal method, accounting for 48% of total waste in the South East and 30% in London. Landfill waste is 9% and 7% in the South East and London respectively.

Natural capital

The WRSE region contains a diverse range of Natural Capital stocks that provide a range of ecosystem services at the national, regional and local levels. The landscape is a mixture of coastal area, lowlands and small hills that contain all eight broad habitat types included within the National Ecosystem Services assessment. The region also contains several key abiotic stocks including fertile soils and coastal shelves.

Soils and geology

Detailed Information on soils stocks with the WRSE region is provided in Section 4.2.3. The WRSE region contains important stocks of soils nationally

Freshwater

Freshwater natural capital stocks cover approximately 1.5% of the WRSE regions. This encompasses all waterbodies and wetlands such as rivers ponds fens marshes and bogs. Within the WRSE region artificial freshwater habitats, such as canals and reservoirs are also an

³⁸ Transport for the South East (2018). Economic Connectivity Review. Available at: https://transportforthesoutheast.org.uk/wp-content/uploads/2018/07/FINAL-Economic-Connectivity-Review.pdf

³⁹ Defra (2019). Statistics on waste managed by local authorities in England in 2018/19. Available at:

https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/f ile/906559/201819_LA_collected_waste_mgt_annual_Stats_Notice_FINAL_Accessible_rev_v11 .pdf

important natural capital stock. These natural capital stocks are vital to support the regions biodiversity and provide other ecosystem services such as water supply, climate regulation and cultural services

Farmland

Farmland natural capital stocks cover approximately 56.5% of the WRSE regions, agriculture with cereal and livestock grazing being the most predominant type of farming. Examples of types of Farmland stocks include Arable and rotational leys, Horticulture, Improved grassland, Orchards and top fruit and Permanent pasture. In addition to the primary production of agricultural products, farmland provides many other services such as supporting biodiversity and providing cultural and heritage services.

Grasslands

Grassland natural capital stocks cover approximately 5.3% of the WRSE region and include predominately semi natural grasslands. These habitats provide key services supporting biodiversity, sequestering carbon and mitigating climate change and livestock production. In addition, this stock is associated with reaction and physical benefits.

Urban

Urban natural capital stocks cover approximately 23.2% of the WRSE region and include greenspace, blue space and mosaic habitats within urban areas. These natural capital stocks provide a wide range of ecosystem services supporting a diverse array of plants and animals and can be particularly important for pollination services. Amenity greenspaces (parks, outdoor sports facilities) are vital for community cohesion, and the mental and physical health of urban residents.

Woodland

Woodland natural capital stocks cover approximately 13.5% of the WRSE region and consist of several sub habitat types including Broadleaved, mixed and yew woodland, Coniferous woodland, Individual trees/veteran trees and Woodland priority habitats. The quality of woodland stocks vary within the region as the majority is under management however several high-quality stocks include ancient woodland. These stocks provide services such as carbon sequestration, air purification and flood prevention.

Coastal and marine

Coastal and marine habitats cover less than 1% of the land cover within the WRSE region however include several key habitats and natural capital stocks such as:

- Beach
- Salt marsh
- Sand dunes
- Intertidal rock
- Intertidal sediment
- Reefs
- Sea grass beds
- Shallow subtidal sediment.

These stocks support a range of services including reaction, cultural service, hazard prevention and climate regulation.

Future baseline

The SEA Directive requires that "the relevant aspects of the current state of the environment and the likely evolution thereof without implementation of the Plan or Programme" is identified. Prediction of future trends is difficult because they depend on a wide range of global, national and regional factors and decision making. Key trends have been identified and from an initial review it is likely that the following trends will continue:

Air quality - new development, economic growth and tourism may lead to increased car journeys and congestion within the area leading to localised air quality effects. Public transport improvements, national air quality targets and European emissions standards for new vehicles should contribute to reducing future air quality impacts from motor vehicles.

Water – water quality is likely to continue to be maintained and improved through legislation such as the WFD. The region is already water-stressed and projected economic and population growth will likely place further pressure on the region's water resources and water dependent environments. There is potential for an increased need for wastewater treatments as a result of WFD water quality standards combined with population increase. Given the energy intensity of wastewater treatment, the water industry CO2 emissions may increase and further contribute to climate change.

Climatic factors - the climate is expected to continue to change with annual average temperatures projected to increase, particularly in summer. Winters are projected to be wetter and summers drier. Climate change is projected to result in more extreme weather events, potentially causing or exacerbating periods of drought which alongside population and economic growth will impact water availability. Carbon and other GHG emissions will continue to be emitted, however regulations and legislation will likely continue to promote the reduction in emissions through commitments to net zero. The water industry in the UK is aiming to become net zero by 2030⁴⁰.

Biodiversity, flora and fauna - habitats and species are likely to continue to be protected through European and UK legislation. England's wildlife habitats have become increasingly fragmented and isolated, leading to declines in the provision of some ecosystem services, and losses to species populations'. Lawton (2010) recognises that future climate change, demographic change, economic growth, new technologies, societal preferences and changes in policy and regulatory environments may all have profound consequences⁴¹. However, new legislation such as the Environment Bill is likely to continue protection of biodiversity by providing a framework for a legally binding target of net gain within the planning system.

Population and human health – water available for consumptive use may be affected by climate change whereby access to water is limited through more frequent droughts or floods. Population is projected to increase in the region and life expectancy is also higher than the nation average meaning that the numbers of elderly residents are likely to increase. As such, water demand will increase, and further pressure will be placed on water resources within the region.

⁴⁰ Available at: https://www.water.org.uk/news-item/water-industry-plans-to-reach-net-zero-carbon-by-2030/

⁴¹ Lawton (2010). Making Space for Nature.

Material assets - regeneration and future investment and demand are likely to increase the number and quality of material assets such as housing, transport infrastructure, waste facilities, and community facilities.

Landscape – changing and continued development will affect the quality and character of landscapes.

Soil – as the population increases it is likely that more brownfield land will be remediated and developed. There is potential for a loss of agricultural land through development pressures.

Historic environment - Historic England recently reported that heritage assets at risk are decreasing. There are now 87 fewer heritage assets at risks than in 2018 with successes in buildings and structures and archaeology⁴². Historic assets will likely continue to be protected through European and UK legislation. Development could put pressure on heritage assets and their setting.

⁴² Historic England (2019). Heritage at Risk. Available at: https://historicengland.org.uk/advice/heritage-at-risk/findings/

Annex E: SEA Scoring Criteria

Table E.1 SEA Scoring Criteria

SEA Objective	Datasets/Key Themes	Effect		Description
 Biodiversity, Flora, Fauna: Protect and enhance biodiversity, priority species, vulnerable habitats and habitat connectivity (no loss and improve connectivity where possible) Marine Protected Area (MPA) Marine Conservation Zone (MCZ) National Nature Reserves (NNR) Local Nature Reserve (LNR) Priority habitats and species Non-designated sites Terrestrial, aquatic and marine habitats, species and protected sites Green networks and corridors (e.g. foraging areas and commuting routes, migration routes, hibernation areas etc. at all scales) 	 SPA SAC Ramsar site SSSIs Marine Protected Area (MPA) Marine Conservation 	+++	Major Positive	The option would result in a major enhancement on the quality of designated sites/habitats due to changes in flow or groundwater levels, water quality or habitat quality and availability. The option would result in a major increase in the population of a priority species. Effects could be caused by beneficial changes in water flows/water quality, or large amounts of creation or enhancement of habitat, promoting a major increase in ecosystem structure and function. The option would result in a major reduction or management of INNS.
	 Marine Conservation Zone (MCZ) National Nature Reserves (NNR) Local Nature Reserve (LNR) Priority habitats and species Non-designated sites Terrestrial, aquatic and marine habitats, species and protected sites Green networks and corridors (e.g. foraging areas and commuting routes, migration routes, hibernation areas etc. at all scales) 	++	Moderate Positive	The option would result in a moderate enhancement on the quality of designated and/or non- designated sites / habitats due to changes in flow or groundwater levels, water quality or habitat creation and enhancement measures. The option would result in a moderate increase in the population of a priority species. Effects could be caused by beneficial changes in water flows/water quality, or moderate amounts of creation or enhancement of habitat, promoting a moderate increase in ecosystem structure and function. The option would result in a moderate reduction or management of INNS.
		Terrestrial, aquatic and marine habitats, species and protected sites Green networks and corridors (e.g. foraging areas and commuting routes, migration routes, hibernation areas etc. at all scales)	Minor Positive	The option would result in a minor enhancement of the quality of designated and/or non-designated sites / habitats due to changes in flow or groundwater levels, water quality or habitat creation and enhancement measures. The option would result in a minor increase in the population of a priority species. Effects could be caused by beneficial changes in water flows/water quality, or small amounts of creation or enhancement of habitat, promoting a minor increase in ecosystem structure and function. The option would result in a minor reduction or management of INNS.
		0	Neutral	The option would not result in any effects on designated or non-designated sites including habitats and/or species). It will not have an effect on INNS.
		-	Minor Negative	The option would result in a minor negative effect on the quality of designated and/or non- designated sites / habitats due to changes in flow or groundwater levels, water quality or habitat loss or degradation. The option would result in a minor decrease in the population of a priority species. Effects could be caused by detrimental changes in flows/water quality, or small losses or degradation of habitat leading to a minor loss of ecosystem structure and function. The option would result in a minor increase or spread of INNS.

SEA Objective	Datasets/Key Themes	Effect		Description
			Moderate Negative	The option would result in a moderate negative effect on the quality of designated and/or non- designated sites / habitats due to changes in flow or groundwater levels, water quality or habitat loss or degradation. The option would result in a moderate decrease in the population of a priority species. Effects could be caused by detrimental changes in flows/water quality, or moderate loss or degradation of habitat leading to a moderate loss of ecosystem structure and function. The options would result in a moderate increase or spread of INNS.
			Major Negative	The option would result in a major negative effect on the quality of designated and/or non- designated sites / habitats due to changes in flow or groundwater levels, water quality or habitat loss or degradation. HRA results indicate potential for Likely Significance Effects. The option would result in a major decrease in the population of a priority species. Effects could be caused by detrimental changes in flows/water quality, or large losses or degradation of habitat leading to a major loss of ecosystem structure and function. The option would result in a major increase or spread of INNS.
		?	Uncertain	From the level of information available the effect that the option would have on this objective is uncertain.
Soil: • Protect and enhance the functionality,	 Agricultural Land Classification Landfill sites – authorised and historic 	+++	Major Positive	The option would result in a major enhancement on the quality of soils through the implementation of catchment approaches, remediation or other measures.
quantity and quality of soils		++	Moderate Positive	The option would result in a moderate enhancement on the quality of soils through the implementation of catchment approaches, remediation or other measures.
		+	Minor Positive	The option is located on a brownfield site and has no effect on soils or existing land use. The option results in the remediation of contaminated land.
		0	Neutral	The option would not result in any effects on soils or land use.
		-	Minor Negative	The option is not located on a brownfield site and/or results in a minor loss of best and most versatile agricultural land or is in conflict with existing land use. The option results in land contamination.
		-	Moderate Negative	The option will result in a moderate loss of best and most versatile agricultural land or is in substantial conflict with existing land use. The option is partially overlying mineral resources leading to partial mineral sterilisation.

SEA Objective	Datasets/Key Themes	Effect		Description
		-	Major Negative	The option will result in a major loss of best and most versatile agricultural land or is in substantial conflict with existing land use. The option results in land contamination. The option is directly overlying mineral resources leading to mineral sterilisation.
		?	Uncertain	From the level of information available the effect that the option would have on this objective is uncertain.
 Water: Increase resilience and reduce flood risk Protect and enhance the quality of the water environment and water resources Deliver reliable and resilient water supplies Environment Agency Main Rivers Flood Zones 2 and 3 Surface Water Features WFD River Waterbody Catchments WFD River Waterbodies Cycle 2 Bathing Waters (for desal options) Shellfish Waters (desal options) Source Protection Zones WFD Groundwater bodies 	+++	Major Positive	The option results in addressing failure of WFD Good Ecological Status / Good Ecological Potential. The option would result in a major improvement to flood risk. The option would result in a major improvements in water efficiency, reduces demand and improves resilience. Additional MI/d capacity over 50MI/d.	
	++	Moderate Positive	The option achieves savings through demand management and does not require abstraction to achieve yield. The option contributes to addressing failure of WFD Good Ecological Status / Good Ecological Potential. The option would result in a moderate improvement to flood risk. The option would result in a moderate improvements in water efficiency, reduces demand and improves resilience. Additional MI/d capacity between 25.1 and 50MI/d.	
	 Source Protection Zones WFD Groundwater bodies 	+	Minor Positive	The option achieves savings through demand management and does not require abstraction to achieve yield. The option would result in a minor improvement to flood risk. The option would result in a minor improvements in water efficiency, reduces demand and improves resilience. AdditionalMI/d capacity between 0.1 and 25MI/d.
		0	Neutral	The option would have no discernible effect on river flows or surface/coastal water quality or on groundwater quality or levels. The option would not have an effect on or be affected by flood risk.
	-	Minor Negative	The option would result in minor decreases in river flows. River and/or coastal water quality may be affected and lead to short-term or intermittent effects on receptors (e.g. designated habitats, protected species or recreational users of rivers and the coastline) that could not be avoided but could be mitigated. The option would result in minor decreases in groundwater quality or levels. The option is located in Flood Zone 2. The option would result in minor decreases in water efficiency, increases demand and reduces resilience.	

SEA Objective	Datasets/Key Themes	Effect		Description
		_	Moderate Negative	The option would result in moderate decreases in river flows. River and/or coastal water quality may be affected and lead to long-term or continuous effects on receptors (e.g. designated habitats, protected species or recreational users of rivers and the coastline) that could not reasonably be mitigated. The option results in the likely deterioration of WFD classification. The option would result in moderate decreases in groundwater quality or levels. The option is located in Flood Zone 3. The option would result in moderate decreases in water efficiency, increases demand and reduces resilience.
			Major Negative	The option would result in major decreases in river flows. River and/or coastal water quality may be affected and lead to long-term or continuous effects on receptors (e.g. designated habitats, protected species or recreational users of rivers and the coastline) that could not reasonably be mitigated. The option results in the deterioration of WFD classification. The option would result in major decreases in groundwater quality or levels. The option is located in Flood Zone 3 and further contributes to flood risk. The option would result in major decreases in water efficiency, increases demand and reduces resilience.
		?	Uncertain	From the level of information available the effect that the option would have on this objective is uncertain.
Air:	 Air Quality Management Zones (AOMAs) 	+++	Major Positive	The option would result in a major enhancement of the air quality within one or more AQMAs.
 Reduce and minimise air emissions 	 Air quality monitoring sites 	++	Moderate Positive	The option would result in a moderate enhancement of the air quality within one or more AQMAs.
		+	Minor Positive	The option would result in an enhancement of the air quality.
		0	Neutral	The option would not result in any effects on air quality and AQMAs.
		-	Minor Negative	The option would result in a decrease of the air quality.
		_	Moderate Negative	The option would result in a decrease of the air quality within one or more AQMAs.
			Major Negative	The option would result in a major decrease in the air quality within one or more AQMAs.
		?	Uncertain	From the level of information available the effect that the option would have on this objective is uncertain.

SEA Objective	Datasets/Key Themes	Effect		Description
Climate Factors: • Reduce embodied and operational carbon emissions	Option Carbon data UKCP18 climate data Sea level rise projections	+++	Major Positive	The option will generate significant additional zero carbon energy that can be fed back into the grid/reduce carbon emissions (see carbon scale). The option will result in a major increase in carbon sequestration. The option will increase resilience/decrease vulnerability to climate change effects.
 Reduce vulnerability to climate change risks and hazards 		++	Moderate Positive	The option will increase resilience/decrease vulnerability to climate change effects. The option will result in a moderate increase in carbon sequestration. The option will generate moderate additional zero carbon energy that can be fed back into the grid/reduce carbon emissions (see carbon scale).
		+	Minor Positive	The option will increase resilience/decrease vulnerability to climate change effects. The option will result in a minor increase in carbon sequestration. The option will generate minor additional zero carbon energy that can be fed back into the grid/reduce carbon emissions (see carbon scale).
		0	Neutral	The option would have no discernible effect on greenhouse gas emissions, nor would the option increase resilience/decrease vulnerability to climate change effects.
		-	Minor Negative	The option will have a minor impact on resilience/decrease vulnerability to climate change effects. The option will generate minor construction and/or operational carbon emissions (see carbon scale).
		-	Moderate Negative	The option will have a moderate impact on resilience/significantly decrease vulnerability to climate change effects. The option will generate moderate construction and/or operational carbon emissions (see carbon scale). The option will result in a moderate release of previously sequestered carbon.
		_	Major Negative	The option will have a major impact on resilience/significantly decrease vulnerability to climate change effects. The option will generate significant construction and/or operational carbon emissions (see carbon scale). The option will result in a major release of previously sequestered carbon.
		?	Uncertain	From the level of information available the effect that the option would have on this objective is uncertain.
 Landscape: Conserve, protect and enhance landscape, townscape and coasscape character and 	 Areas of Outstanding Natural Beauty National Character Areas Green Belt land 	+++	Major Positive	The option would have a major positive contribution to designated landscape (AONB or National Park) management plan objectives. The option results in new, above ground infrastructure that significantly enhances the local landscape, townscape or seascape.
visual amenity	 National Park 	++	Moderate Positive	The option would have a moderate positive contribution to designated landscape management plan objectives.

SEA Objective	Datasets/Key Themes	Effect		Description
				The option results in new, above ground infrastructure that has a moderate positive effect on the local landscape, townscape or seascape.
		+	Minor Positive	The option results in new, above ground infrastructure that has a minor positive effect on the local landscape, townscape or seascape.
		0	Neutral	The option would not result in any effects on the local landscape, townscape or seascape.
		-	Minor Negative	The option results in new, above ground infrastructure that has a minor negative effect on the local landscape, townscape or seascape.
		_	Moderate Negative	The option would have a moderate negative effect on a designated landscape or feature (i.e. significant visually intrusive infrastructure) whose effects could not be reasonably mitigated. The option results in new, above ground infrastructure that has a moderate negative effect on the local landscape, townscape or seascape.
		-	Major Negative	The option would have a negative effect on a designated landscape or feature (i.e. significant visually intrusive infrastructure) whose effects could not be reasonably mitigated. The option results in new, above ground infrastructure that has a major negative effect on the local landscape, townscape or seascape.
		?	Uncertain	From the level of information available the effect that the option would have on this objective is uncertain.
 Historic Environment Conserve, protect and enhance the historic environment, including archaeology 	 Listed buildings: Grade I listed structures Grade II* listed structures Grade II listed structures Registered Parks and 	+++	Major Positive	 The option will result in enhancements to designated heritage assets and/or their setting, fully realising the significance and value of the asset, such as: Securing repairs or improvements to heritage assets, especially those identified in the Historic England Buildings/Monuments at Risk Register. Improving interpretation and public access to important heritage assets.
	Gardens: - Grade I Registered Parks and Cardens	++	Moderate Positive	The option will result in enhancements to designated heritage assets and/or their setting. Improving interpretation and public access to important heritage assets.
	 Grade II* Registered Parks 	+	Minor Positive	The option will result in enhancements to non-designated heritage assets and/or their setting.
	and Gardens - Grade II Registered Parks	0	Neutral	The option will have no effect on cultural heritage assets or archaeology.
	and Gardens Protected Wreck Registered Battlefields Scheduled Monuments	-	Minor Negative	The option will result in the loss of significance of undesignated heritage assets and/or their setting, notwithstanding remedial recording of any elements affected. There will be limited damage to known, undesignated archaeology important sites with a consequent loss of significance only partly mitigated by archaeological investigation.
	Conservation AreasWorld Heritage Sites		Moderate Negative	The option will result in the loss of significance of undesignated heritage assets and/or their setting, notwithstanding remedial recording of any elements affected.

SEA Objective	Datasets/Key Themes	Effect		Description
				The option will diminish the significance of designated heritage assets and/or their setting, notwithstanding remedial recording of any elements affected.
		-	Major Negative	 The option will diminish the significance of designated heritage assets and/or their setting such as: Demolition or further deterioration in the condition of designated heritage assets especially those identified in the Historic England Buildings/Monuments at Risk Register. Loss of public access to important heritage assets and lack of appropriate interpretation. There will be major damage to known, designated archaeology important sites with a consequent loss of significance only partly mitigated by archaeological investigation.
		?	Uncertain	From the level of information available the effect that the option would have on this objective is uncertain.
Population, Human Health • Maintain and enhance the health and	 Noise action important area Indices of Multiple Deprivation 2015 	+++	Major Positive	The option leads to major positive effect on the health of local communities and will ensure that surface water and bathing water quality is maintained within statutory limits. The option creates new, and significantly enhances existing, recreational facilities, publicly accessible greenspace and/or tourism within the operational area.
 weilbeing of the local community, including economic and social wellbeing Maintain and enhance 	 Functional site: Schools Medical facilities OS Greenspace dataset: 	++	Moderate Positive	The option leads to positive effect on the health of local communities and will ensure that surface water and bathing water quality is maintained within statutory limits. The option enhances existing, recreational facilities, publicly accessible greenspace and/or tourism within the operational area.
tourism and recreation	 Allotments Bowling green Cemetery 	+	Minor Positive	The option has a temporary positive effect on the health of local communities and will ensure that surface water and bathing water quality is maintained within statutory limits.
	 Golf course Sports facility 	0	Neutral	The option would not result in any effects on human health and existing recreational facilities and/or tourism.
	 Play space Playing field Public park or garden 	-	Minor Negative	The option has a temporary effect on human health (e.g. noise or air quality). The option reduces the availability and quality of existing recreational facilities and/or tourism within the operational area.
	 Religious grounds Tennis courts 	-	Moderate Negative	The option results in the permanent removal of existing recreational facilities, publicly accessible greenspace and/or tourism within the operational area.
	 Natural England - Country Parks National Parks 	_	Major Negative	The option has a significant long-term effect on human health (e.g. noise or air quality). The option results in the removal of existing recreational facilities, publicly accessible greenspace and/or tourism within the operational area.
	 Section 15 open access areas CRoW S4 Conclusive Registered Common Land 	?	Uncertain	From the level of information available the effect that the option would have on this objective is uncertain.

SEA Objective	Datasets/Key Themes	Effect		Description
Material Assets Minimise resource use and waste production Avoid negative effects 	 Transport: Major roads – A roads Major roads motorway Railway line 	+++	Major Positive	The option will reuse or recycle substantial quantities of waste materials and any new infrastructure will incorporate substantial sustainable design measures and materials. There will be no increase in energy consumption or energy will be from 100% renewable sources. The option improves national cycle routes or national trails.
on built assets and infrastructure	 National cycle route National trails 	++	Moderate Positive	The option will reuse or recycle moderate quantities of waste materials and any new infrastructure will incorporate some sustainable design measures and materials. There will be no increase in energy consumption or energy will be from 90% renewable sources. The option improves national cycle routes or national trails.
		+	Minor Positive	The option will reuse or recycle a limited quantity of waste materials and any new infrastructure will incorporate some limited sustainable design measures and materials. There will be no increase in energy consumption or energy will be from 80% renewable sources. The option improves national cycle routes or national trails.
		0	Neutral	The option would not result in any effects on material assets.
		-	Minor Negative	The option will require new infrastructure with only limited opportunities for the reuse or recycling of waste materials. There are limited opportunities for sustainable design or the use of sustainable materials. The option results in a minor increase in energy consumption with no renewable energy options. The option results in a minor disruption on built assets and infrastructure, including transport.
		-	Moderate Negative	The option will require new infrastructure with only limited opportunities for the reuse or recycling of waste materials. The option results in a moderate increase in energy consumption with no renewable energy options. The option results in a moderate disruption on built assets and infrastructure, including transport links.
			Major Negative	The option will require significant new infrastructure that cannot be provided through the reuse or recycling of waste materials. There are no opportunities for sustainable design or the use of sustainable materials. The option results in a major increase in energy consumption with no renewable energy options. The option results in a major distribution on built assets and infrastructure, including transport links.
		?	Uncertain	From the level of information available the effect that the option would have on this objective is uncertain.

Annex F: SEA Option Assessments

A summary of the options selected within the BVP, LCP and BESP are presented respectively in Table F.2, F.3 and F.4. The full list of options is summarised in Table F.5. The demand management strategies, media, TUBs and NEUBs options are the same across all three plans. To avoid repetition, they are only included in the BVP Table F.2. It should be noted that the medium demand management strategy is equivalent to the deliverable demand management strategy (Table F.2 uses the option codes from the WRSE investment model which uses the term medium).

The significance key used to undertake the SEAs is provided in Table 4.5. The significance scores for each SEA objective have been converted to numerical scores to facilitate investment model for the regional plan, discussed further in Section 5 below. The SEA significance and the associated numerical score is summarised in below. Options that result in both positive and negative effects are presented 'positive score/negative score'.

Qualitative Score	Description	Numerical Score
+++	Major Positive	8
++	Moderate Positive	4
+	Minor Positive	1
0	Neutral	0
-	Minor Negative	-1
	Moderate Negative	-4
	Major Negative	-8

Table F.1 SEA Significance and Numerical Score (from Table 4.5)

Detailed SEA Summary Sheets can be provided upon request

Table F.2 SEA Summary Table – BVP

												SEA	Object	ives ar	nd Asse	essmen	t Quest	ions										
Options ID	Biodiv	versity	S	oil			Wa	ater			A	Nir	C	Climatio	: Facto	Irs	Land	scape	Hist Enviro	oric nment	Pop	ulation He	and Hu alth	uman		Mate	rial Ass	ets
		1	:	2	;	3		4	;	5		6		7		8	ę	9	1	0	1	1	1	2	1	3		14
	С	0	С	0	С	0	С	0	С	0	С	0	С	0	С	0	С	0	С	0	С	0	С	0	С	0	С	0
TWU_GUI_RE-OTH_ALL_ALL_neub - guilfd	0	1	0	0	0	0	0	1	0	1	0	0	0	0	0	1	0	-1	0	0	0	-1	0	-1	0	0	0	0
TWU_HEN_RE-OTH_ALL_ALL_neub - henley	0	1	0	0	0	0	0	1	0	1	0	0	0	0	0	1	0	-1	0	0	0	-1	0	-1	0	0	0	0
TWU_KVZ_RE-OTH_ALL_ALL_neub - kv	0	1	0	0	0	0	0	1	0	1	0	0	0	0	0	1	0	-1	0	0	0	-1	0	-1	0	0	0	0
TWU_LON_RE-OTH_ALL_ALL_neub - london	0	1	0	0	0	0	0	1	0	1	0	0	0	0	0	1	0	-1	0	0	0	-1	0	-1	0	0	0	0
TWU_SWA_RE-OTH_ALL_ALL_neub - swa	0	1	0	1	0	0	0	1	0	1	0	0	0	0	0	1	0	-1	0	0	0	-1	0	-1	0	0	0	0
TWU_SWX_RE-OTH_ALL_ALL_neub - swox	0	1	0	0	0	0	0	1	0	1	0	0	0	0	0	1	0	-1	0	0	0	-1	0	-1	0	0	0	0
TWU_GUI_HI-GRW_ALL_ALL_dapdune lic disagg	0	-1	0	0	0	0	0	0	0	1	0	0	0	-1	o	0	0	0	0	0	0	0	0	0	0	0	0	0
TWU_GUI_HI-TFR_RZ5_ALL_sewtogui	-4	0	0	0	0	0	-1	0	0	0	-1	0	-1	-1	0	0	-1	0	-1	0	-1	0	-1	0	-1	0	-1	0
TWU_GUI_RE-DRP_ALL_ALL_dp-shalford- guild	0	0	0	0	0	0	0	0	0	1	0	0	0	-1	0	-1	0	0	0	0	4	0	0	0	0	0	0	0
TWU_HEN_HI- TFR_KVZ_ALL_tw(kv)to(hen)con	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TWU_KGV_HI-REU_RE1_CNO_deephams reuse 46.5b	-1	-4	-1	0	-1	0	0	0	0	4	-1	0	-1	-1	0	0	-1	-1	-1	0	-1	0	-1	0	-1	0	-1	0
TWU_KGV_HI-TFR_KGV_ALL_lockwood ps-kgv res	-4	1/-4*	-4	0	-1	0	-1	-1	0	8	-1	0	-1	-8	0	1/-1	-1	0	-1	0	-1	1	-1	0	-1	-1	-1	0
TWU_KVZ_HI-GRW_ALL_ALL_mortimer recomm	0	0	0	0	0	0	0	-1	0	1	0	0	-1	-1	0	-1	0	0	0	0	0	0	0	0	0	0	0	0
TWU_KVZ_HI-TFR_T2S_ALL_t2st cul to speen	-4	0	0	0	-1	0	-4	-4	0	1	-1	0	-1	-1	0	0	-1	0	-1	0	-1	0	-1	0	-1	0	-1	0
TWU_KVZ_HI-TFR_UTC_ALL_thamestofobney	-1	-8	-1	0	-1	-1	0	-4	0	4	-1	0	-1	-1	0	-1	-1	0	-1	0	-1	0	-1	0	-1	0	-1	0
TWU_KVZ_RE-DRP_ALL_ALL_dp-playhatch-kv	0	0	0	0	0	0	0	0	0	1	0	-1	0	-1	0	-1	0	0	0	0	4	0	0	0	0	0	0	0
TWU_KVZ_EF-LKR_ALL_ALL_dmp kvz gov-led b hy	0	8	0	0	0	0	0	8	0	8	0	0	-1	1	0	1	-1	1	-1	0	-1	1	0	0	-1	0	-1	0
TWU_LON_HI-GRW_ALL_ALL_addington gw	-1	-1	0	0	0	0	-1	-1	0	1/-1	-1	0	-1	-1	0	-1	-1	0	-1	0	-1	0	0	0	1/-1	-1	-1	0
TWU_LON_HI-GRW_ALL_ALL_merton recommission	-1	0	0	0	0	0	-1	0	0	1	-1	0	-1	-1	0	0	-1	0	-1	0	-1	0	-1	0	1/-1	-1	-1	0
TWU_LON_HI-GRW_ALL_ALL_s'fleet lic disagg	-1	0	0	0	0	0	-1	0	0	1	-1	0	-1	-1	0	0	-1	0	-1	0	-1	0	-1	0	-1	-1	-1	0
TWU_KGV_HI- TFR_TED_ALL_teddingtondrated/tlt	-1	1	-1	0	-1	0	-1	-1	0	8 / -1	-1	0	-1	-1	0	1/-1	-1	0	-1	0	-1	1	-1	0	-1	-1	-1	0

												SEA	Object	ives ar	nd Asse	essmen	nt Quest	tions										
Options ID	Biodiv	/ersity	S	oil			Wa	ater			A	Air	C	Climatic	c Facto	rs	Land	scape	His Enviro	toric onment	Рор	ulation He	and Hu alth	uman		Mate	rial Ass	ets
		1	:	2	;	3	4	4		5		6		7		8	9	9	1	0	1	1	1	2	1	3		14
	С	0	С	0	С	0	С	0	С	0	С	0	С	0	С	0	С	0	С	0	С	0	С	0	С	0	С	0
TWU_LON_HI-GRW_RE1_ALL_asrhortonkirby	-1	1/-1	-1	0	-1	0	0	-1	0	1	-1	0	-1	-1	0	1	-1	0	-1	0	-1	0	-1	0	-1	-1	-1	0
TWU_LON_HI-ROC_NET_CNO_hampton- battersea	-4	0	-1	0	-1	0	0	0	0	8	-1	0	-1	-4	o	0	-1	0	-1	0	-1	0	-1	0	-1	0	-1	0
TWU_LON_HI- ROC_WT1_CNO_kemptonwtw100 p1	-4	0	0	0	-1	0	-1	0	0	8	-1	0	-1	-4	0	1	-1	0	-1	0	-1	0	0	0	-1	0	-1	0
TWU_LON_HI- ROC_WT1_CNO_kemptonwtw150	-4	0	0	0	-1	0	-1	0	0	8	-1	0	-1	-4	0	1	-1	0	-1	0	-1	0	0	0	-1	0	-1	0
TWU_STR_HI- RSR_RE1_CNO_abingdon100(lon)	-1	8	-4	1	-1	1	-1	1	0	8	-1	0	-1	-1	0	4	-4	-1/+4	-4	1	-4	8	-1	8	-1	1	-1	0
TWU_STT_HI-IMP_STT_CNO_sttpipe500(lon)	-4	4 / -1	-1	0	-1	0	-1	-1	0	8	-1	-1	-1	-8	0	8	-4	0	-1	0	-1	4	-1	1	-4	-1	-1	0
TWU_STT_HI-RAB_RE1_ALL_p10-500- vyrnwy_180_b	-1	1/-1	-1	0	-1	0	-1	-1	0	8	-1	0	-1	-1	0	8	0	0	-1	0	-1	4	0	1	-1	-1	-1	0
TWU_GUI_EF-LKR_ALL_ALL_dmp gui gov-led b hy	0	8	0	0	0	0	0	8	0	8	0	0	-1	1	0	1	-1	1	-1	0	-1	1	0	0	-1	0	-1	0
TWU_GUI_EF-LKR_ALL_ALL_dmp gui medium	0	1	0	0	0	0	0	1	0	1	0	0	-1	1	0	1	-1	1	-1	0	-1	1	0	0	-1	0	-1	0
TWU_GUI_RE-OTH_ALL_ALL_tub - guilfd	0	1	0	0	0	0	0	1	0	1	0	0	0	0	0	1	0	-1	0	0	0	-1	0	-1	0	0	0	0
TWU_HEN_EF-LKR_ALL_ALL_dmp hen gov-led b hy	0	8	0	0	0	0	0	8	0	8	0	0	-1	1	0	1	-1	1	-1	0	-1	1	0	0	-1	0	-1	0
TWU_HEN_EF-LKR_ALL_ALL_dmp hen medium	0	1	0	0	0	0	0	1	0	1	0	0	-1	1	0	1	-1	1	-1	0	-1	1	0	0	-1	0	-1	0
TWU_HEN_RE-OTH_ALL_ALL_tub - henley	0	1	0	0	0	0	0	1	0	1	0	0	0	0	0	1	0	-1	0	0	0	-1	0	-1	0	0	0	0
TWU_KVZ_EF-LKR_ALL_ALL_dmp kvz medium	0	1	0	0	0	0	0	1	0	1	0	0	-1	1	0	1	-1	1	-1	0	-1	1	0	0	-1	0	-1	0
TWU_STT_HI-RAB_RE1_ALL_p7-500- vyrnwy_135_b	-1	1/-1	-1	0	-1	0	-1	-1	0	8	-1	0	-1	-1	0	8	0	0	-1	0	-1	4	0	1	-1	-1	-1	0
TWU_KVZ_RE-OTH_ALL_ALL_tub - kv	0	1	0	0	0	0	0	1	0	1	0	0	0	0	0	1	0	-1	0	0	0	-1	0	-1	0	0	0	0
TWU_LON_EF-LKR_ALL_ALL_dmp lon gov-led b hy	0	8	0	0	0	0	0	8	0	8	0	0	-1	1	0	1	-1	1	-1	0	-1	1	0	0	-1	0	-1	0
TWU_LON_EF-LKR_ALL_ALL_dmp lon medium	0	1	0	0	0	0	0	1	0	1	0	0	-1	1	0	1	-1	1	-1	0	-1	1	0	0	-1	0	-1	0
TWU_LON_RE-OTH_ALL_ALL_tub - london	0	1	0	1	0	0	0	1	0	1	0	0	0	0	0	1	0	-1	0	0	0	-1	0	-1	0	0	0	0
TWU_SWA_EF-LKR_ALL_ALL_dmp swa gov- led b hy	0	8	0	0	0	0	0	8	0	8	0	0	-1	1	0	1	-1	1	-1	0	-1	1	0	0	-1	0	-1	0
TWU_SWA_EF-LKR_ALL_ALL_dmp swa medium	0	1	0	0	0	0	0	1	0	1	0	0	-1	1	0	1	-1	1	-1	0	-1	1	0	0	-1	0	-1	0

												SEA	Object	ives ar	nd Asse	essmen	t Quest	tions										
Options ID	Biodiv	versity	S	oil			Wa	ater			A	Air	(Climatic	: Facto	rs	Land	scape	His Enviro	toric onment	Рор	ulation He	and H alth	uman		Mate	rial Ass	ets
		1	:	2	;	3	· ·	4		5		6		7		8	(9	1	0	1	1	1	2	1	3		14
	С	0	С	0	С	0	С	0	С	0	С	0	С	0	С	0	С	0	С	0	С	0	С	0	С	0	С	0
TWU_SWA_RE-OTH_ALL_ALL_tub - swa	0	1	0	1	0	0	0	1	0	1	0	0	0	0	0	1	0	-1	0	0	0	-1	0	-1	0	0	0	0
TWU_SWX_EF-LKR_ALL_ALL_dmp swx gov-led b hy	0	8	0	0	0	0	0	8	0	8	0	0	-1	1	0	1	-1	1	-1	0	-1	1	0	0	-1	0	-1	0
TWU_SWX_EF-LKR_ALL_ALL_dmp swx medium	0	1	0	0	0	0	0	1	0	1	0	0	-1	1	0	1	-1	1	-1	0	-1	1	0	0	-1	0	-1	0
TWU_GUI_RE-OTH_ALL_ALL_media - guilfd	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
TWU_SWX_RE-OTH_ALL_ALL_tub - swox	0	1	0	0	0	0	0	1	0	1	0	0	0	0	0	1	0	-1	0	0	0	-1	0	-1	0	0	0	0
TWU_STT_HI-RAB_RE1_ALL_p8-500- vyrnwy_155_b	-1	1/-1	-1	0	-1	0	-1	-1	0	8	-1	0	-1	-1	0	8	0	0	-1	0	-1	4	0	1	-1	-1	-1	0
TWU_STT_HI-RAB_RE1_ALL_p9-500- vyrnwy_100_b	-1	1/-1	-1	0	-1	0	-1	-1	0	8	-1	0	-1	-1	0	8	0	0	-1	0	-1	4	0	1	-1	-1	-1	0
TWU_HEN_RE-OTH_ALL_ALL_media - henley	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
TWU_STT_HI-REU_RE1_ALL_p11-500- min_115_p2	-1	1/-1	-1	0	-1	0	-1	-8	0	8	-4	0	-1	-8	0	8	0	0	-1	0	-1	4	0	1	-1	-1	-1	0
TWU_STT_HI-REU_RE1_ALL_p5-500-neth_p35	-1	1/-1	-1	0	-1	0	-1	0	0	4	-1	0	-1	-1	0	4	0	0	-1	0	-1	4	0	1	-1	-1	-1	0
TWU_STT_HI-REU_RE1_ALL_p7-500- minworth_115	-1	1/-1	-1	0	-1	0	-1	-8	0	8	-4	0	-1	-8	0	8	0	0	-1	0	-1	4	0	1	-1	-1	-1	0
TWU_SWA_HI-GRW_ALL_ALL_datchet do	-1	0	0	0	-1	0	0	0	0	1	-1	0	-1	-1	0	-1	-1	0	-1	0	-1	0	-1	0	-1	0	-1	0
TWU_SWA_HI-TFR_SWX_ALL_swoxswa48	-4	0	-1	0	-1	0	-1	0	0	4	-1	0	-1	-1	0	0	-1	0	-1	0	-1	0	-1	0	-1	0	-1	0
TWU_SWX_HI-GRW_ALL_ALL_moulsford gw	-1	0	0	0	-1	0	-1	-1	0	1/-1	-1	-1	-1	-1	0	-1	-1	0	-1	0	-1	0	-1	0	-1	-1	-1	0
TWU_SWX_HI-GRW_ALL_ALL_woods farm do	-1	0	-1	0	-1	0	-1	-1	0	1/-1	-1	0	-1	-1	0	-1	-1	0	-1	0	-1	0	-1	0	1/-1	0	-1	0
TWU_SWX_HI-GRW_RE1_ALL_britwell roc	-1	0	-1	0	-1	0	-1	-1	0	1	-1	0	-1	-1	0	-1	-1	0	-1	0	-1	0	-1	0	-1	0	-1	0
TWU_SWX_HI- IMP_SWX_ALL_wessextoswoxflax	-1	0	-1	0	-1	0	0	0	0	1	-1	0	-1	-1	0	0	-1	0	-1	0	-1	0	-1	0	-1	0	-1	0
TWU_KVZ_RE-OTH_ALL_ALL_media - kv	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
TWU_SWX_HI-ROC_WT1_CNO_abingdon wtw ph1	-1	0	-1	0	-1	0	0	0	0	1	-1	0	-1	-1	0	0	-1	0	-1	0	-1	0	-1	0	-1	0	-1	0
TWU_TED_HI- TFR_TED_ALL_teddingtondramog/ted	-1	1	-1	0	-1	0	-1	-1	0	8/-1	-1	0	-1	-1	0	1/-1	-1	0	-1	0	-1	1	-1	0	-1	-1	-1	0
TWU_SWA_RE-OTH_ALL_ALL_media - swa	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
TWU_SWX_RE-OTH_ALL_ALL_media - swox	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0

												SEA	Object	ives an	d Asse	essmen	t Quest	ions										
Options ID	Biodiv	/ersity	S	oil			Wa	ater			A	vir	C	Climatic	: Facto	rs	Lands	scape	Hist Enviro	oric nment	Рор	ulation He	and Hu alth	uman		Mate	rial Ass	sets
		1		2		3	4	4		5	(6	-	7		8	Ģ	9	1	0	1	1	1	2	1	3		14
	С	0	С	0	С	0	С	0	С	0	С	0	С	0	С	0	С	0	С	0	С	0	С	0	С	0	С	0
TWU_SWX_HI-ROC_WT2_ALL_abingdon wtw ph2	-1	0	-1	0	-1	0	0	0	0	1	-1	0	-1	-1	0	0	-1	0	-1	0	-1	0	-1	0	-1	0	-1	0
TWU_SWX_HI-TFR_HEN_ALL_henley-swox5	-1	-1	0	0	0	0	0	0	0	0	-1	0	-1	-1	0	1	-1	0	-1	0	-1	0	-1	0	-1	-1	-4	0
TWU_SWX_HI-TFR_STR_ALL_abing-farmoor pipe	-1	-1	-1	0	-1	0	-1	0	0	1	-1	0	-1	-1	0	0	-1	0	-1	0	-1	0	-1	0	-1	0	-1	0
TWU_SWX_HI- TFR_SWA_ALL_tw(swa)to(swx)con	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TWU_SWX_RE-DRP_ALL_ALL_dp- gatehampton-swox	0	0	0	0	0	0	0	0	0	1	0	-1	0	-1	o	-1	0	0	0	0	4	0	0	0	0	0	0	0
TWU_TED_HI-RAB_RE1_CNO_teddington dra 75	-1	1	-1	0	-1	0	-1	-1	0	8/-1	-1	0	-1	-1	o	1/-1	-1	0	-1	0	-1	1	-1	0	-1	-1	-1	0
TWU_U7T_HI-RAB_RE1_ALL_p1-500- unsupported	-4	4 / -4	-1	0	-1	0	-1	-1	0	8	-4	-1	-1	-8	0	8	-4	0	-1	0	-1	4	-1	4	-4	-1	-1	0

*Options that result in both positive (beneficial) and negative (adverse) effects presented 'positive score/negative score'

Table F.3 SEA Summary Table – LCP

												SEA C	bjective	es and <i>i</i>	Assessi	ment Q	uestion	S										
Options ID	Biodi	versity	S	oil			Wa	ater			A	vir	(Climatic	: Factor	S	Lands	scape	His ⁻ Enviro	toric onment	Рор	oulation He	and Hu alth	ıman		Materia	al Asset	S
		1		2		3	· ·	4	;	5	(6		7	8	8	ę	9	1	0	1	1	1	2	1	3	1	4
	С	0	С	0	С	0	С	0	С	0	С	0	С	0	С	0	С	0	С	0	С	0	С	0	С	0	С	0
TWU_STT_HI-REU_RE1_ALL_p5-300- neth_p35	-1	1/-1	-1	0	-1	0	-1	0	0	4	-1	0	-1	-1	0	4	0	0	-1	0	-1	4	0	1	-1	-1	-1	0
TWU_U7T_HI-RAB_RE1_ALL_p1-300- unsupported	-4	4 / -4	-1	0	-1	0	-1	-1	0	8	-4	-1	-1	-8	0	8	-4	0	-1	0	-1	4	-1	4	-4	-1	-1	0
TWU_SWX_HI-TFR_STR_ALL_abing- farmoor pipe	-1	-1	-1	0	-1	0	-1	0	0	1	-1	0	-1	-1	0	0	-1	0	-1	0	-1	0	-1	0	-1	0	-1	0
TWU_SWX_HI- ROC_WT1_CNO_abingdon wtw ph1	-1	0	-1	0	-1	0	0	0	0	1	-1	0	-1	-1	0	0	-1	0	-1	0	-1	0	-1	0	-1	0	-1	0
TWU_LON_HI- GRW_RE1_ALL_asrhortonkirby	-1	1/-1	-1	0	-1	0	0	-1	0	1	-1	0	-1	-1	0	1	-1	0	-1	0	-1	0	-1	0	-1	-1	-1	0
TWU_SWX_HI- GRW_RE1_ALL_britwell roc	-1	0	-1	0	-1	0	-1	-1	0	1	-1	0	-1	-1	0	-1	-1	0	-1	0	-1	0	-1	0	-1	0	-1	0
TWU_GUI_HI- GRW_ALL_ALL_dapdune lic disagg	0	-1	0	0	0	0	0	0	0	1	0	0	0	-1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TWU_KGV_HI- REU_RE1_CNO_deephams reuse 46.5b	-1	-4	-1	0	-1	0	0	0	0	4	-1	0	-1	-1	0	0	-1	-1	-1	0	-1	0	-1	0	-1	0	-1	0
TWU_SWA_HI- GRW_ALL_ALL_datchet do	-1	0	0	0	-1	0	0	0	0	1	-1	0	-1	-1	0	-1	-1	0	-1	0	-1	0	-1	0	-1	0	-1	0
TWU_KGV_HI- TFR_TED_ALL_teddingtondrated/tlt	-1	1	-1	0	-1	0	-1	-1	0	8/-1	-1	0	-1	-1	0	1/-1	-1	0	-1	0	-1	1	-1	0	-1	-1	-1	0
TWU_SWX_HI- TFR_SWX_ALL_dukescut-farmoor	-1	0	0	0	-1	-1	0	0	0	1	-1	0	-1	-1	0	1	-1	0	-1	0	-1	0	-1	0	-1	0	-1	0
TWU_KVZ_RE-DRP_ALL_ALL_dp- playhatch-kv	0	0	0	0	0	0	0	0	0	1	0	-1	0	-1	0	-1	0	0	0	0	4	0	0	0	0	0	0	0
TWU_LON_HI- GRW_ALL_ALL_addington gw	-1	-1	0	0	0	0	-1	-1	0	1/-1	-1	0	-1	-1	0	-1	-1	0	-1	0	-1	0	0	0	1/-1	-1	-1	0
TWU_LON_HI-GRW_ALL_ALL_london conchalk	-1	0	0	0	0	0	-1	-1	0	1	-1	0	-1	-1	0	-1	-1	0	-1	0	-1	0	-1	0	1/-1	-1	-1	0
TWU_SWA_HI-TFR_HEN_ALL_henley- swa5	-1	0	0	0	-1	0	-1	0	0	1	-1	0	-1	-1	0	0	-1	0	-1	0	-1	0	-1	0	1/-1	0	-1	0
TWU_LON_HI- ROC_WT1_CNO_kemptonwtw150	-4	0	0	0	-1	0	-1	0	0	8	-1	0	-1	-4	0	1	-1	0	-1	0	-1	0	0	0	-1	0	-1	0
TWU_TED_HI- TFR_TED_ALL_teddingtondramog/ted	-1	1	-1	0	-1	0	-1	-1	0	8/-1	-1	0	-1	-1	0	1/-1	-1	0	-1	0	-1	1	-1	0	-1	-1	-1	0
TWU_KVZ_HI- GRW_ALL_ALL_mortimer recomm	0	0	0	0	0	0	0	-1	0	1	0	0	-1	-1	0	-1	0	0	0	0	0	0	0	0	0	0	0	0

												SEA O	bjective	es and /	Assessi	ment Q	uestions	6										
Options ID	Biodiv	versity	S	oil			Wa	ater			A	ir	(Climatic	Factor	S	Lands	scape	Hist Enviro	toric nment	Рор	oulation He	and Hu alth	iman		Materia	l Assets	3
		1	;	2	(3	4	4	:	5	(6	7	7	8	3	ę	9	1	0	1	1	1	2	1	3	1	4
	С	0	С	0	С	0	С	0	С	0	С	0	С	0	С	0	С	0	С	0	С	0	С	0	С	0	С	0
TWU_SWX_HI- GRW_ALL_ALL_moulsford gw	-1	0	0	0	-1	0	-1	-1	0	1/-1	-1	-1	-1	-1	0	-1	-1	0	-1	0	-1	0	-1	0	-1	-1	-1	0
TWU_LON_HI- ROC_WT1_CNO_kemptonwtw100 p1	-4	0	0	0	-1	0	-1	0	0	8	-1	0	-1	-4	0	1	-1	0	-1	0	-1	0	0	0	-1	0	-1	0
TWU_STR_HI- RSR_RE1_CNO_abingdon150(lon)	-4	8	-4	1	-1	1	-1	1	0	8	-1	0	-1	-1	0	4	-4	4/-1	-4	1	-4	8	-1	8	-1	1	-1	0
TWU_SWX_HI-IMP_SWX_CNO_oxc- dukes cutswox	-8	-8	-1	0	-1	1	0	-4	0	1	-1	0	-4	-1	0	0	1/-1	0	-1	0	-1	0	-1	0	-1	0	0	0
TWU_STT_HI-RAB_RE1_ALL_p10- 300-vyrnwy_180_b	-1	1/-1	-1	0	-1	0	-1	-1	0	8	-1	0	-1	-1	0	8	0	0	-1	0	-1	4	0	1	-1	-1	-1	0
TWU_STT_HI-RAB_RE1_ALL_p7-300- vyrnwy_135_b	-1	1/-1	-1	0	-1	0	-1	-1	0	8	-1	0	-1	-1	0	8	0	0	-1	0	-1	4	0	1	-1	-1	-1	0
TWU_STT_HI-RAB_RE1_ALL_p9-300- vyrnwy_100_b	-1	1/-1	-1	0	-1	0	-1	-1	0	8	-1	0	-1	-1	0	8	0	0	-1	0	-1	4	0	1	-1	-1	-1	0
TWU_STT_HI-REU_RE1_ALL_p11- 300-min_115_p2	-1	1/-1	-1	0	-1	0	-1	-8	0	8	-4	0	-1	-8	0	8	0	0	-1	0	-1	4	0	1	-1	-1	-1	0
TWU_STT_HI-REU_RE1_ALL_p7-300- minworth_115	-1	1/-1	-1	0	-1	0	-1	-8	0	8	-4	0	-1	-8	0	8	0	0	-1	0	-1	4	0	1	-1	-1	-1	0
TWU_STT_HI- IMP_STT_CNO_sttpipe300(lon)	-4	4 / -1	-1	0	-1	0	-1	-1	0	8	-1	-1	-1	-8	0	8	-4	0	-1	0	-1	4	-1	1	-4	-1	-1	0
TWU_KVZ_HI- TFR_UTC_ALL_thamestofobney	-1	-8	-1	0	-1	-1	0	-4	0	4	-1	0	-1	-1	0	-1	-1	0	-1	0	-1	0	-1	0	-1	0	-1	0
TWU_GUI_HI-TFR_RZ5_ALL_sewtogui	-4	0	0	0	0	0	-1	0	0	0	-1	0	-1	-1	0	0	-1	0	-1	0	-1	0	-1	0	-1	0	-1	0
TWU_LON_HI-GRW_ALL_ALL_s'fleet lic disagg	-1	0	0	0	0	0	-1	0	0	1	-1	0	-1	-1	0	0	-1	0	-1	0	-1	0	-1	0	-1	-1	-1	0
TWU_SWA_HI- TFR_SWX_ALL_swoxswa48	-4	0	-1	0	-1	0	-1	0	0	4	-1	0	-1	-1	0	0	-1	0	-1	0	-1	0	-1	0	-1	0	-1	0
TWU_KVZ_HI-TFR_T2S_ALL_t2st cul to speen	-4	0	0	0	-1	0	-4	-4	0	1	-1	0	-1	-1	0	0	-1	0	-1	0	-1	0	-1	0	-1	0	-1	0
TWU_TED_HI- RAB_RE1_CNO_teddington dra 75	-1	1	-1	0	-1	0	-1	-1	0	8/-1	-1	0	-1	-1	0	1 / -1	-1	0	-1	0	-1	1	-1	0	-1	-1	-1	0
TWU_KEM_HI-TFR_TED_ALL_tedd- kempton	-1	1	-1	0	-1	0	-1	-1	0	8/-1	-1	0	-1	-1	0	1 / -1	-1	0	-1	0	-1	1	-1	0	-1	-1	-1	0
TWU_HEN_HI- TFR_KVZ_ALL_tw(kv)to(hen)con	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TWU_SWX_HI- TFR_SWA_ALL_tw(swa)to(swx)con	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TWU_KGV_HI- TFR_KGV_ALL_lockwood ps-kgv res	-4	1/-4	-4	0	-1	0	-1	-1	0	8	-1	0	-1	-8	0	1/-1	-1	0	-1	0	-1	1	-1	0	-1	-1	-1	0

												SEA O	bjective	es and /	Assessi	ment Q	uestions	6										
Options ID	Biodiv	versity	S	oil			Wa	ater			A	lir	(Climatic	Factor	S	Lands	scape	Hist Enviro	toric nment	Рор	oulation He	and Hu alth	iman		Materia	ll Asset	5
			:	2		3	4	4	ļ	5	6	5	7	7	8	3	Ģ	9	1	0	1	1	1	2	1	3	1	4
	С	0	С	0	С	0	С	0	С	0	С	0	С	0	С	0	С	0	С	0	С	0	С	0	С	0	С	0
TWU_SWX_RE-DRP_ALL_ALL_dp- gatehampton-swox	0	0	0	0	0	0	0	0	0	1	0	-1	0	-1	0	-1	0	0	0	0	4	0	0	0	0	0	0	0
TWU_LON_HI- ROC_NET_CNO_hampton-battersea	-4	0	-1	0	-1	0	0	0	0	8	-1	0	-1	-4	0	0	-1	0	-1	0	-1	0	-1	0	-1	0	-1	0
TWU_SWX_HI- IMP_SWX_ALL_wessextoswoxflax	-1	0	-1	0	-1	0	0	0	0	1	-1	0	-1	-1	0	0	-1	0	-1	0	-1	0	-1	0	-1	0	-1	0
TWU_SWX_HI-GRW_ALL_ALL_woods farm do	-1	0	-1	0	-1	0	-1	-1	0	1/-1	-1	0	-1	-1	0	-1	-1	0	-1	0	-1	0	-1	0	1/-1	0	-1	0

Table F.4 SEA Summary Table – BESP

												SEA C	bjective	es and <i>i</i>	Assessi	ment Q	uestions	S										
Options ID	Biodiversity		S	oil			Water				Air		Climatic Factors			Landscape		Historic Environment		Population and Human Health				Material Assets				
	1		2		3		4		5		6		7		8		ę	9		10		11		12		13		14
	С	0	С	0	С	0	С	0	С	0	С	0	С	0	С	0	С	0	С	0	С	0	С	0	С	0	С	0
TWU_STT_HI-REU_RE1_ALL_p5-300- neth_p35	-1	1/-1	-1	0	-1	0	-1	0	0	4	-1	0	-1	-1	0	4	0	0	-1	0	-1	4	0	1	-1	-1	-1	0
TWU_U7T_HI-RAB_RE1_ALL_p1-300- unsupported	-4	4 / -4	-1	0	-1	0	-1	-1	0	8	-4	-1	-1	-8	0	8	-4	0	-1	0	-1	4	-1	4	-4	-1	-1	0
TWU_SWX_HI-TFR_STR_ALL_abing- farmoor pipe	-1	-1	-1	0	-1	0	-1	0	0	1	-1	0	-1	-1	0	0	-1	0	-1	0	-1	0	-1	0	-1	0	-1	0
TWU_SWX_HI- ROC_WT1_CNO_abingdon wtw ph1	-1	0	-1	0	-1	0	0	0	0	1	-1	0	-1	-1	0	0	-1	0	-1	0	-1	0	-1	0	-1	0	-1	0
TWU_LON_HI- GRW_RE1_ALL_asrhortonkirby	-1	1/-1	-1	0	-1	0	0	-1	0	1	-1	0	-1	-1	0	1	-1	0	-1	0	-1	0	-1	0	-1	-1	-1	0
TWU_SWX_HI- GRW_RE1_ALL_britwell roc	-1	0	-1	0	-1	0	-1	-1	0	1	-1	0	-1	-1	0	-1	-1	0	-1	0	-1	0	-1	0	-1	0	-1	0
TWU_GUI_HI- GRW_ALL_ALL_dapdune lic disagg	0	-1	0	0	0	0	0	0	0	1	0	0	0	-1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TWU_KGV_HI- REU_RE1_CNO_deephams reuse 46.5b	-1	-4	-1	0	-1	0	0	0	0	4	-1	0	-1	-1	0	0	-1	-1	-1	0	-1	0	-1	0	-1	0	-1	0
TWU_SWA_HI- GRW_ALL_ALL_datchet do	-1	0	0	0	-1	0	0	0	0	1	-1	0	-1	-1	0	-1	-1	0	-1	0	-1	0	-1	0	-1	0	-1	0
TWU_KGV_HI- TFR_TED_ALL_teddingtondrated/tlt	-1	1	-1	0	-1	0	-1	-1	0	8/-1	-1	0	-1	-1	0	1/-1	-1	0	-1	0	-1	1	-1	0	-1	-1	-1	0
TWU_SWX_HI- TFR_SWX_ALL_dukescut-farmoor	-1	0	0	0	-1	-1	0	0	0	1	-1	0	-1	-1	0	1	-1	0	-1	0	-1	0	-1	0	-1	0	-1	0
TWU_KVZ_RE-DRP_ALL_ALL_dp- playhatch-kv	0	0	0	0	0	0	0	0	0	1	0	-1	0	-1	0	-1	0	0	0	0	4	0	0	0	0	0	0	0
TWU_LON_HI- GRW_ALL_ALL_addington gw	-1	-1	0	0	0	0	-1	-1	0	1/-1	-1	0	-1	-1	0	-1	-1	0	-1	0	-1	0	0	0	1/-1	-1	-1	0
TWU_LON_HI-GRW_ALL_ALL_london conchalk	-1	0	0	0	0	0	-1	-1	0	1	-1	0	-1	-1	0	-1	-1	0	-1	0	-1	0	-1	0	1/-1	-1	-1	0
TWU_SWA_HI-TFR_HEN_ALL_henley- swa5	-1	0	0	0	-1	0	-1	0	0	1	-1	0	-1	-1	0	0	-1	0	-1	0	-1	0	-1	0	1/-1	0	-1	0
TWU_LON_HI- ROC_WT1_CNO_kemptonwtw150	-4	0	0	0	-1	0	-1	0	0	8	-1	0	-1	-4	0	1	-1	0	-1	0	-1	0	0	0	-1	0	-1	0
TWU_TED_HI- TFR_TED_ALL_teddingtondramog/ted	-1	1	-1	0	-1	0	-1	-1	0	8/-1	-1	0	-1	-1	0	1/-1	-1	0	-1	0	-1	1	-1	0	-1	-1	-1	0
TWU_KVZ_HI- GRW_ALL_ALL_mortimer recomm	0	0	0	0	0	0	0	-1	0	1	0	0	-1	-1	0	-1	0	0	0	0	0	0	0	0	0	0	0	0
												SEA O	bjective	es and /	Assessi	ment Q	uestions	6										
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Options ID	Biodiv	versity	S	oil			Wa	ater			А	vir	(Climatic	Factor	S	Lands	scape	Hist Enviro	toric nment	Рор	ulation He	and Hu alth	man		Materia	l Asset	3
			:	2	;	3	4	4		5	(6	ī	7	8	8	(9	1	0	1	1	1	2	1	3	1	4
	С	0	С	0	С	0	С	0	С	0	С	0	С	0	С	0	С	0	С	0	С	0	С	0	С	0	С	0
TWU_SWX_HI- GRW_ALL_ALL_moulsford gw	-1	0	0	0	-1	0	-1	-1	0	1/-1	-1	-1	-1	-1	0	-1	-1	0	-1	0	-1	0	-1	0	-1	-1	-1	0
TWU_LON_HI- ROC_WT1_CNO_kemptonwtw100 p1	-4	0	0	0	-1	0	-1	0	0	8	-1	0	-1	-4	0	1	-1	0	-1	0	-1	0	0	0	-1	0	-1	0
TWU_STR_HI- RSR_RE1_CNO_abingdon150(lon)	-4	8	-4	1	-1	1	-1	1	0	8	-1	0	-1	-1	0	4	-4	4/-1	-4	1	-4	8	-1	8	-1	1	-1	0
TWU_SWX_HI-IMP_SWX_CNO_oxc- dukes cutswox	-8	-8	-1	0	-1	1	0	-4	0	1	-1	0	-4	-1	0	0	1/-1	0	-1	0	-1	0	-1	0	-1	0	0	0
TWU_STT_HI-RAB_RE1_ALL_p10- 300-vyrnwy_180_b	-1	1/-1	-1	0	-1	0	-1	-1	0	8	-1	0	-1	-1	0	8	0	0	-1	0	-1	4	0	1	-1	-1	-1	0
TWU_STT_HI-RAB_RE1_ALL_p7-300- vyrnwy_135_b	-1	1/-1	-1	0	-1	0	-1	-1	0	8	-1	0	-1	-1	0	8	0	0	-1	0	-1	4	0	1	-1	-1	-1	0
TWU_STT_HI-RAB_RE1_ALL_p9-300- vyrnwy_100_b	-1	1/-1	-1	0	-1	0	-1	-1	0	8	-1	0	-1	-1	0	8	0	0	-1	0	-1	4	0	1	-1	-1	-1	0
TWU_STT_HI-REU_RE1_ALL_p11- 300-min_115_p2	-1	1/-1	-1	0	-1	0	-1	-8	0	8	-4	0	-1	-8	0	8	0	0	-1	0	-1	4	0	1	-1	-1	-1	0
TWU_STT_HI-REU_RE1_ALL_p7-300- minworth_115	-1	1/-1	-1	0	-1	0	-1	-8	0	8	-4	0	-1	-8	0	8	0	0	-1	0	-1	4	0	1	-1	-1	-1	0
TWU_STT_HI- IMP_STT_CNO_sttpipe300(lon)	-4	4/-1	-1	0	-1	0	-1	-1	0	8	-1	-1	-1	-8	0	8	-4	0	-1	0	-1	4	-1	1	-4	-1	-1	0
TWU_KVZ_HI- TFR_UTC_ALL_thamestofobney	-1	-8	-1	0	-1	-1	0	-4	0	4	-1	0	-1	-1	0	-1	-1	0	-1	0	-1	0	-1	0	-1	0	-1	0
TWU_GUI_HI-TFR_RZ5_ALL_sewtogui	-4	0	0	0	0	0	-1	0	0	0	-1	0	-1	-1	0	0	-1	0	-1	0	-1	0	-1	0	-1	0	-1	0
TWU_LON_HI-GRW_ALL_ALL_s'fleet lic disagg	-1	0	0	0	0	0	-1	0	0	1	-1	0	-1	-1	0	0	-1	0	-1	0	-1	0	-1	0	-1	-1	-1	0
TWU_SWA_HI- TFR_SWX_ALL_swoxswa48	-4	0	-1	0	-1	0	-1	0	0	4	-1	0	-1	-1	0	0	-1	0	-1	0	-1	0	-1	0	-1	0	-1	0
TWU_KVZ_HI-TFR_T2S_ALL_t2st cul to speen	-4	0	0	0	-1	0	-4	-4	0	1	-1	0	-1	-1	0	0	-1	0	-1	0	-1	0	-1	0	-1	0	-1	0
TWU_TED_HI- RAB_RE1_CNO_teddington dra 75	-1	1	-1	0	-1	0	-1	-1	0	8/-1	-1	0	-1	-1	0	1/-1	-1	0	-1	0	-1	1	-1	0	-1	-1	-1	0
TWU_KEM_HI-TFR_TED_ALL_tedd- kempton	-1	1	-1	0	-1	0	-1	-1	0	8 / -1	-1	0	-1	-1	0	1/-1	-1	0	-1	0	-1	1	-1	0	-1	-1	-1	0
TWU_HEN_HI- TFR_KVZ_ALL_tw(kv)to(hen)con	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TWU_SWX_HI- TFR_SWA_ALL_tw(swa)to(swx)con	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TWU_KGV_HI- TFR_KGV_ALL_lockwood ps-kgv res	-4	1/-4	-4	0	-1	0	-1	-1	0	8	-1	0	-1	-8	0	1/-1	-1	0	-1	0	-1	1	-1	0	-1	-1	-1	0

												SEA O	bjective	es and A	Assessi	ment Q	uestions	5										
Options ID	Biodiv	/ersity	S	oil			Wa	ater			A	ir	(Climatic	Factor	S	Lands	scape	Hist Enviro	oric nment	Рор	ulation He	and Hu alth	man		Materia	I Asset	6
	-	1		2	,	3	4	4	ł	5	6	6	1	7	8	3	Ç)	1	0	1	1	1	2	1	3	1	4
	С	0	С	0	С	0	С	0	С	0	С	0	С	0	С	0	С	0	С	0	С	0	С	0	С	0	С	0
TWU_SWX_RE-DRP_ALL_ALL_dp- gatehampton-swox	0	0	0	0	0	0	0	0	0	1	0	-1	0	-1	0	-1	0	0	0	0	4	0	0	0	0	0	0	0
TWU_LON_HI- ROC_NET_CNO_hampton-battersea	-4	0	-1	0	-1	0	0	0	0	8	-1	0	-1	-4	0	0	-1	0	-1	0	-1	0	-1	0	-1	0	-1	0
TWU_SWX_HI- IMP_SWX_ALL_wessextoswoxflax	-1	0	-1	0	-1	0	0	0	0	1	-1	0	-1	-1	0	0	-1	0	-1	0	-1	0	-1	0	-1	0	-1	0
TWU_SWX_HI-GRW_ALL_ALL_woods farm do	-1	0	-1	0	-1	0	-1	-1	0	1/-1	-1	0	-1	-1	0	-1	-1	0	-1	0	-1	0	-1	0	1/-1	0	-1	0
TWU_STT_HI-RAB_RE1_ALL_p8-300- vyrnwy_155_b	-1	1/-1	-1	0	-1	0	-1	-1	0	8	-1	0	-1	-1	0	8	0	0	-1	0	-1	4	0	1	-1	-1	-1	0
TWU_LON_HI-GRW_ALL_ALL_merton recommission	-1	0	0	0	0	0	-1	0	0	1	-1	0	-1	-1	0	0	-1	0	-1	0	-1	0	-1	0	1/-1	-1	-1	0

Table F.5 SEA Summary Table – Full List of Options (excluding demand management strategies, media, TUBs and NEUBs options. The summary tables for these option are presented in Section 4.13)

												SEA C	Objecti	ves an	d Asse	ssmen	t Quest	ions										
Options ID	Biodiv	/ersity	S	oil			Wa	ater			A	Nir	(Climatic	Facto	ors	Land	scape	Hist Enviro	oric nment	Ρορι	ulation Hea	and H alth	uman		Mater	al Asse	əts
		1	:	2		3	4	4		5	(6		7		8	Ģ	9	1	0	1	1	1	2	1	3		14
	С	0	С	0	С	0	С	0	С	0	С	0	С	0	С	0	С	0	С	0	С	0	С	0	С	0	С	0
TWU_GUI_HI-TFR_RZ5_ALL_sewtogui	-4	0	0	0	0	0	-1	0	0	0	-1	0	-1	-1	0	0	-1	0	-1	0	-1	0	-1	0	-1	0	-1	0
TWU_SWX_HI-TFR_SVE_ALL_dukescut-farmoor	-1	0	0	0	-1	-1	0	0	0	1	-1	0	-1	-1	0	1	-1	0	-1	0	-1	0	-1	0	-1	0	-1	0
TWU_LON_HI-ROC_WT1_CNO_kemptonwtw150	-4	0	0	0	-1	0	-1	0	0	8	-1	0	-1	-4	0	1	-1	0	-1	0	-1	0	0	0	-1	0	-1	0
TWU_SWA_HI-ROC_WT2_ALL_abingdon swa wtw ph2	-1	0	-1	0	-1	0	0	0	0	1	-1	0	-1	-1	0	0	-1	0	-1	0	-1	0	-1	0	-1	0	-1	0
TWU_SWA_HI-ROC_WT1_CNO_abingdon swa wtw ph1	-1	0	-1	0	-1	0	0	0	0	1	-1	0	-1	-1	0	0	-1	0	-1	0	-1	0	-1	0	-1	0	-1	0
TWU_SWX_HI-ROC_WT1_ALL_abingdon swox wtw	-1	0	-1	0	-1	0	0	0	0	1	0	0	-1	-1	0	0	-1	-1	-1	0	-1	0	-1	0	-1	0	-1	0
TWU_SWX_HI-ROC_WT1_ALL_radcotwtw	-1	0	0	0	-1	0	0	0	0	1	-1	0	-1	-1	0	0	-1	-1	-1	-1	-1	0	-1	0	-1	0	-1	0
TWU_SWA_HI-ROC_WT2_ALL_medmenhamwtw ph2	-4	0	0	0	0	0	-4	-4	0	1	-1	-1	-1	-1	0	1	-4	-4	-1	-1	-1	0	-1	1	-1	0	-1	0
TWU_SWA_HI-ROC_WT1_CNO_medmenhamwtw ph1	-4	0	0	0	0	0	-4	-4	0	1	-1	-1	-1	-1	0	1	-4	-4	-1	-1	-1	0	-1	4	-1	0	-1	0
TWU_LON_HI-ROC_WT1_CNO_kemptonwtw300	-4	0	0	0	-1	0	-1	0	0	8	-1	0	-1	-8	0	1	-1	0	-1	0	-1	0	0	0	-1	0	-1	0
TWU_LON_HI-REU_RE1_CNO_reuse mogden 100 p1 TWU_LON_HI-REU_RE2_ALL_reuse mogden 100 p2 TWU_LON_HI-TFR_LON_ALL_reuse mogden/walton	-4	1/-1	-4	0	-1	0	-1	-1	0	8	-1	0	-1	-8	0	1	-1	-1	-1	0	-1	1	-1	0	-1	-1	-1	0
TWU_LON_HI-REU_RE1_CNO_reuse mogden 50 p1 TWU_LON_HI-REU_RE2_ALL_reuse mogden 50 p2 TWU_LON_HI-TFR_LON_ALL_reuse mogden/walton	-4	1/-1	-4	0	-1	0	-1	-1	0	4	-1	0	-1	-8	0	1	-1	-1	-1	0	-1	1	-1	0	-1	-1	-1	0
TWU_LON_HI-REU_RE1_CNO_reuse beckton 100 TWU_LON_HI-REU_RE2_ALL_reuse beckton 100 p2 TWU_LON_HI-TFR_LON_ALL_beckton to lockwood TWU_LON_HI_REU_CON_ALL_reuse lockwood_kgv TWU_KGV_HI-TFR_KGV_ALL_lockwood ps-kgv res	-4	1/-4	-4	0	-1	0	-1	-1	0	8	-1	0	-1	-8	0	1/-1	-1	0	-1	0	-1	1	-1	0	-1	-1	-1	0
TWU_LON_HI-REU_RE1_CNO_reuse beckton 150 TWU_LON_HI-REU_RE2_ALL_reuse beckton 150 p2 TWU_LON_HI-TFR_LON_ALL_beckton to lockwood TWU_LON_HI_REU_CON_ALL_reuse lockwood_kgv TWU_KGV_HI-TFR_KGV_ALL_lockwood ps-kgv res	-4	1/-4	-4	0	-1	0	-1	-1	0	8	-1	0	-1	-8	0	1/-1	-1	0	-1	0	-1	1	-1	0	-1	-1	-1	0
TWU_LON_HI-REU_RE1_CNO_reuse beckton 50 TWU_LON_HI-REU_RE2_ALL_reuse beckton 50 p2 TWU_LON_HI-TFR_LON_ALL_beckton to lockwood TWU_LON_HI_REU_CON_ALL_reuse lockwood_kgv TWU_KGV_HI-TFR_KGV_ALL_lockwood ps-kgv res	-4	1/-4	-4	0	-1	0	-1	-1	0	4	-1	0	-1	-8	0	1/-1	-1	0	-1	0	-1	1	-1	0	-1	-1	-1	0
TWU_LON_HI-RAB_RE1_CNO_teddington dra 50 TWU_KGV_HI-RAB_RE2_ALL_teddington dra 50 p2	-1	1	-1	0	-1	0	-1	-1	0	4 / -1	-1	0	-1	-1	0	1/-1	-1	0	-1	0	-1	1	-1	0	-1	-1	-1	0

												SEA (Objectiv	ves an	d Asse	ssment	t Quest	ions										
Options ID	Biodiv	/ersity	S	oil			Wa	ater			A	Nir	C	limatic	: Facto	Irs	Land	scape	Hist Enviro	toric onment	Рори	ulation He	and H alth	uman		Mater	ial Asso	əts
		1	:	2	;	3		4		5	(6		7		8	Ģ	9	1	0	1	1	1	2	1	3		14
	С	0	С	0	С	0	С	0	С	0	С	0	С	0	С	0	С	0	С	0	С	0	С	0	С	0	С	0
TWU_LON_HI-TFR_LON_ALL_teddingtondramog/ted TWU_LON_HI-TFR_LON_ALL_teddingtondrated/tlt																												
TWU_LON_HI-RAB_RE1_CNO_teddington dra 75 TWU_KGV_HI-RAB_RE2_ALL_teddington dra 75 p2 TWU_LON_HI-TFR_LON_ALL_teddingtondramog/ted TWU_LON_HI-TFR_LON_ALL_teddingtondrated/tlt	-1	1	-1	0	-1	0	-1	-1	0	8/-1	-1	0	-1	-1	0	1/-1	-1	0	-1	0	-1	1	-1	0	-1	-1	-1	0
TWU_SWA_HI-TFR_SWX_ALL_swoxswa72	-4	0	-1	0	-1	0	-1	0	0	8	-1	0	-1	-1	0	0	-1	0	-1	0	-1	0	-1	0	-1	0	-1	0
TWU_SWA_HI-TFR_SWX_ALL_swoxswa48	-4	0	-1	0	-1	0	-1	0	0	4	-1	0	-1	-1	0	0	-1	0	-1	0	-1	0	-1	0	-1	0	-1	0
TWU_LON_HI-DES_RE1_CNO_beckton desal 100p1	-1	0	0	0	-1	-1	0	-4	0	8	-1	0	-1	-8	0	0	-1	-1	-1	0	-1	0	-1	0	-1	0	-1	0
TWU_LON_HI-DES_RE2_ALL_beckton desal 50p2b	-1	0	0	0	-1	-1	0	-4	0	4	-1	0	-1	-8	0	0	-1	-1	-1	0	-1	0	-1	0	-1	0	-1	0
TWU_LON_HI-DES_RE1_CNO_beckton desal 50 p1	-1	0	0	0	-1	-1	0	-4	0	4	-1	0	-1	-8	0	0	-1	-1	-1	0	-1	0	-1	0	-1	0	-1	0
TWU_LON_HI-DES_RE1_CNO_beckton desal 150	-1	0	0	0	-1	-1	0	-4	0	8	-1	0	-1	-8	0	0	-1	-1	-1	0	-1	0	-1	0	-1	0	-1	0
TWU_LON_HI-DES_RE2_ALL_beckton desal 50p2a	-1	0	0	0	-1	-1	0	-4	0	4	-1	0	-1	-8	0	0	-1	-1	-1	0	-1	0	-1	0	-1	0	-1	0
TWU_SWX_HI-TFR_SWX_ALL_abing-farmoor pipe	-1	-1	-1	0	-1	0	-1	0	0	1	-1	0	-1	-1	0	0	-1	0	-1	0	-1	0	-1	0	-1	0	-1	0
TWU_SWX_HI-GRW_ALL_ALL_moulsford gw	-1	0	0	0	-1	0	-1	-1	0	1/-1	-1	-1	-1	-1	0	-1	-1	0	-1	0	-1	0	-1	0	-1	-1	-1	0
TWU_LON_HI-GRW_RE1_ALL_asrhortonkirby	-1	1/-1	-1	0	-1	0	0	-1	0	1	-1	0	-1	-1	0	1	-1	0	-1	0	-1	0	-1	0	-1	-1	-1	0
TWU_LON_HI-TFR_LON_ALL_kgv res to bt	-1	-1	-1	0	-1	0	-1	0	0	8	-1	0	-1	0	0	0	-1	0	-1	0	-1	0	-1	0	-1	0	-1	0
TWU_STT_HI-RAB_RE1_ALL_c1-300-unsupported	-4	4 / -4	-1	0	-1	0	-1	-1	0	8	-4	-1	-1	-8	0	8	-4	0	-1	0	-1	4	-1	4	-4	-1	-1	0
TWU_STT_HI-RAB_RE1_ALL_p1-300-unsupported	-4	4 / -1	-1	0	-1	0	-1	-1	0	8	-1	-1	-1	-8	0	8	-4	0	-1	0	-1	4	-1	1	-4	-1	-1	0
TWU_STT_HI-RAB_RE1_ALL_p1-400-unsupported	-4	4/-1	-1	0	-1	0	-1	-1	0	8	-1	-1	-1	-8	0	8	-4	0	-1	0	-1	4	-1	1	-4	-1	-1	0
TWU_STT_HI-RAB_RE1_ALL_p1-500-unsupported	-4	4/-1	-1	0	-1	0	-1	-1	0	8	-1	-1	-1	-8	0	8	-4	0	-1	0	-1	4	-1	1	-4	-1	-1	0
TWU_LON_HI-DES_RE1_CNO_crossnessdesal100p1	-1	0	0	0	-1	-1	0	-4	0	8	-1	0	-1	-8	0	0	-1	-1	-1	0	-1	0	-1	0	-1	0	-1	0
TWU_LON_HI-DES_RE1_CNO_crossnessdesal50p1	-1	0	0	0	-1	-1	0	-4	0	4	-1	0	-1	-8	0	0	-1	-1	-1	0	-1	0	-1	0	-1	0	-1	0
TWU_LON_HI-DES_RE2_ALL_crossnessdesal50p2	-1	0	0	0	-1	-1	0	-4	0	4	-1	0	-1	-8	0	0	-1	-1	-1	0	-1	0	-1	0	-1	0	-1	0
TWU_LON_HI-DES_RE2_ALL_crossnessdesal100p2	-1	0	0	0	-1	-1	0	-4	0	8	-1	0	-1	-8	0	0	-1	-1	-1	0	-1	0	-1	0	-1	0	-1	0
TWU_SWA_HI-GRW_ALL_ALL_dorney do	-1	0	-1	0	-1	0	-1	0	0	1	-1	0	-1	-1	0	-4	-1	0	-1	0	-1	0	-1	0	1/-1	0	-1	0
TWU_LON_HI-ROC_WT1_CNO_eastlondonwtw150	-4	-1	0	0	0	0	0	0	0	8	-1	0	-1	-8	0	0	-1	0	-1	0	-1	0	-1	0	-1	0	-1	0

												SEA (Objectiv	ves and	d Asse	ssmen	t Quest	ions										
Options ID	Biodiv	versity	S	oil			W	ater			A	Air	C	limatic	Facto	Irs	Lands	scape	Hist Enviro	oric nment	Рори	ulation He	and H alth	uman		Mater	al Asse	ets
		1	4	2	(3		4		5		6		7	1	8	ę	9	1	0	1	1	1	2	1	3		14
	С	0	С	0	С	0	С	0	С	0	С	0	С	0	С	0	С	0	С	0	С	0	С	0	С	0	С	0
TWU_LON_HI-ROC_WT1_CNO_eastlondonwtw200	-4	-1	0	0	0	0	0	0	0	8	-1	0	-1	-8	0	0	-1	0	-1	0	-1	0	-1	0	-1	0	-1	0
TWU_LON_HI-ROC_WT1_CNO_eastlondonwtw300	-4	-1	0	0	0	0	0	0	0	8	-1	0	-1	-8	0	0	-1	0	-1	0	-1	0	-1	0	-1	0	-1	0
TWU_LON_HI-TFR_LON_ALL_ch'ford s intake	-1	-8	0	0	-1	0	0	-4	0	8	-1	0	-1	-1	0	0	-1	-1	-1	0	-1	0	-1	0	-1	0	-1	0
TWU_LON_HI-TFR_LON_ALL_datchet int-qm	-1	-1	0	0	-1	0	-4	-4	0	4	0	0	-1	-1	0	0	-1	-1	-1	0	-1	0	-1	0	-1	0	-1	0
TWU_LON_HI-TFR_LON_ALL_kgv res intake	-1	-4	-1	0	-1	0	0	-4	0	8	-1	0	-1	-1	0	-1	-1	-1	-1	0	-1	0	-1	0	-1	0	-1	0
TWU_LON_HI-TFR_LON_ALL_littleton int-qm	-1	-4	-1	0	-1	0	-4	-4	0	8/-1	-1	0	-1	-1	0	0	-1	0	-1	0	0	0	-1	0	-1	0	-1	0
TWU_LON_HI-TFR_LON_ALL_surbiton int-walton	-1	-1	0	0	-1	-1	-1	-1	0	8/-1	-1	0	-1	0	0	-1	-1	0	-1	0	-1	0	-1	0	-1	0	-1	0
TWU_SWX_HI-GRW_ALL_ALL_ashton keynes roc	-1	-1	0	0	0	0	-1	-1	0	1	-1	0	-1	-1	0	-4	-1	-1	-1	-1	-1	0	-1	0	-1	0	-1	0
TWU_GUI_HI-GRW_ALL_ALL_dapdune lic disagg	0	-1	0	0	0	0	0	0	0	1	0	0	0	-1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TWU_STT_HI-RAB_RE1_ALL_p8-400-vyrnwy_155_b	-1	1/-1	-1	0	-1	0	-1	-1	0	8	-1	0	-1	-1	0	8	0	0	-1	0	-1	4	0	1	-1	-1	-1	0
TWU_STT_HI-RAB_RE1_ALL_p8-500-vyrnwy_155_b	-1	1/-1	-1	0	-1	0	-1	-1	0	8	-1	0	-1	-1	0	8	0	0	-1	0	-1	4	0	1	-1	-1	-1	0
TWU_STT_HI-RAB_RE1_ALL_c8-300-vyrnwy_155_b	-1	1/-1	-1	0	-1	0	-1	-1	0	8	-1	0	-1	-1	0	8	0	0	-1	0	-1	4	0	1	-1	-1	-1	0
TWU_STT_HI-RAB_RE1_ALL_p7-300-vyrnwy_135_b	-1	1/-1	-1	0	-1	0	-1	-1	0	8	-1	0	-1	-1	0	8	0	0	-1	0	-1	4	0	1	-1	-1	-1	0
TWU_STT_HI-RAB_RE1_ALL_p8-300-vyrnwy_155_b	-1	1/-1	-1	0	-1	0	-1	-1	0	8	-1	0	-1	-1	0	8	0	0	-1	0	-1	4	0	1	-1	-1	-1	0
TWU_STT_HI-RAB_RE1_ALL_p7-400-vyrnwy_135_b	-1	1/-1	-1	0	-1	0	-1	-1	0	8	-1	0	-1	-1	0	8	0	0	-1	0	-1	4	0	1	-1	-1	-1	0
TWU_STT_HI-RAB_RE1_ALL_p7-500-vyrnwy_135_b	-1	1/-1	-1	0	-1	0	-1	-1	0	8	-1	0	-1	-1	0	8	0	0	-1	0	-1	4	0	1	-1	-1	-1	0
TWU_STT_HI-RAB_RE1_ALL_c7-300-vyrnwy_135_b	-1	1/-1	-1	0	-1	0	-1	-1	0	8	-1	0	-1	-1	0	8	0	0	-1	0	-1	4	0	1	-1	-1	-1	0
TWU_STT_HI-REU_RE1_ALL_p7-300-minworth_115	-1	1/-1	-1	0	-1	0	-1	-8	0	8	-4	0	-1	-8	0	8	0	0	-1	0	-1	4	0	1	-1	-1	-1	0
TWU_STT_HI-REU_RE1_ALL_p7-400-minworth_115	-1	1/-1	-1	0	-1	0	-1	-8	0	8	-4	0	-1	-8	0	8	0	0	-1	0	-1	4	0	1	-1	-1	-1	0
TWU_STT_HI-REU_RE1_ALL_p7-500-minworth_115	-1	1/-1	-1	0	-1	0	-1	-8	0	8	-4	0	-1	-8	0	8	0	0	-1	0	-1	4	0	1	-1	-1	-1	0
TWU_STT_HI-REU_RE1_ALL_c7-300-minworth_115	-1	1/-1	-1	0	-1	0	-1	-8	0	8	-4	0	-1	-8	0	8	0	0	-1	0	-1	4	0	1	-1	-1	-1	0
TWU_STT_HI-RAB_RE1_ALL_p2-300-mythe_15	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0	0
TWU_STT_HI-RAB_RE1_ALL_p2-400-mythe_15	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0	0
TWU_STT_HI-RAB_RE1_ALL_p2-500-mythe_15	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0	0

												SEA C	Objectiv	ves an	d Asse	ssmen	t Quest	ions										
Options ID	Biodiv	versity	S	oil			Wa	ater			A	vir	C	limatic	Facto	ors	Land	scape	Hist Enviro	oric nment	Ρορι	ulation Hea	and H alth	uman		Mater	ial Asse	ets
		1	:	2		3		4		5	(6		7		8	ę	9	1	0	1	1	1	2	1	3		14
	С	0	С	0	С	0	С	0	С	0	С	0	С	0	С	0	С	0	С	0	С	0	С	0	С	0	С	0
TWU_STT_HI-RAB_RE1_ALL_c2-300-mythe_15	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0	0
TWU_STT_HI-REU_RE1_ALL_c3-300-neth_c35	-1	1/-1	-1	0	-1	0	-1	0	0	4	-1	0	-1	-1	0	4	0	0	-1	0	-1	4	0	0	-1	-1	-1	0
TWU_STT_HI-REU_RE1_ALL_p5-300-neth_p35	-1	1/-1	-1	0	-1	0	-1	0	0	4	-1	0	-1	-1	0	4	0	0	-1	0	-1	4	0	1	-1	-1	-1	0
TWU_STT_HI-REU_RE1_ALL_p5-500-neth_p35	-1	1/-1	-1	0	-1	0	-1	0	0	4	-1	0	-1	-1	0	4	0	0	-1	0	-1	4	0	1	-1	-1	-1	0
TWU_LON_HI-GRW_ALL_ALL_epsom roc	0	-1	0	0	0	0	0	-4	0	1/-1	0	0	-1	-1	0	-1	-1	0	-1	0	0	0	-1	0	-1	0	-1	0
TWU_LON_HI-GRW_ALL_ALL_addington gw	-1	-1	0	0	0	0	-1	-1	0	1/-1	-1	0	-1	-1	0	-1	-1	0	-1	0	-1	0	0	0	1/-1	-1	-1	0
TWU_LON_HI-GRW_ALL_ALL_london conchalk	-1	0	0	0	0	0	-1	-1	0	1	-1	0	-1	-1	0	-1	-1	0	-1	0	-1	0	-1	0	1/-1	-1	-1	0
TWU_SWX_HI-GRW_ALL_ALL_woods farm do	-1	0	-1	0	-1	0	-1	-1	0	1/-1	-1	0	-1	-1	0	-1	-1	0	-1	0	-1	0	-1	0	1/-1	0	-1	0
TWU_LON_HI-TFR_LON_ALL_qm res-kempton wtw	-1	0	-1	0	-1	0	-1	0	0	8	-1	0	-1	-1	0	1	-1	0	-1	0	-1	0	-1	0	-1	0	-1	0
TWU_LON_HI-RSR_RE1_CNO_res_haddenham 30	-4	4-4	-1	0	-1	0	0	-1	0	4	-1	0	-1	-1	0	1/-1	-1	-1	-1	-1	-1	0	-1	4	-1	-1	-1	0
TWU_LON_HI-RSR_RE1_CNO_res_ludgershall 50	-1	4-4	-4	0	-1	-1	-1	-1	0	4	-1	-1	-1	-1	-1	-1	-1	-1	-1	0	-1	0	-1	4	-1	0	-1	0
TWU_LON_HI-RSR_RE1_CNO_res_aylesbury 30	-4	4-4	-4	0	-1	0	-1	-1	0	4	-1	0	-1	-4	0	1/-1	-1	-1	-4	-1	-1	0	-1	4	-1	0	-1	0
TWU_LON_HI-RSR_RE1_CNO_res_aylesbury 50	-4	4-4	-4	0	-1	0	-1	-1	0	4	-1	0	-1	-4	0	1/-1	-1	-1	-4	-1	-1	0	-1	4	-1	0	-1	0
TWU_LON_HI-RSR_RE1_CNO_res_aylesbury 75	-4	4-4	-4	0	-1	0	-1	-1	0	8	-1	0	-1	-4	0	1/-1	-1	-1	-4	-1	-1	0	-1	4	-1	0	-1	0
TWU_LON_HI-RSR_RE1_CNO_res_chinnor_2	-1	4-4	-1	0	-1	-1	-1	-1	0	4	-1	0	-1	-1	0	1	-1	-1	-1	0	-1	0	-1	4	-1	0	-1	0
TWU_LON_HI-RSR_RE1_CNO_res_chinnor_1	-1	4-4	-1	0	-1	-1	-1	-1	0	4	-1	0	-1	-1	0	1	-1	-1	-1	-1	-1	0	-1	4	-1	0	-1	0
TWU_LON_HI-RSR_RE1_CNO_res_marsh gibbon_3	-1	4-4	-1	0	-1	0	-1	-4	0	4	-1	0	-1	-1	0	1/-1	-4	-1	-1	0	-1	0	-1	4	-1	0	-1	0
TWU_LON_HI-RSR_RE1_CNO_res_marshgibbon_2	-1	4-4	-1	0	-1	0	-1	-4	0	4	-1	0	-1	-1	0	1/-1	-4	-1	-1	0	-1	0	-1	4	-1	0	-1	0
TWU_LON_HI-RSR_RE1_CNO_res_marshgibbon_1	-1	4-4	-1	0	-1	0	-1	-4	0	8	-1	0	-1	-1	0	1/-1	-4	-1	-1	0	-1	0	-1	4	-1	0	-1	0
TWU_LON_HI-RSR_RE1_CNO_res_ludgershall 30	-1	4-4	-4	0	-1	-1	-1	-1	0	4	-1	-1	-1	-1	-1	-1	-1	-1	-1	0	-1	0	-1	4	-1	0	-1	0
TWU_LON_HI-TFR_LON_ALL_cop'mills-honoroak	-4	0	0	0	-1	0	-1	0	0	8	-1	0	-1	-4	0	0	-1	0	-1	0	-1	0	-1	0	-1	0	-1	0
TWU_LON_HI-TFR_LON_ALL_hampton-battersea	-4	0	-1	0	-1	0	0	0	0	8	-1	0	-1	-4	0	0	-1	0	-1	0	-1	0	-1	0	-1	0	-1	0
TWU_KVZ_HI-TFR_T2S_ALL_t2sttofobney	-1	0	0	0	-1	0	0	0	0	1	-1	0	-1	-1	0	0	-1	0	-1	0	-1	0	-1	0	-1	0	-1	0
TWU_LON_HI-GRW_ALL_ALL_streatham ar	0	0	0	0	0	0	0	0	0	1	-1	0	-1	-1	0	0	-1	-1	-1	0	-1	0	-1	0	-1	0	-1	0

												SEA C	Objecti	ves an	d Asse	ssmen	t Quest	ions										
Options ID	Biodiv	versity	S	oil			Wa	ater			A	vir	C	Climatic	: Facto	rs	Land	scape	Hist Enviro	oric nment	Ρορι	ulation Hea	and H alth	uman		Mater	ial Asse	ets
		1	:	2	3	3		4	ļ	5	(6		7	1	8	(9	1	0	1	1	1	2	1	3		14
	С	0	С	0	С	0	С	0	С	0	С	0	С	0	С	0	С	0	С	0	С	0	С	0	С	0	С	0
TWU_LON_HI-ROC_WT1_CNO_eastlondonwtw100p1	-4	-1	0	0	0	0	-1	0	0	8	0	0	-1	-8	0	0	-1	0	-1	0	-1	0	-1	0	-1	0	-1	0
TWU_LON_HI-ROC_WT1_CNO_kemptonwtw100 p1	-4	0	0	0	-1	0	-1	0	0	8	-1	0	-1	-4	0	1	-1	0	-1	0	-1	0	0	0	-1	0	-1	0
TWU_LON_HI-ROC_WT2_ALL_eastlondonwtw100p2	-4	-1	0	0	0	0	-1	0	0	8	0	0	-1	-8	0	0	-1	0	-1	0	-1	0	-1	0	-1	0	-1	0
TWU_LON_HI-ROC_WT2_ALL_kemptonwtw100 p2	-4	0	0	0	-1	0	-1	0	0	8	-1	0	-1	-4	0	1	-1	0	-1	0	-1	0	0	0	-1	0	-1	0
TWU_KVZ_HI-TFR_HEN_ALL_tw(hen)to(kv)con	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TWU_SWX_HI-TFR_SWA_ALL_tw(swa)to(swx)con	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TWU_STT_HI-TFR_STT_ALL_stt-sesro c1	-1	0	0	0	0	0	0	0	0	1	0	0	0	-1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TWU_STT_HI-TFR_STT_ALL_stt-sesro c2	-1	0	0	0	0	0	0	0	0	1	0	0	0	-1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TWU_STT_HI-TFR_STT_ALL_stt-sesro p1	-1	0	0	0	0	0	0	0	0	1	0	0	0	-1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TWU_STT_HI-TFR_STT_ALL_stt-sesro p2	-1	0	0	0	0	0	0	0	0	1	0	0	0	-1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TWU_LON_HI-TFR_SES_ALL_woodman-epsom p	-1	0	0	0	0	0	0	0	0	1	-1	0	-1	-1	0	0	-1	0	-1	0	-1	0	-1	0	-1	0	-1	0
TWU_SWX_HI-RSR_RE1_CNO_abingdon30+100p1	-4	8	-4	1	-1	1	-1	1	0	4	-1	0	-1	-1	0	4	-4	4 / -1	-4	1	-4	8	-1	8	-1	1	-1	0
TWU_SWX_HI-RSR_RE1_CNO_abingdon80+42p1	-4	8	-4	1	-1	1	-1	1	0	8	-1	0	-1	-1	0	4	-4	4/-1	-4	1	-4	8	-1	8	-1	1	-1	0
TWU_SWX_HI-RSR_RE1_CNO_abingdon100(lon)	-4	8	-4	1	-1	1	-1	1	0	8	-1	0	-1	-1	0	4	-4	4 / -1	-4	1	-4	8	-1	8	-1	1	-1	0
TWU_SWX_HI-RSR_RE1_CNO_abingdon125(lon)	-4	8	-4	1	-1	1	-1	1	0	8	-1	0	-1	-1	0	4	-4	4 / -1	-4	1	-4	8	-1	8	-1	1	-1	0
TWU_SWX_HI-RSR_RE1_CNO_abingdon150(lon)	-4	8	-4	1	-1	1	-1	1	0	8	-1	0	-1	-1	0	4	-4	4 / -1	-4	1	-4	8	-1	8	-1	1	-1	0
TWU_SWX_HI-RSR_RE1_CNO_abingdon75(lon)	-4	8	-4	1	-1	1	-1	1	0	8	-1	0	-1	-1	0	4	-4	4 / -1	-4	1	-4	4	-1	4	-1	1	-1	0
TWU_LON_HI-TFR_LON_ALL_newriverhead pump 4	0	0	0	0	0	0	0	0	0	8	-1	-1	-1	-1	0	0	0	0	0	0	0	0	0	0	-1	0	0	0
TWU_LON_HI-TFR_LON_ALL_barrowhillpump	0	0	0	0	0	0	0	-1	0	4	0	0	-1	-1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TWU_KVZ_HI-GRW_ALL_ALL_mortimer recomm	0	0	0	0	0	0	0	-1	0	1	0	0	-1	-1	0	-1	0	0	0	0	0	0	0	0	0	0	0	0
TWU_SWA_HI-GRW_ALL_ALL_datchet gw	-1	-1	-1	0	0	0	0	-1	0	1	-1	0	-1	-1	0	-1	-1	0	-1	0	-1	0	-1	0	-1	0	-1	0
TWU_SWA_HI-GRW_ALL_ALL_datchet do	-1	0	0	0	-1	0	0	0	0	1	-1	0	-1	-1	0	-1	-1	0	-1	0	-1	0	-1	0	-1	0	-1	0
TWU_SWX_HI-GRW_RE1_ALL_britwell roc	-1	0	-1	0	-1	0	-1	-1	0	1	-1	0	-1	-1	0	-1	-1	0	-1	0	-1	0	-1	0	-1	0	-1	0
TWU_LON_HI-TFR_LON_ALL_second spine tunnel	-1	-4	-1	0	-1	0	-1	0	0	8	-1	0	-1	-4	0	0	-1	0	-1	0	-1	0	-1	0	-1	0	-1	0

												SEA C	Objecti	es an	d Asse	ssmen	t Quest	ions										
Options ID	Biodiv	versity	S	oil			Wa	ater			A	Nir	C	limatic	Facto	rs	Land	scape	Hist Enviro	toric nment	Ρορι	ulation Hea	and H alth	uman		Mater	ial Asso	ets
		1	:	2	(3		4		5		6		7	1	8	ę	9	1	0	1	1	1	12	-	3		14
	С	0	С	0	С	0	С	0	С	0	С	0	С	0	С	0	С	0	С	0	С	0	С	0	С	0	С	0
TWU_LON_HI-GRW_ALL_ALL_s'fleet lic disagg	-1	0	0	0	0	0	-1	0	0	1	-1	0	-1	-1	0	0	-1	0	-1	0	-1	0	-1	0	-1	-1	-1	0
TWU_KVZ_HI-TFR_T2S_ALL_t2st cul to fobney	-1	0	-1	0	-1	0	-4	-4	0	4	-1	0	-1	-1	0	0	-1	0	-1	0	-1	0	-1	0	-1	0	-1	0
TWU_KVZ_HI-TFR_T2S_ALL_t2st cul to speen	-4	0	0	0	-1	0	-4	-4	0	1	-1	0	-1	-1	0	0	-1	0	-1	0	-1	0	-1	0	-1	0	-1	0
TWU_LON_HI-TFR_LON_ALL_beckton-crossness	-1	0	-1	0	-4	0	-1	-4	0	8	-1	0	-1	-4	0	0	-1	0	-1	0	-1	0	-1	0	-1	0	-1	0
TWU_LON_HI-OTH_ALL_ALL_ch'ford purchase	0	-1	0	0	0	0	0	0	0	1	0	0	0	-1	0	1	0	0	0	0	0	0	0	0	0	0	0	0
TWU_LON_HI-TFR_LON_ALL_twrm ht-coppermills	-1	0	0	0	-1	0	-1	0	0	1	-1	0	-1	-1	-1	0	-4	0	-1	0	-4	0	-4	0	-1	0	-1	0
TWU_SWA_HI-TFR_SWX_ALL_medmenham intake 80	0	-4	0	0	-1	0	-1	-4	0	8/-1	0	0	-1	-1	0	-1	-1	0	-1	0	-1	0	-1	0	-1	0	0	0
TWU_LON_HI-GRW_ALL_ALL_merton recommission	-1	0	0	0	0	0	-1	0	0	1	-1	0	-1	-1	0	0	-1	0	-1	0	-1	0	-1	0	1/-1	-1	-1	0
TWU_SWX_HI-TFR_HEN_ALL_henley-swox2.4	-1	0	0	0	0	0	0	0	0	1	-1	0	-1	-1	0	1	-1	0	-1	0	-1	0	-1	0	-1	0	-4	0
TWU_SWA_HI-TFR_HEN_ALL_henley-swa2.4	-1	0	0	0	-1	0	-1	0	0	1	-1	0	-1	-1	0	0	-1	0	-1	0	-1	0	-1	0	-1	0	-1	0
TWU_SWX_HI-TFR_HEN_ALL_henley-swox5	-1	-1	0	0	0	0	0	0	0	0	-1	0	-1	-1	0	1	-1	0	-1	0	-1	0	-1	0	-1	-1	-4	0
TWU_LON_HI-GRW_ALL_ALL_kidbrooke slars	-1	0	0	0	-1	0	-1	-1	0	1/-1	-1	-1	-1	-1	0	1/-1	-1	-1	-1	0	-1	-1	-1	0	-1	-1	-1	0
TWU_LON_HI-GRW_ALL_ALL_merton ar	-1	0	0	0	-1	0	-1	-1	0	1/-1	-1	0	-1	-1	0	-1	-1	0	-1	0	-1	0	-1	0	-1	0	-1	0
TWU_SWX_HI-TFR_KVZ_ALL_kennet-swox2.3	-4	0	0	0	-1	0	-1	-1	0	1	-1	0	-1	-1	0	0	-1	0	-1	0	-1	0	-1	0	-1	0	-1	0
TWU_SWX_HI-TFR_KVZ_ALL_kennet-swox6.7	-1	0	0	0	-1	0	-1	-1	0	1	-1	0	-1	-1	0	0	-1	0	-1	0	-1	0	-1	0	-1	0	-1	0
TWU_SWA_HI-GRW_ALL_ALL_taplowincreasedo	-1	0	-1	0	0	0	-1	-4	0	1	-1	0	-1	-1	0	-1	-1	0	-1	0	-1	0	-1	0	-1	0	-1	0
TWU_LON_HI-TFR_LON_ALL_twrm shaft kempton	-4	0	0	0	0	0	0	0	0	8	-1	0	-1	-1	0	0	-1	0	-1	0	-1	0	-1	0	-1	0	-1	0
TWU_UTC_HI-IMP_UTC_CNO_oxcanal-cropredy	-8	-8	-1	0	-1	1	0	-4	0	1	-1	0	-4	-1	0	0	1/-1	0	-1	0	-1	0	-1	0	-1	0	0	0
TWU_SWX_HI-IMP_SWX_CNO_oxc-dukes cutswox	-8	-8	-1	0	-1	1	0	-4	0	1	-1	0	-4	-1	0	0	1/-1	0	-1	0	-1	0	-1	0	-1	0	0	0
SES_SES_HI-TFR_GUI_ALL_guildfo-reigat p 20	-1	0	0	0	-1	0	-1	0	0	1	-1	0	-1	-1	0	0	-1	0	-1	0	-1	0	-1	0	-1	-1	-1	0
SES_SES_HI-TFR_GUI_ALL_guildfo-reigat p 5	-1	0	0	0	-1	0	-1	0	0	1	-1	0	-1	-1	0	0	-1	0	-1	0	-1	0	-1	0	-1	-1	-1	0
TWU_SWA_HI-TFR_SWX_ALL_medmenham intake 53	0	-1	0	0	-1	0	-1	-1	0	8/-1	0	0	-1	-1	0	-1	-1	0	-1	0	-1	0	-1	0	-1	0	0	0
TWU_LON_HI-TFR_LON_ALL_tlt upgrade - roc	-4	-1	0	0	0	0	-1	0	0	8	-1	0	-1	-4	0	0	-1	0	-1	0	-1	0	-1	0	-1	0	-1	0

												SEA C	Objecti	ves an	d Asse	ssmen	t Quest	ions										
Options ID	Biodiv	/ersity	S	oil			Wa	ater			A	vir	0	Climatic	: Facto	rs	Land	scape	Hist Enviro	oric nment	Рори	ulation He	and H alth	uman		Mater	al Asse	ets
		1	:	2	3	3	4	4		5	(6		7	-	8	(9	1	0	1	1	1	2	1	3		14
	С	0	С	0	С	0	С	0	С	0	С	0	С	0	С	0	С	0	С	0	С	0	С	0	С	0	С	0
TWU_SWX_HI-IMP_SWX_ALL_wessextoswoxflax	-1	0	-1	0	-1	0	0	0	0	1	-1	0	-1	-1	0	0	-1	0	-1	0	-1	0	-1	0	-1	0	-1	0
TWU_SWA_HI-TFR_HEN_ALL_henley-swa5	-1	0	0	0	-1	0	-1	0	0	1	-1	0	-1	-1	0	0	-1	0	-1	0	-1	0	-1	0	1/-1	0	-1	0
TWU_KVZ_HI-TFR_UTC_ALL_thamestofobney	-1	-8	-1	0	-1	-1	0	-4	0	4	-1	0	-1	-1	0	-1	-1	0	-1	0	-1	0	-1	0	-1	0	-1	0
WSX_HSW_HI-IMP_MQS_ALL_wsx 2 sws	-8	0	-1	0	-1	0	-4	0	0	1	-1	0	-1	-1	0	0	-1	0	-1	0	-1	0	-1	0	-1	0	-1	0
TWU_LON_HI-TFR_LON_ALL_crossness to Beckton	-1	0	-1	0	-1	0	-1	-1	0	8	-1	0	-1	-4	0	0	-1	0	-1	0	-1	0	-1	0	-1	0	-1	0
TWU_LON_HI-TFR_LON_ALL_crossness-beckton	-1	0	-1	0	-1	0	-1	-1	0	8	-1	0	-1	-4	0	0	-1	0	-1	0	-1	0	-1	0	-1	0	-1	0
TWU_KGV_HI-REU_RE1_CNO_deephams reuse 46.5	-4	0	-1	0	-1	0	0	-1	0	4	-1	0	-1	-1	0	0	-1	0	-1	0	-1	0	-1	0	-1	0	-1	0
TWU_KGV_HI-REU_RE1_CNO_deephams reuse 46.5b	-1	-4	-1	0	-1	0	0	0	0	4	-1	0	-1	-1	0	0	-1	-1	-1	0	-1	0	-1	0	-1	0	-1	0
TWU_LON_HI-TFR_LON_ALL_beckton-coppermills	-4	0	-1	0	-1	0	-1	-1	0	8	-1	0	-1	-4	0	0	-1	-1	-1	0	-1	0	-1	0	-1	0	-1	0
TWU_LON_HI-GRW_ALL_ALL_honor oak gw	-1	0	-1	0	0	0	-1	-1	0	1	-1	0	-1	-1	0	-1	-1	0	-1	0	-1	0	-1	0	-1	0	-1	0
TWU_LON_HI-GRW_ALL_ALL_thames valley asr	-1	0	-1	0	-1	0	0	-1	0	1	-1	0	-1	-1	0	1/-1	-1	0	-1	0	-1	0	-1	0	1/-1	-1	-1	0
TWU_LON_HI-GRW_ALL_ALL_addington asr	-1	0	0	0	0	0	0	0	0	1	-1	0	-1	-1	0	-1	-1	0	0	0	-1	0	-1	0	-1	0	-1	0
TWU_LON_HI-REU_RE1_ALL_reuse mogden s sewer TWU_LON_HI-TFR_LON_ALL_reuse mogden ss k/w	-4	1/-4	-4	0	-1	0	-1	-1	0	4	-1	0	-1	-8	0	1	-1	-1	-1	0	-1	1/-1	-1	0	-1	-1	-1	0
TWU_GUI_HI-GRW_ALL_ALL_dapdune roc	0	0	0	0	-1	-1	-1	0	0	1	-1	0	-1	-1	0	-1	-1	0	0	0	-1	0	-1	0	1/-1	0	-1	0
TWU_KVZ_HI-GRW_ALL_ALL_east woodhay roc	0	-1	0	0	0	0	0	-1	0	1	0	0	-1	-1	0	0	0	0	0	0	0	0	0	0	-1	0	0	0
TWU_LON_HI-GRW_ALL_ALL_honoroak do	-1	0	0	0	0	0	-1	0	0	1	-1	0	-1	-1	0	1	-1	0	-1	0	-1	0	-1	0	-1	-1	-1	0
TWU_STT_HI-RAB_RE1_ALL_p4-300-vyrnwy_75	0	1/-1	0	0	0	0	0	1/-1	0	8	0	0	0	0	0	8	0	0	0	0	0	4	0	0	0	1	0	0
TWU_STT_HI-RAB_RE1_ALL_p4-400-vyrnwy_75	0	1/-1	0	0	0	0	0	1/-1	0	8	0	0	0	0	0	8	0	0	0	0	0	4	0	0	0	1	0	0
TWU_STT_HI-RAB_RE1_ALL_p4-500-vyrnwy_75	0	1/-1	0	0	0	0	0	1/-1	0	8	0	0	0	0	0	8	0	0	0	0	0	4	0	0	0	1	0	0
TWU_STT_HI-RAB_RE1_ALL_c5-300-vyrnwy_75	0	1/-1	0	0	0	0	0	1/-1	0	8	0	0	0	0	0	8	0	0	0	0	0	4	0	0	0	1	0	0
TWU_STT_HI-RAB_RE1_ALL_p6-300-shrewsbury_25	0	1	-1	0	0	0	0	0	0	4	0	0	-1	-4	0	4	0	0	0	0	0	4	0	0	-1	1/-1	0	0
TWU_STT_HI-RAB_RE1_ALL_p6-400-shrewsbury_25	0	1	-1	0	0	0	0	0	0	4	0	0	-1	-4	0	4	0	0	0	0	0	4	0	0	-1	1/-1	0	0
TWU_STT_HI-RAB_RE1_ALL_p6-500-shrewsbury_25	0	1	-1	0	0	0	0	0	0	4	0	0	-1	-4	0	4	0	0	0	0	0	4	0	0	-1	1/-1	0	0
TWU_STT_HI-RAB_RE1_ALL_c6-300-shrewsbury_25	0	1	-1	0	0	0	0	0	0	4	0	0	-1	-4	0	4	0	0	0	0	0	4	0	0	-1	1/-1	0	0

Annex G: SEA Options Assessments (WRMP19)

Please see SEA Summary Table G.1, which contains the WRMP19 SEA Summaries as presented in the Thames Water WRMP19 Environmental Report:

Table G.1 Summary SEA Table (WRMP19 Options)

Option type & sub-type	Element name	Element Ref 🗸	-	-	[SE	A obje	ctives										- A	effect
			HRA	WFD	1.1	1.2	1.3	1.4	2.1	2.2	2.3	3.1 3.2	4.1	4.2	4.3 4.	4	4.5	5.1	5.2	5.3	6.1	6.2	6.3	7.1 8	8.1	metric
Treatment: London	Coppermills WTW extension (100MVd)	WTW-LON-COP-100																								-7
Treatment: London	Coppermills WTW extension (150MVd)	WTW-LON-COP-150																								-7
Network: TWRM	Hampton WTW to Battersea Extension	NET-TWRM-HAM-BAT																								-7
Treatment: London	Kempton WTW expansion (100MVd)	WTW-LON-KEM-100																								-7
Treatment: London	Kempton WTW expansion (150MVd)	WTW-LON-KEM-150																								-7
Treatment: London	Kempton WTW expansion (300MVd)	WTW-LON-KEM-300																								-7
Sprint 2 Raw Water Transfer	Minworth STW to River Avon 115 MVd	RES-RWTS-MIN																								-7
Network: TWRM	Network Reinforcement – Kempton WTW New shaft	NET-TWRM-KEM																								-7
Network: TWRM	Network Reinforcement New Header tank at Coppermills WTW	NET-TWRM-COP-HEA																								-7
Conveyance: Raw Water System	Raw Water System Conveyance from Break Tank to Coppermills	CON-RWS-BT-COP-800																								-7
Sprint 3 Resource: Removal of	Britwell Removal of Constraints	RES-RC-BTW																								-7
Conveyance: Reuse	Beckton to Lockwood Covneyance (300 MLD)	CON-RU-BEC-LCK																				_				-6
Network: TWRM	Coppermills WTW to New Honor Oak Service Reservoir TWRM Extension	NET-TWRM-COP-HON																				_				-6
Resource: Desalination	Crossness Desal Treatment Plant 3 phases of 100Mid	RES-DES-CRO-100																				_				-6
Resource: Reservoir	South East Strategic Reservoir Option 100Mm3	RES-RRR-ABI-100Mm3																								-6
Resource: Reservoir	South East Strategic Reservoir Option 125Mm3	RES-RRR-ABL125Mm3																		_						-6
Resource: Reservoir	South East Strategic Reservoir Option 150Mm3	RES-RRR-ABI-150Mm3																			_					-6
Resource: Reservoir	South East Strategic Reservoir Option 30+100Mm3 Phase 1	RES-RRR-ABL30+100Mm3-P1												_												-6
Resource: Reservoir	South East Strategic Reservoir Option 30+100Mm3 Phase 2	RES-RRR-ABL30+100Mm3-P2															_	_	_		_					-6
Resource: Reservoir	South East Strategic Reservoir Option 75Mm3	RES_RRR_ABL75Mm3												_			_			_						
Desource: Deservoir	South East Strategic Reservoir Option 80+42Mm3 Phase 1	DES_DDD_ABL80+42Mm3_D1												_			_		_	_						3-
Pasource: Pasanyoir	South East Strategic Reservoir Option 80+421/m3 Phase 2	DES DDD ABL 80+42Mm3 D2												_	_		_	_	_	_	_					
Daw Water Transfer	Severn Thames Transfer - Deerhurst to Culham (300MMd) nineline	CON-PWT-DEH-CLM-300												_	_		-			_			_			-6
Raw Water Transfer	Severn Thames Transfer - Deerhurst to Culham (300MVd) pipeline	CON RWT DEH CLM 400												_			-	_	_	_		_				-0-
Daw Water Transfer	Severa Themes Transfer - Deerhurst to Culham (500MI/d) pipeline	CON DWT DEH CLM 500												_			-	_	_	_		_				
Raw Waler Hallster	Beoldes Desalization treatment cleant (500M/d)	DEC DEC REC 450	-			_								_	_		_	_	_	_		_	_			-0
Resource: Desaination	Beckton Desaination treatment plant 150m/d	DES DU REC-100			-										_	+	-	-	-	_			_	_	-	-0
Resource: Reuse	Beckton Reuse 150 MLD	DEC DU REC 450												-	_	-	-	-+	-+	_			-	-	-	-2
Resource: Reuse	Deckoli Reuse 150 MLD	DEC DU DOU			-									_		+	-	-+	-+	_	_			-	-	
Network Descinction	Deephams Reuse 45MVd	NET DEC CDO DEC												_	_	-	-	-	-	_	_	_	_	_	-	2
Network: Deselination	Desalination – Crossness to Beckton tunnel	NET-DES-CRU-DEC												_	_		_	_	-	_	_	_	-	_	_	
Network: Desaination	Descination Deckton to Coppermits tunnel	INET-DES-DEC-COP												_	-		-	-	-	_	_	_	-	_	-	2
Conveyance: Raw water System	Desaination – Beckton to Crossness tunnel	CON-RWS-BEC-CRO-300	-												_		_	_	_	_	_	_	_	_	_	
Conveyance: Raw Water System	Raw Water System – Lockwood PS to KGV Reservoir Intake	CON-RWS-LCK-KGV-800	-		-									_	_	+	-	_	_	_	_	_	_	_	_	
Conveyance: Raw water System	Raw water System – Queen Mary Reservoir to Kempton WTW site	CON-RWS-QMR-REM-800												_		-	_	-	_	_		_	_	_	_	
Sprint 3 SWA North	SWUX to SWA (46 MVd)	NET-IZT-AB-LC-46	-		-					-				_		-	_	_	-+	-	_	_	_	_		
Raw water Transfer	SWOX to SWA (72 MVd)	NET-IZT-AB-LC-72			-									_		-	_	_	-		_	_	_	_	_	
Sprint 3 Raw Water Systems	Abingdon to Farmoor	CON-RWS-ABFFMR			-	_								_		-	_	_	_	_	_	_	_	_	_	-4
Conveyance: Reuse	Deephams to KGV Conveyance	CON-RU-DPH-KGV	-										+ +	-		-	_	-	_	_	_	_	-	_	_	-4
Resource: Inter-Zonal Transfers	Henley to SWOX 2.37 MLD	RES-IZT-HEN-SWX-NET-2.37	-		-					-			+ +		_	\rightarrow	_	-	_			_	_	_	_	-4
Sprint 3 Resource: Inter-Zonal Transfers	Henley to SWOX 5 MLD	RES-IZT-HEN-SWX-NET-5	-		_					-			+ +		_	-	_	_	_			_	-	_	_	-4
Resource: Inter-Zonal Transfers	Kennet Valley to SWOX 2.3 MLD	RES-IZT-KEN-SWX-CLV-2.3							-	-			+ +		_	_	_	_	_			_	_	_	_	-4
Resource: Inter-Zonal Transfers	Kennet Valley to SWOX 6.7 MLD	RES-IZT-KEN-SWX-CLV-6.7	-							-				-	_	_	_	-	_	-		_	_			-4
Sprint 3 SWA South	Medmenham Intake-53	CON-RWS-MMM-53	-		-					-				_		_	_	_	_	_	_	_	_			-4
Sprint 3 SWA South	Medmenham Intake-80	CON-RWS-MMM-80	_											_	_	_	_	_	_	_		_	_			-4
Raw Water Transfer	Medmenham WTW (24MVd)	WTW-SWA-MMM												_	_	_	_	_	_	_	_					-4
Sprint 3 Raw Water Transfer	Oxford Canal Duke's Cut to Farmoor 15MVd Pipeline	CON-RWS-DKC-FRM	-							-				_		_	_	_	_	_		_	_			-4
Sprint 3 Network Reinforcement	Shalford to Netley Mil	NET-GUI-SFD-NML														_				_						-4
Sprint 2 Raw Water Transfer	Wye to Deerhurst 60.3MVd	CON-RWT-ROW-DEH-60.3														_				_						-4
Resource: Aquifer Recharge	ASR SE Lon Addington	RES-ASR-SEL															_		_	_		_	_			-3
Treatment: SWOX	Abingdon WTW (24MVd)	WTW-SWOX-ABI										_				_				_						-3
Treatment: SWOX	SWA North: Abingdon WTW (24MVd)	WTW-SWOX-ABI-SWA														-										-3
Resource: Aquifer Recharge	SLARS 1 Kidbrooke	RES-AR-SLARS1-7														-		-		_						-3
Resource: Aquifer Recharge	SLARS 2 Streatham	RES-AR-SLARS2																								-3

Conveyance: Reuse Deephams to TLT extension Conveyance	CON-RU-DPH-TLTEX -3
Resource: Inter-Zonal Transfers Henley to SWA 2.37 MLD	RES-IZT-HEN-SWA-HAM-2.37 -3
Sprint 3 Resource: Inter-Zonal Transfers Henley to SWA 5 MLD	RES-IZT-HEN-SWA-HAM-5 -3
Resource: Aguifer Recharge SLARS 3 Merton Abbey	RES-AR-SLARS3 -3
Resource: Aguifer Recharge Thames Valley Central ASR	RES-ASR-TV -3
Resource: Groundwater Addington Groundwater	RES-GW-ADD -3
Resource: Groundwater London confined Chalk north	RES-GW-LCC -3
Resource: Groundwater Mortimer Recommissioning	RES-GW-MOR -3
Sprint 2 Raw Water Transfer Netheridge STW to River Severn 35Mld	RES-RWTS-NTH -3
Resource: Groundwater Mouls ford Groundwater	RES-GW-MOU -3
Sprint 3 Raw Water Transfer Oxford Canal to Cropredy Resource 15 MVd	RES-RWTS-OXC-CRP-15 -3
Sprint 3 Raw Water Transfer Oxford Canal to Dukes Cut Resource 15 MVd	RES-RWTS-OXC-DKC-15 -3
Treatment: SWOX Radcot WTW (24MVd)	WTW-SW0X-RAD -3
Conveyance: Raw Water System Raw Water System - Chingford South intake increase	CON-RWS-CHS-100 -3
Conveyance: Raw Water System Raw Water System - Datchet intake increase	CON-RWS-DAT-300 -3
Conveyance: Raw Water System Raw Water System – Increase capacity of Littleton intake PS	CON-RWS-LTN-300 -3
Conveyance: Raw Water System Raw Water System - KGV Reservoir to Break Tank	CON-RWS-KGV-BT-300 -3
Conveyance: Raw Water System Raw Water System KGV Reservoir intake increase	CON-RWS-KGV-360 -3
Resource: Inter-Company Transfers SEW to GUI 10 MLD	RES-ICT-SEW-GULMNT-10 -3
Resource: Groundwater Southfleet/Greenhithe License Disaggregation	RES-GW-SOU -3
Resource: Inter-Company Transfers Wessex to SWOX (Flaxlands)	RES-ICT-WSX-FLX
Sprint 3 Groundwater Resource Honor Oak Groundwater	RES-GW-HON -3
Sprint 3 Groundwater Resource Horton Kirby ASR	RES-ASR-HTK
Sprint 3 Groundwater Resource New River Head Removal of Constraints	RES-RC-NRV
Resource: Groundwater Merton Recommissioning	RES-RC-MTN
Resource: Removal of Constraints Ashton Keynes Borehole pumps	RES-RC-ASH
Resource: Removal of Constraints Dapdune removal of constraints	RES-RC-DAP
Resource: Removal of Constraints East Woodhay borehole pumps	RES-RC-EWO
Resource: Removal of Constraints Ladymead WTW removal of constraints	RES-RC-LAD -2
Raw Water Purchase Didcot	RES-RWP-DD
Sprint 3 Groundwater Resource Datchet Groundwater	RES-GW-DAT
Resource: Raw water transfer support Lake Vyrnwy - 148 Mid	RES-RWTS-VYR-148
Resource: Raw water transfer support Lake Vyrnwy - 180 Mid	RES-RWTS-VYR-180
Resource: Raw water transfer support Lake Vyrnwy - 60 Mid	RES-RWTS-VYR-60
Sprint 3 Resource Removal of Constraints Epsom Removal of Constraints	RES-RC-EPS -2
Resource: Raw water transfer support Mythe WTW	RES-RWTS-MYT
Network: TWRM Network Reinforcement – Barrow Hill Pump 6 replacement	NET-TWRM-BAR-PUM
Network: TWRM Riverhead Pump Replacement	NET-TWRM-NRV-PUM
Conveyance: Raw Water System - Increase capacity of Surbiton intake	CON-RWS-SUR-100 -2
Conveyance: Raw Water System Raw Water System – TLT upgrade	CON-RWS-TLT-UPG-450 -2
Sprint 2 Raw Water Transfer Vyrnwy Agueduct Transfer to Shrewsbury via Oswestry 12MVd	CON-TWT-VYR-SWY
Sprint 2 Raw Water Transfer Vyrnwy Agueduct Transfer to Shrewsbury via Oswestry 30Ml/d	CON-TWT-VYR-SWY
Raw Water Purchase Chingford RWP	RES-RWP-CHD
Resource: Groundwater Dapdune Licence Disaggregation	RES-GW-DAP 0
Raw Water Transfer River Lee New Gauge nineline (chalk streams)	
Raw Water Transfer SWA ninelines (chaik streams)	
Paw Water Transfer South West London pipelines (chalk streams)	
rear mater indianer i douain meas conden pipelines (chaik all callas)	
Raw Water Transfer South East London pipelines (chalk streams)	

Annex H: WRMP19 Mitigation Register

The following Table provides a summary of mitigation measures outlined in the Thames Water WRMP19 Report – Appendix I, over and above the application of standard good practice or best construction practices to minimise the effects of construction activity on people, recreation and the environment. The Table outlines all options in WRMP19, many of these are still relevant for WRMP24 and have been carried over into Sections 8 and 9:

- Biodiversity: during construction, appropriate biosecurity mitigation measures will be put in place to avoid the spread of any INNS that may be present in the construction areas. Invasive species on site are to be identified and removed or treated in advance of construction works, in line with national INNS protocols and guidance. Tunnel commissioning will be undertaken with treated water.
- Biodiversity: habitat and protected species surveys will be undertaken for each development to determine whether further site and species/habitat specific mitigation measures are required.
- Biodiversity: where trees need removal, or works are in close proximity, an Arboricultural Implications Assessment will be completed to minimise impacts and identify root protection zones that should be observed.
- Health and wellbeing: trenchless pipeline construction techniques will be used where appropriate to mitigate impacts on health and wellbeing.
- Health and wellbeing: Operational noise impacts should be effectively mitigated using noise insulation and enclosing such plant within buildings as part of their design.
- Recreation and access: during construction all reasonable effort will be made to avoid temporary closure of public rights of way and in the event that these are required diversions will be provided instead. Public rights of way will be reinstated following construction completion. Careful siting and use of screening where work locations are in proximity to public rights of way will be undertaken.
- Archaeology: archaeological desk based studies, written schemes of investigation and watching briefs will be required where options are in close proximity to heritage sites or where there is the potential for archaeological finds to be uncovered as part of excavation works.
- Water: potential construction impacts on surface and groundwater quality will be minimised by the use of pipejacking, and any chemical /oil storage will be fully bunded to prevent accidental pollution.
- Water: drainage water from operational sites will be disposed of appropriately to avoid pollution (e.g. road drainage).
- Water: adherence to Environment Agency Pollution Prevention Guidelines (although now formally withdrawn they are a useful source of information).
- General: a Construction Environmental Management Plan will be produced for each development, detailing the general and specific mitigation measures required to avoid and/or minimise impacts. The CEMP will detail the control measures, thresholds and necessary feedback mechanisms.
- General: construction compounds will be located to avoid the need for the removal of trees, hedgerows or other important vegetation, where possible.

Table H.1: WRMP19 Mitigation Register

Option Type	Element Name	Element Ref.	Construction Mitigation	Operation Mitigation
Conveyance: Raw Water System	Datchet intake increase	CON-RWS-DAT- 300	 Most disruptive construction activities to occur 1km from South West London Waterbodies SPA and Ramsar or outside winter period (Oct-Mar) Use of plant silencers and visual screening within 250m of the SPA (or offsite functional habitat). Noise assessment to be completed during the detailed design and planning/permit applications and associated HRA, prior to commencement of works to ensure mitigation measures will be effective (if not, seasonal avoidance to be used). Flood compensation may be required to negate effects of construction on the flood plain, and standard flood risk mitigations would be detailed in a CEMP. 	Sensitive design and wider landscaping through ground reprofiling and planting around the new pumping station site at Datchet would be undertaken.
Conveyance: Raw Water System	KGV Reservoir intake increase	CON-RWS-KGV- 360	 Avoid noisiest construction activities at sensitive times of the year (later summer (moult) and wintering period (Oct-Mar)). Use of landscaping bunds, plant silencers and visual screening within 250m of the SPA (or offsite functional habitat) to avoid impacts to wintering wildfowl and wetland birds. Noise assessment to be completed during the detailed design and planning/permit applications and associated HRA, prior to commencement of works to ensure mitigation measures will be effective (if not, seasonal avoidance to be used). Flood storage compensation will be provided if required to negate effects of construction 	 Sensitive design of layout and built structures to the existing pumping station will be undertaken for changes, with planting to aid integration into the landscape setting.

Option Type	Element Name	Element Ref.	Construction Mitigation	Operation Mitigation
			on the flood plain and this would be a pre- requisite to planning permission.	
Conveyance: Raw Water System	KGV to BPT south of William Girling - 300MI/d	CON-RWS-KGV- BPT	 Use of landscaping bunds, noise barriers and plant silencers to avoid impacts to Chingford Reservoirs SSSI (wintering wildfowl and wetland birds). Avoid noisiest construction activities at sensitive times of the year (later summer (moult) and wintering period (Oct-Mar)). Noise assessment to be completed during the detailed design and planning/permit applications and associated HRA, prior to commencement of works to ensure mitigation measures will be effective (if not, seasonal avoidance to be used). Flood storage compensation will be provided if required to negate effects of construction on the flood plain and this would be a prerequisite to planning permission. 	• N/A
Conveyance: Raw Water System	Littleton Intake Capacity increase transfers to Queen Mary	CON-RWS-LTN- 300	 Most disruptive construction to occur 1km from South West London Waterbodies SPA and Ramsar or outside winter period (Oct-Mar) Visual and noise screening, including plant silencers. Noise assessment to be completed during the detailed design and planning/permit applications and associated HRA, prior to commencement of works to ensure mitigation measures will be effective (if not, seasonal avoidance to be used). For flood risk adequate methods of construction will be adopted to minimise the impact. Mitigation measures will be set out in 	• N/A

Option Type	Element Name	Element Ref.	Construction Mitigation	Operation Mitigation
			applications for Flood Defence Consents (FDC) and will be agreed with the Environment Agency prior to commencement of works where these are required. Flood compensation would be required to negate effects of construction on the flood plain and this would be a pre- requisite to planning permission.	
Conveyance: Raw Water System	Queen Mary Res to Kempton WTW - 800MI/d	CON-RWS-QMR- KEM	 Most disruptive construction activities to occur 1km from South West London Waterbodies SPA and Ramsar or outside wintering bird period (Oct-Mar) Visual and noise screening, including plant silencers. Noise assessment to be completed during the detailed design and planning/permit applications and associated HRA, prior to commencement of works to ensure mitigation measures will be effective (if not, seasonal avoidance to be used). Use of appropriate backfill and clay stanks etc along pipeline route to prevent preferential flows. Shaft and site drainage and dewatering strategy to be developed. For flood risk adequate methods of construction will be adopted to minimise the impact. Mitigation measures will be set out in applications for Flood Defence Consents (FDC) and will be agreed with the Environment Agency prior to commencement of works where these are required. Flood compensation would be required to negate effects of construction on 	• N/A

Option Type	Element Name	Element Ref.	Construction Mitigation	Operation Mitigation
			the flood plain and this would be a pre- requisite to planning permission.	
Conveyance: Raw Water System	Surbiton intake capacity increase	CON-RWS-SRB	 Use of appropriate backfill and clay stanks etc along pipeline route to prevent preferential flows. Shaft and site drainage and dewatering strategy to be developed. 	• N/A
Conveyance: Raw Water System	TLT capacity enhancement – up to 450MI/d	CON-RWS-TLT	 Most disruptive construction activities to occur 1km from Lee Valley SPA and Ramsar or outside wintering bird period (Oct-Mar) Visual and noise screening, including plant silencers. Noise assessment to be completed during the detailed design and planning/permit applications and associated HRA, prior to commencement of works to ensure mitigation measures will be effective (if not, seasonal avoidance to be used). Air quality mitigation – dust suppression measures (e.g. dampening). Avoid routing construction traffic within 200m of designated sites. Use of appropriate backfill and clay stanks etc along pipeline route to prevent preferential flows. Shaft and site drainage and dewatering strategy to be developed. 	Appropriate mitigation measures to protect the underlying groundwater body during operation.
Conveyance: Raw Water System	TLT extension from Lockwood to KGV - 800MI/d	CON-RWS-LCK- KGV	 Most disruptive construction activities to occur 1km from Lee Valley SPA and Ramsar or outside wintering bird period (Oct-Mar) Visual and noise screening, including plant silencers. Noise assessment to be completed during the detailed design and planning/permit 	• N/A

Option Type	Element Name	Element Ref.	Construction Mitigation	Operation Mitigation
			 applications and associated HRA, prior to commencement of works to ensure mitigation measures will be effective (if not, seasonal avoidance to be used). Use of appropriate backfill and clay stanks etc along pipeline route to prevent preferential flows. Shaft and site drainage and dewatering strategy to be developed. Adequate methods of construction will be adopted to minimise the impact on flood risk. Mitigation measures will be set out in applications for Flood Defence Consents where these are required. 	
Conveyance: Reuse	Reuse Beckton to Lockwood 300 MLD	CON-RU-BEC- LCK	 Most disruptive construction activities to occur 1km from Lee Valley SPA and Ramsar or outside wintering bird period (Oct-Mar) Visual and noise screening, including plant silencers. Noise assessment to be completed during the detailed design and planning/permit applications and associated HRA, prior to commencement of works to ensure mitigation measures will be effective (if not, seasonal avoidance to be used). Avoid routing construction traffic within 200m of designated sites (Lee Valley SPA and Ramsar, Chingford Reservoirs SSSI, Walthamstow Reservoir SSSI). Minimise development areas within Wood-pasture and Parkland (NERC), with full reinstatement of temporary work areas. Earthworks drainage to be controlled by temporary settlement ponds. 	 Appropriate mitigation measures in place to protect the underlying groundwater body during operation. In operation and through the application of good design in consultation with Historic England and the Local Authority no long term effects on heritage assets or their setting is anticipated. In operation, trees, grassland and landscape features would be reinstated and only ancillary assets and areas of hard standing would be visible. Sensitive design of permanent hard surfacing in relation to existing land use, trees and landscape features, would aid integration of the new assets into the landscape.

Option Type	Element Name	Element Ref.	Construction Mitigation	Operation Mitigation
			 Standard bunding to be installed to prevent run-off from concreting works. All vehicles and any chemical/oil storage will be fully bunded to prevent any accidental pollution of groundwater or watercourses. The mitigation measures will be set out in the applications for Flood Defence Consents where these are required for any river construction works. Use of appropriate backfill and clay stanks etc along pipeline route to prevent preferential flows. Shaft and site drainage and dewatering strategy to be developed. Where necessary mitigation measures including flood compensation measures will be provided as well as set out in applications for Flood Defence Consents and will be agreed with the EA prior to commencement of works where these are required. Locate the shaft outside of the Grade II* Wanstead Registered Park and Garden. Carry out detailed settlement analysis and route alignment optioneering to minimise impacts to Grade II listed buildings and City of London Cemetery. 	
Conveyance: Reuse	Reuse Deephams to KGV Intake 60MLD	CON-RU-DPH- KGV	 Most disruptive construction activities to occur 1km from Lee Valley SPA and Ramsar or outside wintering bird period (Oct-Mar) Visual and noise screening, including plant silencers. Noise assessment to be completed during the detailed design and planning/permit applications and associated HRA, prior to commencement of works to ensure 	• A new consent to discharge is likely to be required. The discharge will be treated using RO and remineralisation so that the water discharged into the river will not impact the ecology.

Option Type	Element Name	Element Ref.	Construction Mitigation	Operation Mitigation
			 mitigation measures will be effective (if not, seasonal avoidance to be used). For flood risk, mitigation measures will be required to be employed as part of the design of the outfall and maintained during the operation of the facility. Mitigation measures will be set out in applications for Flood Defence Consents where these are required. For heritage, stockpiling plant or materials in sensitive locations will be avoided during construction in order to mitigate impacts. Detailed noise abatement and visual disturbance mitigation measures to be developed in co-ordination with Natural England, taking account of local site knowledge from the site managers and follow professional mitigation guidance, in particular the Waterbird Disturbance Mitigation Toolkit Informing Estuarine Planning and Construction Projects produced by the Institute of Estuarine and Coastal Studies (IECS) at Hull University. Sensitive lighting design to be developed following professional guidance to address identified risks relating to light pollution that is applicable to birds in flight, such as that developed by the Institute of Lighting Engineers (Guidance Note 8 Bats and Artificial Lighting, 2018) and others, to ensure no adverse effects on site integrity from light spill. In combination studies to be conducted to identify the key flight paths of the wintering birds that use the designated site (and 	

Option Type	Element Name	Element Ref.	Construction Mitigation	Operation Mitigation
			 associated functional habitat), and an assessment to be made of the impact of the construction activities on these key flight paths. Agreed mitigation measures to be included in the project-specific HRA of each scheme to support applications for planning permissions and environmental permits. Implementation of planning conditions and/or conditions of relevant environmental permits to be managed through contractual obligations with supervision from an Environmental Clerk of Works appointed by Thames Water 	
Conveyance: Reuse	Reuse Deephams to new TLT extension	CON-RU-DPH- TLT	 Most disruptive construction activities to occur 1km from Lee Valley SPA and Ramsar or outside wintering bird period (Oct-Mar) Visual and noise screening around perimeter of site, use of plant silencers. Noise assessment to be completed during the detailed design and planning/permit applications and associated HRA, prior to commencement of works to ensure mitigation measures will be effective (if not, seasonal avoidance to be used). Mitigation measures for flood risk will be set out in applications for Flood Defence Consents where these are required. 	 Appropriate mitigation measures in place to protect the underlying groundwater body during operation.
Network: Desalination	Desalination South Crossness to Beckton 300 MLD Didcot	NET-DES-CRO- BEC RES-DRA-DID	 Adequate methods of construction will be adopted to minimise the impact on flood risk. Mitigation measures will be set out in applications for Flood Defence Consents (FDC) and will be agreed with the Environment Agency prior to 	 Appropriate mitigation measures in place to protect the underlying groundwater body during operation.

Option Type	Element Name	Element Ref.	Construction Mitigation	Operation Mitigation
			 commencement of works where these are required, i.e. where works are within 8m of a main river. Mitigation for effects on geology and soil includes standard good construction practice and control of shaft site drainage including specific management of spoil arising from tunnel activities. Geology dependant mitigation measures to be deployed to protect the underlying geology; and reinstatement of soils with appropriate landscaping. Impacts on the structure and setting of heritage assets will be mitigated through avoidance of stockpiling plant or materials in/near sensitive locations and use of screening of contractor and development areas. 	
Network: Desalination:	Desalination North Beckton to Coppermills 150 MLD.	NET-DES-BEC- COP	 The intermediate shafts located in very close proximity (<50m) to part of Epping Forest SSSI may require specific mitigation measures to avoid adverse effects. Walthamstow Marshes SSSI; potentially disturbing construction activities will take place outside of the winter period (October to March inclusive). Noise assessment to be completed during the detailed design and planning/permit applications and associated HRA, prior to commencement of works to ensure mitigation measures will be effective (if not, seasonal avoidance to be used). Visual and noise screening, the use of plant silencers and ceasing works during 	Appropriate mitigation measures in place to protect the underlying groundwater body during operation.

Option Type	Element Name	Element Ref.	Construction Mitigation	Operation Mitigation
			 prolonged severe weather to ensure no significant effects to waterfowl populations. Minimise development areas within Wood-pasture and Parkland (NERC), with full reinstatement of temporary work areas. Avoid removal of hedgerows and complete Arboricultural Implications Assessment to ensure root protection zones are observed. Use of non-dig construction techniques to also be undertaken to minimise vegetation loss where practicable. Mitigation as part of the scheme, such as bunding to prevent run-off from concreting works, will minimise the risks to water quality. Mitigation will be set out in the applications for Flood Defence Consents where these are required for any river construction works. Use of appropriate backfill and clay stanks etc along pipeline route to prevent preferential flows. Shaft and site drainage and dewatering strategy to be developed. Sensitive design of permanent hard surfacing in relation to existing land use, trees and landscape features, would aid integration of the new assets into the landscape. 	
Network: TWRM	Barrow Hill Pump Replacement	NET-TWRM-BAR- PUM	Potential impacts on water levels, flows and abstraction will be mitigated through licence requirements.	• N/A
Network: TWRM	Coppermills New Header tank	NET-TWRM-COP- HEA	• The header tank would be located approximately 160m from the Lee Valley SPA. The proposed site is not visible from the SPA and the construction period could be phased such that it would be possible to	• During operation works regard to be given to existing Thames Water mitigation measures operating close to the SPA.

Option Type	Element Name	Element Ref.	Construction Mitigation	Operation Mitigation
			 avoid impacts to the qualifying features of the SPA (wintering birds) from this option on the basis the most disruptive construction occurred outside of the winter period (October to March inclusive). Mitigation measures such as visual and noise screening, no use of piling and use of plant silencers are to be employed. Noise assessment to be completed during the detailed design and planning/permit applications and associated HRA, prior to commencement of works to ensure mitigation measures will be effective (if not, seasonal avoidance to be used). Construction of header tank will involve loss of non-designated habitat in area to the west of the existing WTW. Mitigation includes potential habitat creation to compensate for area to the west of the site. On-site materials to be retained for landscaping purposes. For water quality potential mitigation, earthworks drainage will be controlled by temporary use of settlement ponds during construction. Standard bunding will be used to prevent run-off from concreting works, and all vehicles will be fully bunded to prevent accidental pollution of groundwater or watercourses. For flood risk, standard good practice mitigation measures during construction to be adopted including compensation mitigation measures. 	 Chemical deliveries will be via hardstanding areas which will drain to dedicated chemical spill tanks to contain accidental spills.
Network: TWRM	New Shaft at Kempton	NET-TWRM-KEM	• The closest part of the works is some 220m from the South West London Waterbodies	Landscape; sensitive design would integrate the new facility into the

Option Type	Element Name	Element Ref.	Construction Mitigation	Operation Mitigation
			 SPA/Ramsar site. It would be possible to avoid impacts to the qualifying features of the SPA (wintering birds) if the most disruptive works are conducted outside of the winter period (October to March inclusive). Regard is to be given to any existing Thames Water mitigation measures from the existing WTW site operating close to the SPA. Noise mitigation measures and use of screening are to be employed. Noise assessment to be completed during the detailed design and planning/permit applications and associated HRA, prior to commencement of works to ensure mitigation measures will be effective (if not, seasonal avoidance to be used). Earthworks drainage will be controlled by temporary use of settlement ponds during construction. Standard bunding will be used to prevent run-off, and all vehicles and any chemical/oil storage will be fully bunded to prevent accidental pollution of groundwater or watercourses. The shaft will be driven in the overburden that overlays the Lower Thames Gravels, the depth to groundwater is unknown but geology dependant mitigation measures will to be used protect the groundwater body. SAM/Grade II Listed Building (Kempton Park Pumping Station/Kempton Steam Museum) and 15 listed buildings within 1km of the WTW at Kempton; best construction practices and mitigation, including avoidance of stockpiling of plant or materials in/near this 	landscape and ground reprofiling and mitigation planting would be undertaken along the site boundaries where possible.

Option Type	Element Name	Element Ref.	Construction Mitigation	Operation Mitigation
			 location. Mitigation measures will also include an archaeological watching brief. Detailed noise abatement and visual disturbance mitigation measures to be developed in co-ordination with Natural England, taking account of local site knowledge from the site managers and follow professional mitigation guidance, in particular the Waterbird Disturbance Mitigation Toolkit Informing Estuarine Planning and Construction Projects produced by the Institute of Estuarine and Coastal Studies (IECS) at Hull University. Sensitive lighting design to be developed following professional guidance to address identified risks relating to light pollution that is applicable to birds in flight, such as that developed by the Institute of Lighting Engineers (Guidance Note 8 Bats and Artificial Lighting, 2018) and others, to ensure no adverse effects on site integrity from light spill. In combination studies to be conducted to identify the key flight paths of the wintering birds that use the designated site (and associated functional habitat), and an assessment to be made of the impact of the construction activities on these key flight paths. Agreed mitigation measures to be included in the project-specific HRA of each scheme to support applications for planning permissions and environmental permits. 	

Option Type	Element Name	Element Ref.	Construction Mitigation	Operation Mitigation
			to be managed through contractual obligations with supervision from an Environmental Clerk of Works appointed by Thames Water	
Network: TWRM	Riverhead Pump Replacement	NET-TWRM-NRV- PUM	No specific measures required.	No specific measures required.
Network: TWRM	TWRM extension - Coppermills to Honor Oak	NET-TWRM-COP- HON	 It would be possible to avoid impacts to the qualifying features of the SPA (wintering birds) if the most disruptive works are conducted outside of the winter period (October to March inclusive). Noise mitigation measures and use of screening are to be employed. Noise assessment to be completed during the detailed design and planning/permit applications and associated HRA, prior to commencement of works to ensure mitigation measures will be effective (if not, seasonal avoidance to be used). Air quality mitigation – dust suppression measures (e.g. dampening). Marine Conservation Zone; there is one intermediate shaft site within 1km of a MCZ and one just over 1km from the same MCZ. Construction mitigation includes full reinstatement of temporary work areas. To protect and enhance health and wellbeing, mitigation includes standard good construction practice and traffic management measures. Control of shaft site drainage and careful management of any required dewatering will to be applied to protect the underlying 	No specific measures required.

Option Type	Element Name	Element Ref.	Construction Mitigation	Operation Mitigation
			 groundwater body Greenwich Tertiaries and Chalk (GB40602G602500). For flood risk, mitigation measures will be set out in applications for Flood Defence Consents where these are required. Where shafts are located close to the River Thames, specific assessment is to be made to provide appropriate mitigation measures relating to possible loss of flood storage and prevent risk of tunnel flooding during construction. For geology and soils, mitigation includes standard good construction practice and control of shaft site drainage including specific management of spoil arising from tunnel activities. Geology dependant mitigation measures to be deployed to protect the underlying geology; full above ground remediation will be carried out and reinstatement of soils with appropriate landscaping. For historic environment and heritage, mitigation includes sensitive siting of the shaft site within the registered park on previously disturbed land. Specific archaeological mitigation measures may be required for identified cultural heritage assets to further reduce the potential residual adverse effects. 	
Network: TWRM	TWRM extension - Hampton to Battersea link	NET-TWRM- HAM-BAT	• Stag beetle surveys within 1km of intermediate shaft 6 and intermediate shaft 4 to check for mating pairs or egg laying. Prevent/minimise loss of broadleaved woodland and dead wood habitat.	 Appropriate mitigation measures in place to protect the underlying groundwater body during operation. The architectural design of permanent buildings will be developed further during the detailed design phase and

Option Type	Element Name	Element Ref.	Construction Mitigation	Operation Mitigation
			 Consideration should be given to locating intermediate tunnel shaft no.4 outside the boundary of Richmond Park SAC if at all possible. Mitigation includes standard good construction practice, including local traffic management to minimise nuisance to local communities but in view of the highly urban nature of the construction location, some traffic and noise nuisance cannot be avoided given the magnitude of the construction works. The shafts and tunnels will be driven in the London Clay which protects the Lower Thames Gravels (GB40603G000300). With good practice construction mitigation measures, such as dewatering of the shafts and tunnels. There will be no impact of the underlying groundwater of the London gravels. Flood risk; where shafts are located close to the River Thames, specific assessment is to be made to provide appropriate flood mitigation measures relating to possible loss of flood storage and prevent risk of tunnel flooding during construction. Geology and soils; standard good construction practice and control of shaft site drainage including specific management of spoil arising from tunnel activities. Geology dependant mitigation measures to be deployed to protect the underlying geology; full above ground remediation will be carried out and reinstatement of soils with appropriate landscaping. 	we would engage with Historic England to mitigate concerns in the final design.

Option Type	Element Name	Element Ref.	Construction Mitigation	Operation Mitigation
Raw Water Transfer	Oxford Canal to Duke's Cut Resource 15MI/d		 Construction works and delivery of materials will need to ensure no adverse effects on these sites through careful planning, HGV route identification and mitigation. For resource efficiency, all dug material will be retained on site and reused where practicable to reduce HGV movements. For water quality, control of shaft site drainage will be included as part of the mitigation measures, including specific management of spoil arising from tunnel activities. Geology dependant mitigation measures will ensure no risk of deterioration in WFD status. For geology and soils, the scheme would not directly affect any sites designated for geological interest but Napton Hill SSSI within 1km of pumping station has geological interest and careful management of the construction site will be needed to ensure no direct or indirect (e.g. through excavations or vehicle access) effects. Good practice construction of the option elements to protect and reinstate soils once the work has been completed. 	 Ongoing water quality monitoring of the canal and its source water would be carried out during operation so that potential risks can be monitored. For landscape, sensitive kiosk design, built finish and location should be considered in relation to setting of listed buildings.
Raw Water Transfer	Raw Water Transfer Deerhurst to Culham 300MI/d	CON-RWT-DEH- CLM-300.	 Ancient woodland/wood pasture; Arboricultural Implications Assessment to assess risks and put in place applicable tree retention and protection measures to ensure construction activities avoids any adverse effects on supporting root structures. In proximity to Ancient Woodland locations, where soil stripping is to be undertaken, the 	 Inclusion of the hands-off flow condition in the abstraction licence at Deerhurst would protect flows to the Severn Estuary and mitigation in the form of intake screens would guard against potential mortality of fish through abstraction. During operation, the abstracted water from River Severn at Deerhurst would

Option Type	Element Name	Element Ref.	Construction Mitigation	Operation Mitigation
			 soils are to be stored and reinstated following construction in order to maintain seedbanks. Public health and well-being; standard good practice methods such as use of plant silencers, damping down of workings, temporary site screening measures and use of wheel wash equipment, approved traffic routes, and diversions of public rights of way. River crossings (e.g. River Colne); use of trenchless crossings to minimise potential impacts. The mitigation measures will be enshrined in conditions set out in the Flood Defence Consents where these are required for the river crossing construction works. Flood risk; dewatering and treatment of the groundwater prior to discharge (in line with discharge permit conditions). Flood Defence Consents will also be obtained in all areas where works are in or within 8m of a main river. Flood compensation ponds will be constructed as part of the enabling works. Earthworks sequencing will include coffer dam formation to avoid flooding of borrow areas during construction. Historic environment and heritage; avoid permanent disturbance to the setting of any designated assets in close proximity. The excavation required for scheme construction is large and therefore represents a risk with respect to unknown buried assets. A watching brief, surveys and investigation would minimise risk of harm to such unknown assets. Mitigation also includes minimising the impact on the settings of existing heritage features such as Deerhurst Priory 	 be discharged into the River Thames at Culham, which has been carefully selected as the discharge location to minimise any adverse effects on the river environment. The abstracted water will be pre-treated to address water quality risks and risks of the spread of INNS. For water quality, the discharge will be treated to environmental standards therefore there will be a low risk of impacting the physico-chemical quality elements of these River Thames water bodies. The risk to a change in WFD chemical status is considered low, although the treatment works mitigation measures will not remove some organic pollutants that are difficult to treat (such as metaldehyde). Hedgerows, trees, fields and walls would be retained wherever possible or would be reinstated following the construction period.

Option Type	Element Name	Element Ref.	Construction Mitigation	Operation Mitigation
			and Wightfield Manor, through the use of screening and avoiding stockpiling in these more sensitive locations.	
Raw Water Transfer	Raw Water Transfer Deerhurst to Culham 400MI/d	CON-RWT-DEH- CLM-400.	As above	As above
Raw Water Transfer	Raw Water Transfer Deerhurst to Culham 500MI/d	CON-RWT-DEH- CLM-500.	As above	As above
Resource: Aquifer Recharge	AR Merton (SLARS3) - 5 MLD	RES-AR-SLARS3	 For surface and groundwater levels and flows, drilling and test pumping of the proposed abstraction borehole will be required in order to determine whether there are any impacts on existing abstractions. For sustainable management of abstraction, drilling and test pumping of the proposed abstraction borehole will be required in order to determine whether there are any impacts on existing abstractions. Potential mitigation measures for impacts on existing abstractions include lowering of pumps, deepening boreholes, replacement boreholes, and provision of mains water supply. 	 For landscape, sensitive design of buildings and structures would aid integration of the new assets. At the borehole site, mitigation planting would aid integration of the new asset into the landscape.
Resource: Aquifer Recharge	AR Merton (SLARS3) - 5 MLD	RES-AR-SLARS2	 For surface and groundwater levels and flows, drilling and test pumping of the AR borehole will be required in order to determine whether there are any impacts on existing abstractions and on surface water bodies. To ensure sustainable management of abstractions, a water features survey will be necessary to identify all private abstractions and surface water bodies which may be 	Landscape; the proposed scheme would be within the context of the waterworks pumping station and sensitive design and landscape treatment would be required to ensure the setting of the building was not adversely affected by the new WTW assets, including tree planting, selection of appropriate and complimentary

Option Type	Element Name	Element Ref.	Construction Mitigation	Operation Mitigation
			 impacted by the option and assess the likely cost of works to ensure there is no derogation of supplies. Potential mitigation measures for impacts on existing abstractions could include any of the following: lowering of pumps; deepening boreholes; replacement boreholes; and provision of mains water supply. Heritage; close liaison with English Heritage and local conservation groups prior to works commencing and through sensitive development and screening of contractor and development areas. 	building materials and colours and hard landscape treatment.
Resource: Aquifer Recharge	ASR South East London (Addington) - 13MLD		No specific measures required	No specific measures required
Resource: Aquifer Recharge	ASR Thames Valley/Thames Central - 1 MLD	RES-ASR-TV	•	• For landscape, there would be opportunities for further mitigation planting to the site boundaries to enhance existing screening, which would be beneficial along Charlton Road.
Resource: Desalination	Desalination South Crossness RO Treatment Plant 100 MLD	RES-DES-CRO	 Mitigation measures include fish screens on the pumps, fish deterrent, raw water quality monitoring and anti-fouling chlorine dioxide dosing. Brine from the process will be discharged and mixed with the final effluent discharge at Crossness STW. The salinity of the final effluent discharge is expected to be less than the River Thames (roughly 40%). Waste water from the desalination process, except RO brine, is to be returned and treated within the Crossness STW. 	 To avoid introduction or spread of INNS, in operation water will be abstracted and treated at the desalination plant. Treated water is to be piped to Coppermills WTW and put into local supply. The waste streams will be treated and discharged to the Thames Estuary. Drainage water from the operational desalination plant site will be subject to treatment as required to avoid potential pollution.

Option Type	Element Name	Element Ref.	Construction Mitigation	Operation Mitigation
			 Earthworks drainage to be controlled by the temporary use of settlement ponds. All vehicles and any chemical/oil storage will be fully bunded to prevent any accidental pollution of groundwater or watercourses. As identified by the WFD assessment, any potential impacts associated with the construction of the tunnel will likely be mitigatable through the adoption of best practice and through licencing. For flood risk, mitigation measures will be set out in applications for Flood Defence Consents (FDC) and will be agreed with the Environment Agency prior to commencement of works where these are required, i.e. where works are within 8m of a main river. Heritage; liaison with Historic England and local conservation groups prior to works commencing. Impacts on the structure and setting of heritage assets will be mitigated through avoidance of stockpiling plant or materials in/near sensitive locations and use of screening of contractor and development areas. 	 Sensitive design of the site layout, structures and buildings, in conjunction with mitigation planting to the site boundaries and ground reprofiling where appropriate in the floodplain, would screen views of the new facility and in the long term.
Resource: Desalination:	Desalination North Beckton RO Treatment Plant	RES-DES-BEC	 The development areas are to be minimised. Where soil stripping is undertaken the soils are to be stored and reinstated following construction. Use of non-dig construction techniques to also be undertaken to minimise vegetation loss where practicable. For public health and well-being; supplementary planting where necessary and temporary construction compounds will 	 During operation mitigation measures include fish screens on the pumps, fish deterrent, raw water quality monitoring and anti-fouling chlorine dioxide dosing. Brine from the process will be discharged and mixed with the final effluent discharge at Beckton STW. To avoid introduction or spread of INNS in operation, water will be abstracted and treated at the desalination plant.

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			 be sited away from residential areas, where practicable. Earthworks drainage to be controlled by the temporary use of settlement ponds. All vehicles and any chemical/oil storage will be fully bunded to prevent any accidental pollution of groundwater or watercourses. As identified by the WFD assessment, any potential impacts associated with the construction of the tunnel will likely be mitigatable through the adoption of best practice and through licencing. For flood risk, mitigation measures will be set out in applications for Flood Defence Consents (FDC) and will be agreed with the Environment Agency prior to commencement of works where these are required, i.e. where works are within 8m of a main river. 	 Treated water is piped to Coppermills WTW and put into local supply. The waste streams will be treated and discharged to the Thames Estuary via Beckton STW. Drainage water from the operational desalination plant site will be subject to treatment as required to avoid potential pollution. For landscape, mitigation planting to the site boundaries would be carried out to screen views of the site and in the long term, 15 years after initial operation, areas of planting would mature and integrate the facility into the landscape.
Resource: Groundwater	AR SLARS Kidbrooke (SLARS1) – 7 MLD	RES-AR-SLARS1- 7	 Pipeline construction could affect aquatic biodiversity, such as through the requirement to cross the River Quaggy (in proximity to Sutcliff Park LNR). These effects would be mitigated as far as possible by sensitive routing of the pipelines, using river crossing methods (e.g. directional drilling) that minimise disturbance to the river channel and timing of works. To ensure sustainable management of abstractions, a monitoring programme will be undertaken during test pumping to check potential impacts on groundwater resources. For landscape, advance landscape works including construction of screen mounds to the proposed site boundary, would mitigate 	 For landscape, in operation, the proposed scheme would be a prominent new feature causing a change in outlook from the residential properties. Sensitive design of buildings, layout and landscape around the new WTW would aid screening of the site through mounding, extensive planting and strategic location of landscape elements.

Option Type	Element Name	Element Ref.	Construction Mitigation	Operation Mitigation
-			some disturbance to receptors from the construction works, by screening views at lower levels.	
Resource: Groundwater	Groundwater - Moulsford 1 - 3.5 MLD	RES-GW-MOU	 Construction work in proximity to the River Thames associated with the pipeline to the Cleeve WTW presents potential for adverse impacts to riparian habitat. These effects would be mitigated as far as possible by use of directional drilling under the River Thames. For natural capital and ecosystem services, use of directional drilling is proposed for main river and rail crossings. For waste minimisation and resource efficiency, mitigation measures include retaining suitable surplus spoil within the working easement with agreement from the landowners and occupiers. The effects on water levels and flows on the Chiltern Chalk Scarp are unknown as this is a new source which has not been constructed and abstractions verified. Mitigation measures will include test pumping of the proposed abstraction borehole with the results of the test pumping exercise being submitted to the Environment Agency in support of an application for a new abstraction licence. There is risk of impacting on the flows in one dependent water body the Thames Wallingford to Caversham. To mitigate these risks the abstraction would operate within licenced limits. Control of earthworks drainage including use of temporary settlement ponds will be implemented if required. Measures to protect 	 The site is also some 600 m north of Streatley Meadows, a Site of Nature Conservation Importance (SNCI), the operation of the scheme within set abstraction levels will mitigate impacts on this designated site. Sensitive design and screening of the borehole site would include boundary planting to aid integration into the landscape setting.
Option Type	Element Name	Element Ref.	Construction Mitigation	Operation Mitigation
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			 bare soil from runoff during heavy rainfall events will be implemented. To ensure sustainable management of abstractions, any potential impacts on groundwater abstractors would be identified through test pumping. For flood risk, construction activities may be at risk from flooding and also remove a portion of the functional floodplain. Mitigation measures include possible provision of compensation areas. 	
Resource: Groundwater	Groundwater Addington - 1 MLD	RES-GW-ADD	 It is proposed that the pond should be monitored and the impacts assessed during test pumping. For water levels and flows, it is proposed that the pond should be monitored, and the impacts assessed during test pumping. Mitigation measures will include drilling and test pumping of the proposed abstraction borehole with the results of the test pumping exercise being submitted to the Environment Agency in support of an application for a new abstractions that may be impacted by the proposal and assess the likely cost of works to ensure there is no derogation of supplies. Potential mitigation measures for impacts on existing abstractions include: lowering of pumps; deepening boreholes; replacement boreholes; and provision of mains water supply. 	• N/A

Option Type	Element Name	Element Ref.	Construction Mitigation	Operation Mitigation
Resource: Groundwater	Groundwater Arla Foods Licence Trading/Transfer - 2 MLD	RES-GW-ARF	 For resource efficiency and waste minimisation, existing infrastructure will be used where possible and all suitable surplus soil from open cut pipeline trench excavation will be retained within the working easement. For water levels and flows, test pumping is to be undertaken and abstractions to be within existing licence limits and subject to agreement with the Environment Agency. To ensure sustainable management of abstractions, abstractions would be controlled through licensing, and informed by test pumping. This would ensure that abstractions for the scheme are sustainable. 	• N/A
Resource: Groundwater	Groundwater Dapdune Licence Disaggregation - 2.2 MLD	RES-GW-DAP	• To avoid adverse impact on surface and groundwater levels and flows, the scheme would only operate within its licenced limits.	• N/A
Resource: Groundwater	Groundwater Datchet 5.7 MLD	RES-GW-DAT	 For sustainable abstraction management, if impacts on groundwater users do occur, potential mitigation measures include lowering the pumps and deepening the boreholes operated by the impacted groundwater users. 	 To avoid adverse impact on surface and groundwater levels and flows during operation, any impacts on local abstractors due to the increase in abstraction rates will be managed through liaison with stakeholders. Potential mitigation measures include lowering pumps and deepening boreholes.
Resource: Groundwater	Groundwater London confined Chalk (north) - 2 MLD	RES-GW-LCC	 For resource efficiency and waste minimisation, it is anticipated that the arisings from the proposed boreholes will be disposed of off-site. For water levels and flows, as part of the scheme extensive pumping tests will be undertaken, and an observation borehole will be constructed to monitoring changes in 	• Water quality; during operations a break tank is to be provided at the WTW to prevent any backflow into the boreholes. Drainage water from the operational area will be disposed of appropriately to avoid pollution. Any chemical/oil/fuel storage will be fully bunded to prevent any accidental

Option Type	Element Name	Element Ref.	Construction Mitigation	Operation Mitigation
			 groundwater levels. Mitigation measures will include drilling and test pumping of the proposed abstraction borehole with the results of the test pumping exercise being submitted to the Environment Agency in support of an application. Control of earthworks drainage including use of temporary settlement ponds will be implemented if required. Measures to protect bare soil from runoff during heavy rainfall events will be implemented. Pipeline commissioning to be undertaken with treated water. Abstractions; a water features survey will be necessary to identify all of the private abstractions that may be impacted by the proposal and assess the likely cost of works to ensure there is no derogation of supplies. Drilling and test pumping of the proposed abstraction borehole will be required in and the results of the test pumping exercise will be submitted to the Environment Agency in support of an application for a new abstractions include: lowering of pumps; deepening boreholes; replacement boreholes; and provision of mains water supply. For landscape, views of construction of the pipeline through the playing fields by sensitive receptors would be available along the route; distinctive landscape features of trees and hedgerows would be avoided, retained and protected where possible. 	 pollution of groundwater or watercourses. Landscape; sensitive design of built form, selection of building materials complimentary to the adjacent architecture and hard and soft landscape treatment would integrate the new feature into the context of the existing land-uses. The pipeline route would be buried and playing fields reinstated, with only low level pipeline accessories visible above ground and strategically placed to minimise disturbance to the sports fields.

Option Type	Element Name	Element Ref.	Construction Mitigation	Operation Mitigation
Resource: Groundwater	Groundwater Mortimer disused source (recommission) - 4.5 MLD	RES-GW-MOR	 For resource efficiency and waste minimisation, it is envisaged that all suitable spoil arising from earthworks will be retained on site. To ensure sustainable management of abstractions, any impact could be mitigated by minimising the duration of peak period abstraction. 	 Water levels and flows; any impacts on local abstractors due to the increase in abstraction rates will be managed through liaison with stakeholders. Potential mitigation measures include lowering pumps and deepening boreholes. Abstractions are to remain within licence limits for the site. Landscape; sensitive design, selection of building materials and colours and planting to the site boundaries would integrate the new feature into the landscape through planting to the site boundaries and forming new connections to existing hedgerows
Resource: Groundwater	Groundwater Southfleet/Greenhithe (new WTW) - 8 MLD	RES-GW-SOU	 For resource efficiency and waste minimisation, in line with standard practice, all suitable surplus spoil from the pipeline works is to be retained within the working easement. In the event that a new abstraction licence is needed a test pumping exercise would be undertaken and the results of which will be submitted to the Environment Agency. Control of earthworks drainage including use of temporary settlement ponds will be implemented if required. Measures to protect bare soil from runoff during heavy rainfall events will be implemented. Pipeline commissioning to be undertaken with treated water. For heritage, close liaison with English Heritage and local conservation groups will be required prior to the works commencing. 	 For water quality, during operations a break tank is to be provided at the WTW to prevent any backflow into the boreholes.

Option Type	Element Name	Element Ref.	Construction Mitigation	Operation Mitigation
			 For landscape, mitigation measures will include existing landscape features such as trees and hedgerows being retained and protected as far as practicable to minimise impact on landscape character and visual amenity and loss of vegetation. In addition, careful consideration to be given to materials used in the development of the WTW to minimise visual impacts. 	
Resource: Groundwater	Merton Recommissioning	RES-RC-MTN	 For natural capital and ecosystem services, works to be located within an existing and operational WTW. For water levels and flows, to minimise the risks associated with recommissioning the disused well, test pumping and water quality testing of the source will be carried out. Control of earthworks drainage including use of temporary settlement ponds will be implemented if required. Measures to protect bare soil from runoff during heavy rainfall events will be implemented. To ensure sustainable management of abstractions, abstractions would be controlled through licensing, and informed by test pumping. For landscape, existing landscape features such as trees and hedgerows will be retained and protected as far as practicable to minimise impact on landscape character and visual amenity and loss of vegetation. 	 For water quality, during operations a break tank is to be provided at the WTW to prevent any backflow into the boreholes.
Resource: Inter-Company Transfers	SEW to GUI 10 MLD (Hogsback-Mount)	RES-ICT-SEW- GUI-MNT-10	Every effort will be made to ensure the final pipeline route minimises the need for the removal of any trees, hedgerows or other	For public health and well-being, operational noise impacts should be effectively mitigated using noise

Option Type	Element Name	Element Ref.	Construction Mitigation	Operation Mitigation
			 important vegetation, or adverse effect on supporting root structures. Due to the proximity of construction sites to residential properties and location in the AONB, mitigation measures for the construction activities would be set out in a detailed CEMP. Use of pipejacking to be adopted under main roads as well as screening of development activities, approved traffic routes for construction traffic and limiting working hours. Careful consideration will be given to building materials. For resource efficiency and waste minimisation, any materials excavated during the construction works will be retained on site and reused where practicable. This will minimise waste generation and encourage its reuse. For heritage, the proposed pipeline route runs in close proximity (~110m) to a scheduled monument. Impacts on these features and their settings will be mitigated through avoidance of stockpiling plant or materials in/near these locations and use of screening of contractor and development areas. For landscape, the majority of trees on the route would be retained and protected, retaining distinctive landscape features. The extension of the reservoir site to the west would require sensitive design, scale of site layouts, treatment of buildings and landscaping to ensure the site is integrated 	insulation and enclosing such plant within buildings.

Option Type	Element Name	Element Ref.	Construction Mitigation	Operation Mitigation
			into the landscape and does not affect the setting of the AONB.	
Resource: Inter-Company Transfers	WESSEX to SWOX 2.9 MLD (Flaxlands)	RES-ICT-WSX- FLX	 The works at Charlton and Minety are in proximity to residential properties; mitigation may include screening of development activities, approved traffic routes for construction traffic and limiting working hours. Vehicle movements would be managed to avoid peak hours on local roads in order to minimise traffic impacts. For resource efficiency and waste minimisation, any materials excavated during the construction works will be retained on site and reused where practicable. This will minimise waste generation and encourage its reuse. For flood risk, although land required for construction and operation of permanent works at Charlton WTW will all be located within the existing Charlton WTW site boundary, a flood risk assessment will still need to be undertaken and compensatory flood measures implemented to mitigate any impacts Topsoil and sub-soil strip to be stored in a way to minimise impact on natural drainage flow paths with particular attention to flood plains. Construction compounds sited sensitively away from any flood risk zones where possible. Measures to protect bare soil from runoff during heavy rainfall events. 	 For public health and well-being, operational noise impacts should be effectively mitigated using noise insulation and enclosing such plant within buildings. For landscape, the extension of the Minety site would require sensitive design, treatment of buildings and landscaping to ensure the sites is integrated into the landscape and creates an opportunity to improve screening at the existing site
Resource: Inter-Zonal Transfers	Henley to SWOX 2.4 MLD	RES-IZT-HEN- SWX-NET-2.37	• Consultation with Natural England and the LPA will be undertaken prior to the works commencing in order to agree suitable	• For public health and well-being, in operation traffic is expected to be limited to small operations vans occasional maintenance works. The

Option Type	Element Name	Element Ref.	Construction Mitigation	Operation Mitigation
			 mitigation measures for the works in close proximity to areas of ancient woodland. Furthermore, the width of the easement in areas of ancient woodland will be reduced from the 25m width proposed in general. For resource efficiency and waste minimisation, any materials excavated during the construction works will be retained on site and reused where practicable. This will minimise waste generation and encourage its reuse. To enhance the ecosystem services function of land, soil and geology, measures such as re-instating top soil and laying the pipeline within the road will provide some mitigation where part of the pipeline runs through an area of Ancient Woodland. 	 CDR identifies that such regular traffic movements are to be managed to avoid peak hours on local roads in order to minimise traffic impacts. Operational noise impacts should be effectively mitigated using noise insulation and enclosing such plant within buildings. For landscape, in operation, fields boundaries and planting would be reinstated, with only above ground assets to the pipeline visible, with these located to the boundaries of fields wherever possible. Due to the proximity of option to heritage properties and location in the AONB, careful consideration will be given to building materials. For landscape, the extension of the SR site into adjacent fields would require sensitive design, scale of site layouts, treatment of buildings and landscaping to ensure the sites is integrated into the landscape and does not affect the setting of the adjacent Registered Park and Gardens and the AONB.
Resource: Inter-Zonal Transfers	Kennet Valley to SWOX 2.3 MLD	RES-IZT-KEN- SWX-CLV-2.3	 The expected vehicle movements associated with this scheme are predominately related to works at the WTW sites that are distant from the designated SAC. Mitigation measures include minimising vehicle movements close to designated sites with any locations within 200m of the SAC being limited to temporary pipeline works only. Pipejacking is proposed to mitigate potential impacts on Ancient Woodland and river 	• Landscape; field boundaries and planting would be reinstated, with only above ground assets to the pipeline visible, with these located to the boundaries of fields wherever possible.

Option Type	Element Name	Element Ref.	Construction Mitigation	Operation Mitigation
			 crossings. Prior discussions with Natural England will be required in order to agree on shaft location and site specific mitigation measures. Due to the proximity of construction sites to residential properties and location in the AONB, careful consideration will be given to traffic routes for construction traffic, limiting working hours and choice of building materials. Resource efficiency and waste minimisation; any materials excavated during the construction works will be retained on site and reused where practicable, thereby minimising waste generation and encouraging reuse. Flood risk; pipeline route and shaft locations for directional drilling under the River Thames are located in flood zones 2 and 3, as is the proposed location of the pumps at Pangbourne. For these sites, appropriate compensatory measures will be put in place to mitigate any impacts which will be agreed with the Environment Agency prior to works commencing. Topsoil and sub-soil strip to be stored in a way to minimise impact on natural drainage flow paths with particular attention to flood plains. Construction compounds sited sensitively away from any flood risk zones where possible. Measures to protect bare soil from runoff during heavy rainfall events. For landscape, the route also runs close to and under sections of Ancient Woodland. Disturbance to these distinctive landscape 	

Option Type	Element Name	Element Ref.	Construction Mitigation	Operation Mitigation
Resource: Inter-Zonal	Kennet Valley to SWOX 6.7 MLD	RES-IZT-KEN- SWX-CLV-6.7	 features is expected to be minimised by laying the pipeline in line with existing road and fields and using pipejacking to bury the pipe at a sufficient depth to avoid tree roots. Basildon Park lies 80m to the west of the route where it passes through Beale Wildlife Park and measures would be taken to avoid permanent disturbance to the setting of this designated landscape and visitor attraction. The compound location and pipeline construction would be a prominent although temporary feature in the landscape visible from the extensive PROW network. The majority of trees along the route would be retained and protected, to minimise impacts on the landscape and nearby sensitive receptors Sensitive recreational and residential receptors would be expected to have views of the pipeline route and built structures during construction, however the Pangbourne site does benefit from existing screening. The balance tank at Cleeve WTW would require sensitive design, ground profiling and planting to ensure the site is integrated into the landscape. As above 	As above
Resource: Inter-Zonal Transfers	Henley to SWA 2.4 MLD	RES-IZT-HEN- SWA-HAM	 Non-designated habitats; habitat fragmentation mitigated through best practice construction methods and employing ecological surveys pre- construction. The scheme involves the crossing of the River Thames which requires 	• Field boundaries and planting would be reinstated, with only above ground assets to the pipeline visible, with these located to the boundaries of fields wherever possible.

Option Type	Element Name	Element Ref.	Construction Mitigation	Operation Mitigation
			 specific mitigation measures including use of pipe jacking. Due to the proximity of construction sites to residential properties and location in the AONB, careful consideration will be given to traffic routes for construction traffic, limiting working hours and the choice of building materials. In addition, pipe jacking is proposed for major A road crossings to minimise impacts Any materials excavated during the construction works will be retained on site and reused where practicable. This will minimise waste generation and encourage its reuse. Earthworks drainage will be controlled by temporary use of settlement ponds during construction For flood risk, appropriate compensatory measures will be put in place to mitigate any impacts which will be agreed with the Environment Agency prior to works commencing. To mitigate impacts on landscape and heritage, the majority of trees along the route would be retained and protected. Sensitive recreational and residential receptors would be expected to have views of the pipeline route and built structures during construction, however, sensitive design, ground profiling and planting to ensure the sites are integrated into the landscape can mitigate this. 	

Option Type	Element Name	Element Ref.	Construction Mitigation	Operation Mitigation
Resource: Raw water transfer support	Raw Water Transfer Mythe 15MI/d (London only)	RES-RWTS-MYT	No specific measures required.	No specific measures required.
Resource: Raw water transfer support	Raw Water Transfer: Upper Severn - Vyrnwy Reservoir 180MI/d (London only)	RES-RWTS-VYR		 Mitigation measures will be in place to address the potential risk of low dissolved oxygen saturation in the discharge water and operational rules will be established to ensure gradual reservoir release start-up and shut-down to avoid sudden changes in flow velocities. Additional flow releases from the Lake Vyrnwy Reservoir have the potential to affect individuals, land and properties immediately downstream of the reservoir. Mitigation measures would be included in the operating controls to ensure that discharge cannot be made from the reservoir when river flows/levels are elevated so as not to increase flood risk. For geomorphology, geology and soils, the risks of scour and erosion would be mitigated by both operational controls to gradually increase the flow release over a period of days and through measures to dissipate the energy of the release immediately downstream of the am).
Resource: Raw water transfer support	Upper Severn - Vyrnwy Reservoir 148MI/d	RES-RWTS-VYR	As above	As above
Resource: Raw water transfer support	Upper Severn - Vyrnwy Reservoir 60MI/d	RES-RWTS-VYR	As above	As above

Option Type	Element Name	Element Ref.	Construction Mitigation	Operation Mitigation
Resource: Removal of Constraints	Eton removal of constraints to DO - 1.3 MLD	RES-RC-ETN	 To ensure sustainable management of abstractions, if impacts on groundwater users do occur potential mitigation measures include liaison with stakeholders as well as lowering existing pumps and deepening existing boreholes. The existing flood risk assessment for Datchet WTW would be reviewed and updated prior to commencement of construction activities. Construction activities and earthmoving would be visible from sensitive recreational receptors from the PRoW running to the west of the site, however sensitive residential receptors would not be expected to have views of the construction works and screening measures would be employed. 	• N/A •
Resource: Removal of Constraints	Ladymead WTW removal of constraints to DO - 7.8 MLD	RES-RC-LAD	No specific mitigation measures required.	
Resource: Removal of Constraints	RC Ashton Keynes borehole pumps - 2.5 MLD	RES-RC-ASH	No specific mitigation measures required.	• Mitigation measures will be reviewed as part of planned investigations by Thames Water in AMP7.
Resource: Removal of Constraints	RC Dapdune removal of constraints to DO - 3.2 MLD	RES-RC-DAP	No specific mitigation measures required.	
Resource: Removal of Constraints	RC East Woodhay borehole pumps - 2.1 MLD	RES-RC-EWO	No specific mitigation measures required.	
Resource: Reservoir	South East Strategic Reservoir 100Mm3	RES-RRR-ABI- 100Mm3	• Loss of non-designated terrestrial (priority habitats); best construction practices to mitigate effects due to construction including identification of suitable traffic routes. Further construction mitigation includes: site specific	• Further assessment of the water quality of the releases is required to better understand potential impacts to downstream watercourses.

Option Type	Element Name	Element Ref.	Construction Mitigation	Operation Mitigation
			 ecological assessments prior to commencement of works; the minimisation of loss of existing trees; the provision of habitat provision in landscaped areas; creation of aquatic habitats; and provision of compensatory habitats Public health and well-being; agreement of HGV routes and working hours (having regard to new housing allocations), the creation of landscaping bunds around the perimeter of the works at the start of construction as well as the undertaking of regular monitoring at sensitive receptors and undertaking to provide prior notification of high noise activities. Water levels and flows; mitigation measures will be set out in any applications for Flood Defence Consents where these are required for any river construction works. Water quality; diversion of watercourses, standard good practices to avoid pollution of watercourses and control of earthworks drainage. Consents will be obtained from the Environment Agency for any in river works. Watercourse diversions are to be designed using a 'naturalised' form to enhance water quality. Flood risk; flood compensation for loss of flood storage will be provided close to proposed reservoir site. Mitigation includes the provision of 80.9ha flood compensation areas for loss, construction good practice and construction area to be sited away from flood areas. In addition, it is proposed that earthworks sequencing is undertaken to 	 Discharge from the reservoir to the River Thames to regulate river flows will be subject to a discharge permit granted by the Environment Agency. For landscape, over the long term, 15 years after initial operation, planting would mature and aid integration of the reservoir into the landscape and the setting of the North Wessex Downs AONB. Sympathetic design and landscaping would mitigate against some adverse effects of a new feature in the landscape.

Option Type	Element Name	Element Ref.	Construction Mitigation	Operation Mitigation
			 include cofferdam formation to avoid flooding of the borrow area during construction. During future design development, further work will be needed to confirm floodplain compensation requirements and this should acknowledge any actual new housing developments and any potential remaining housing allocations contained in the Local Plan. Heritage; mitigation includes siting of temporary and permanent works to minimise impacts on settings. Archaeological remains will be impacted by the construction of the reservoir. Further meetings will be held with Historic England and Oxfordshire County Council to confirm mitigation measures as part of the detailed design process. Mitigation measures will include review of previous desk based and field studies, further targeted field evaluations and targeted excavations alongside watching briefs during overburden stripping where archaeology has been identified Landscape; limiting embankment heights and the steepness of the side slopes. While landscape elements would be lost during construction, sensitive design and landscape treatment around the new reservoir would integrate the new feature into the wider landscape through ground reprofiling, extensive planting, forming new hedgerow and woodland links and grassland. New opportunities would be created for improved access, recreation and amenity provision across the area of the reservoir. 	

Option Type	Element Name	Element Ref.	Construction Mitigation	Operation Mitigation
Resource: Reservoir	South East Strategic Reservoir 125Mm3	RES-RRR-ABI- 125Mm3	As above	As above
Resource: Reservoir	South East Strategic Reservoir 150Mm3	RES-RRR-ABI- 150Mm3	As above	As above
Resource: Reservoir	South East Strategic Reservoir 30+100Mm3 Phase 2	RES-RRR-ABI- 80+42Mm3-P1	As above	As above
Resource: Reservoir	South East Strategic Reservoir 30+100Mm3 Phase 2	RES-RRR-ABI- 80+42Mm3-P1	As above	As above
Resource: Reservoir	South East Strategic Reservoir 75Mm3	RES-RRR-ABI- 75Mm3	As above	As above
Resource: Reservoir	South East Strategic Reservoir 80+42Mm3 Phase 1	RES-RRR-ABI- 80+42Mm3-P1	As above	As above
Resource: Reservoir	South East Strategic Reservoir 80+42Mm3 Phase 2	RES-RRR-ABI- 80+42Mm3-P2	As above	As above
Resource: Reuse	Reuse Beckton 100 MLD	RES-RU-BEC-100	 SINC habitat; minimise the development area and full reinstatement of temporary work areas. Where soil stripping is undertaken the soils are to be stored and reinstated following construction. Avoid removal of any trees, hedgerows or other important vegetation where possible and undertake Arboricultural Implications Assessment. During construction, earthworks drainage will be controlled by the temporary use of settlement ponds and standard bunding will be installed to prevent run-off from concreting works. All vehicles and any chemical/oil storage will be fully bunded to 	• For landscape, in operation, the proposed scheme will be linked to the existing Beckton STW to the south, however mitigation planting to the site boundaries would increase levels of planting at the site to help screen adverse views and, in the long term, these areas of planting would mature and integrate the facility into the local landscape.

Option Type	Element Name	Element Ref.	Construction Mitigation	Operation Mitigation
			 prevent any accidental pollution of groundwater or watercourses. Flood risk; construction in the flood plain may require flood plain compensation measures but as this is a within the "defended" reach of the Tideway from fluvial/estuarine flooding, this may not be necessary subject to agreement with the EA. Landscape; all construction works are proposed on brownfield land, however, some areas of vegetation would be removed with available land for mitigation planting limited to the north and east by the watercourse and by existing development to the west. 	
Resource: Reuse	Reuse Beckton 150 MLD	RES-RU-BEC-150	As above	As above
Treatment: London	Coppermills WTW extension 100 MLD	WTW-LON-COP- 100	 Wintering birds; avoid impacts if the most disruptive construction activities occurred outside of the winter period (October to March inclusive). Visual and noise screening, no use of piling and use of plant silencers Noise assessment to be completed during the detailed design and planning/permit applications and associated HRA, prior to commencement of works to ensure mitigation measures will be effective (if not, seasonal avoidance to be used). Air quality mitigation – dust suppression measures (e.g. dampening). Habitat creation to compensate for the area to the west of the site that will be used for the temporary compound and reinstatement of land following construction. 	 During operational activity will be contained within the existing WTW site boundary and existing Thames Water mitigation measures for operating close to the SPA will be adhered to. During construction loss of open space will result, this area will be reinstated following the construction period. In operation, the proposed scheme would be adjacent to the existing WTW and visually contained by existing planting to the east and A316. Sensitive design would integrate the new facility into the landscape through ground reprofiling and mitigation planting to the southern boundary. Over the long term, areas of planting would mature and enhance existing features of hedgerows, woodlands and

Option Type	Element Name	Element Ref.	Construction Mitigation	Operation Mitigation
			 Earthworks drainage will be controlled by temporary use of settlement ponds during construction. Any diversions of watercourses are to be agreed with the EA to ensure no deterioration of status and no adverse effects on river environment. Detailed noise abatement and visual disturbance mitigation measures to be developed in co-ordination with Natural England, taking account of local site knowledge from the site managers and follow professional mitigation guidance, in particular the Waterbird Disturbance Mitigation Toolkit Informing Estuarine Planning and Construction Projects produced by the Institute of Estuarine and Coastal Studies (IECS) at Hull University. Sensitive lighting design to be developed following professional guidance to address identified risks relating to light pollution that is applicable to birds in flight, such as that developed by the Institute of Lighting Engineers (Guidance Note 8 Bats and Artificial Lighting, 2018) and others, to ensure no adverse effects on site integrity from light spill. In combination studies to be conducted to identify the key flight paths of the wintering birds that use the designated site (and associated functional habitat), and an assessment to be made of the impact of the construction activities on these key flight paths. 	trees, aiding screening to the south and integrating the facility into the landscape.

Option Type	Element Name	Element Ref.	Construction Mitigation	Operation Mitigation
Treatment:	Coppermills WTW	WTW-LON-COP-	 Agreed mitigation measures to be included in the project-specific HRA of each scheme to support applications for planning permissions and environmental permits. Implementation of planning conditions and/or conditions of relevant environmental permits to be managed through contractual obligations with supervision from an Environmental Clerk of Works appointed by Thames Water 	As above
London	extension 150 MLD	150		
Treatment: London	Kempton WTW new 100 MLD	WTW-LON-KEM- 100	 Wintering birds; disruptive works could be conducted outside the winter period (October to March inclusive) Visual and noise screening, no use of piling and use of plant silencers Noise assessment to be completed during the detailed design and planning/permit applications and associated HRA, prior to commencement of works to ensure mitigation measures will be effective (if not, seasonal avoidance to be used). Groundwater levels; mitigation measures will be set out in any applications for Flood Defence Consents where these are required for any river construction works. Earthworks drainage will be controlled by temporary use of settlement ponds during construction. It is expected that spoil removed for option construction can subsequently be used in landscaping at the site 	 Existing Thames Water mitigation measures for operating close to the SPA will apply to operation of the new works. Chemical deliveries will be via hardstanding areas which will drain to dedicated chemical spill tanks to contain accidental spills. Screening of the works during operation will be required to mitigate the presence of staff and minor vehicle movements to avoid adverse effects on the designated bird populations. The proposed scheme would be adjacent to the existing WTW and visually contained by existing planting to the east. Sensitive design would integrate the new facility into the landscape through ground reprofiling and mitigation planting to the southern boundary.

Option Type	Element Name	Element Ref.	Construction Mitigation	Operation Mitigation
Option Type	Element Name	Element Ref.	 Construction Mitigation Adverse impacts towards heritage assets will be mitigated through avoidance of stockpiling of plant or materials in/near this location and use of screening of works during construction and planting as part of the final design. Detailed noise abatement and visual disturbance mitigation measures to be developed in co-ordination with Natural England, taking account of local site knowledge from the site managers and follow professional mitigation guidance, in particular the Waterbird Disturbance Mitigation Toolkit Informing Estuarine Planning and Construction Projects produced by the Institute of Estuarine and Coastal Studies (IECS) at Hull University. Sensitive lighting design to be developed following professional guidance to address identified risks relating to light pollution that is applicable to birds in flight, such as that developed by the Institute of Lighting Engineers (Guidance Note 8 Bats and Artificial Lighting, 2018) and others, to 	Operation Mitigation
			Artificial Lighting, 2018) and others, to ensure no adverse effects on site integrity from light spill.	
			 In combination studies to be conducted to identify the key flight paths of the wintering birds that use the designated site (and associated functional habitat), and an assessment to be made of the impact of the construction activities on these key flight paths. 	
			 Agreed mitigation measures to be included in the project-specific HRA of each scheme to 	

Option Type	Element Name	Element Ref.	Construction Mitigation	Operation Mitigation
			 support applications for planning permissions and environmental permits. Implementation of planning conditions and/or conditions of relevant environmental permits to be managed through contractual obligations with supervision from an Environmental Clerk of Works appointed by Thames Water 	
Treatment: London	Kempton WTW new 150 MLD	WTW-LON-KEM- 150	As above	As above
Treatment: London	Kempton WTW new 300 MLD	WTW-LON-KEM- 300	As above	As above
Treatment: SWOX	Abingdon WTW 24 MLD	WTW-SWOX-ABI	 Proposed pipeline to be constructed at a depth less than 2.5m below ground level (possible only to 1.5m deep) to avoid interfering with groundwater levels or movement towards Cothill Fen. As groundwater data around Cothill Fen SAC are limited, a groundwater survey of the site would be required to confirm the exact location of the groundwater divide and ensure the pipeline is routed to the west of the divide to avoid impact on groundwater flow to the SAC. The pipeline would be backfilled with gravel to help maintain the permeability around the pipeline. Cothill Fen SAC; exclusion fencing around SAC and adjacent functional habitat from the construction zone and informing personnel of the sensitivity of nearby habitats. Plant silencers, approved construction yehicle routes, routing of pipeline away from 	 Traffic movements during operation are to be managed to avoid peak hours on local roads in order to minimise traffic impacts. The scheme would be a noticeable new feature in the landscape. Sensitive design and landscape treatment through ground reprofiling and extensive mitigation planting would aid screening in operation, such that over the long term, planting would mature and integrate the water treatment works into the landscape.

Option Type	Element Name	Element Ref.	Construction Mitigation	Operation Mitigation
			 sensitive receptors and the use of trenchless crossings. Groundwater levels; mitigation measures will be set out in any applications for Flood Defence Consents and agreed with the EA where these are required for any river construction works. Flood risk; construction compounds will be sited sensitively and away from flood risk zones along with trenchless crossings for river crossings. 	
Treatment: SWOX	SWA North: Abingdon WTW 24 MLD	WTW-SWOX-ABI- SWA	 Sensitive siting of construction compounds away from designated habitats. Plant silencers, approved construction vehicle routes and routing of pipeline away from sensitive receptors. Flood risk; construction compounds will be sited sensitively and away from flood risk zones along with trenchless crossings for river crossings. 	 Traffic movements during operation are to be managed to avoid peak hours on local roads in order to minimise traffic impacts. The scheme would be a noticeable new feature in the landscape. Sensitive design and landscape treatment through ground reprofiling and extensive mitigation planting would aid screening in operation, such that over the long term, planting would mature and integrate the water treatment works into the landscape
Treatment: SWOX	Radcot WTW 24Mld SWOX	WTW-SWOX- RAD	 Use of plant silencers, approved construction vehicle routes, routing of pipeline away from sensitive receptors and the use of trenchless crossings and tunnelling. Any watercourse diversions would be agreed with the EA. Construction compounds will be sited sensitively and away from flood risk zones and also there will be trenchless crossings for river crossings. 	 Traffic movements during operation are to be managed to avoid peak hours on local roads in order to minimise traffic impacts.

Option Type	Element Name	Element Ref.	Construction Mitigation	Operation Mitigation
			• Screening through appropriate earth bunding and landscaping to be provided around the proposed treatment site to mitigate any permanent visual amenity impact (e.g. southern and western boundaries).	
	SWA south Medmenham WTW (24MI/d treated water PS transfer and SR	WTW-SWA-MMM	 Use of trenchless crossings will be adopted to minimise impacts on the water environment during construction. Air quality, including dust; dampening haul roads and earthworks. Significant air quality impacts can be avoided by ensuring that construction traffic is not routed within 200m of any designated site with qualifying features sensitive to air quality. 	 Sensitive design and landscape treatment, screen mounds, and woodland planting extending from the ancient woodland would aid integration of the operational works into the landscape. Over the long term, planting would mature and aid integration of the WTW into the landscape and the setting of the AONB.
Raw Water Purchase	Severn Trent/United Utility: Raw Water Transfer ST+UU1 - 12MLD		 Sensitive routing of the pipelines, using river crossing methods (e.g. directional drilling) that minimise disturbance to the river channel will be deployed along with appropriate timing of works. Flood risks; measures to control and attenuate surface water runoff as specified in the CEMP. Adverse impacts towards the setting of heritage assets will be mitigated through avoidance of stockpiling of plant or materials in/near this location and use of screening of works during construction and planting as part of the final design. 	
Raw Water Purchase	Severn Trent/United Utility: Raw Water Transfer ST+UU2 - 12MLD + 18MLD		No specific measures required	No specific measures required

Option Type	Element Name	Element Ref.	Construction Mitigation	Operation Mitigation
	Chingford South intake and PS capacity increase	CON-RWS-CHS- PS-100	 Wintering birds; avoid disruptive construction activities during the winter period (October to March inclusive) and visual screening and use of plant silencers to be employed during the summer to lessen any potential disturbance impact on Lee Valley SPA/Ramsar. Noise assessment to be completed during the detailed design and planning/permit applications and associated HRA, prior to commencement of works to ensure mitigation measures will be effective (if not, seasonal avoidance to be used). Further construction mitigation includes dust suppression measures and careful management of soil movement activities. Haul routes to the site will be sensitively selected to avoid increasing aerial pollutants in the vicinity of the designated site. 	
	Conveyance from Break Tank to Coppermills via Res 5	CON-RWS-BT- COP-800	 Wintering birds; avoid disruptive construction activities during the winter period (October to March inclusive) and visual screening and use of plant silencers to be employed during the summer to lessen any potential disturbance impact on Lee Valley SPA/Ramsar. Noise assessment to be completed during the detailed design and planning/permit applications and associated HRA, prior to commencement of works to ensure mitigation measures will be effective (if not, seasonal avoidance to be used). Dust impacts to the Ramsar/SPA sites to be avoided through damping down. 	 Over the long-term, 15 years after initial operation, mitigation planting would mature to screen new above ground operational assets.

Option Type	Element Name	Element Ref.	Construction Mitigation	Operation Mitigation
			During tunnelling work, mitigation measures will include shaft site drainage and careful management of any required dewatering.	
Resource: Reuse	Deephams Reuse 46.5MI/d	RES-RU-DPH - Confirm	 Provision of landscaping bunds or noise barriers to be provided as required around the perimeter of the Deephams site construction areas at the start of construction in dialogue with Natural England to ensure no adverse effects on bird species associated with nearby SSSI and Natura 2000 sites. Timing of most disruptive construction activities to avoid the winter period (October – March inclusive) Use of plant silencers and visual screening within 250m of the SPA (or offsite functional habitat). Noise assessment to be completed during the detailed design and planning/permit applications and associated HRA, prior to commencement of works to ensure mitigation measures will be effective (if not, seasonal avoidance to be used). Water quality; install bunding to prevent runoff during concreting, and bunding for vehicle, chemical and oil storage. Detailed noise abatement and visual disturbance mitigation measures to be developed in co-ordination with Natural England, taking account of local site knowledge from the site managers and follow professional mitigation guidance, in particular the Waterbird Disturbance Mitigation Toolkit Informing Estuarine Planning and Construction Projects produced by the 	 To protect water quality during operation, chemical deliveries will be via hardstanding area which drains to a dedicated chemical spill tank. Appropriate sustainable drainage solutions will be required in line with local government and Mayor of London policy of ensuring no increase in surface water runoff. Mitigation measures will be reviewed as part of further planned investigations by Thames Water, working with the Environment Agency, Port of London Authority and other stakeholders, to confirm the environmental and navigation impacts from reduced flows from Deephams Sewage Treatment Works.

Option Type	Element Name	Element Ref.	Construction Mitigation	Operation Mitigation
			 Institute of Estuarine and Coastal Studies (IECS) at Hull University. Sensitive lighting design to be developed following professional guidance to address identified risks relating to light pollution that is applicable to birds in flight, such as that developed by the Institute of Lighting Engineers (Guidance Note 8 Bats and Artificial Lighting, 2018) and others, to ensure no adverse effects on site integrity from light spill. In combination studies to be conducted to identify the key flight paths of the wintering birds that use the designated site (and associated functional habitat), and an assessment to be made of the impact of the construction activities on these key flight paths. Agreed mitigation measures to be included in the project-specific HRA of each scheme to support applications for planning permissions and environmental permits. Implementation of planning conditions and/or conditions with supervision from an Environmental Clerk of Works appointed by Thames Water. 	
Raw water transfer	Transfer of Minworth Effluent 115MI/d	RES-RWTS-MIN	 Non-dig techniques/directional drilling to minimise effects on the River Blythe SSSI. Narrower working width of 20m when within proximity of ancient woodland. Construction compounds to be sensitively located. Further investigation for potential effects on fish habitat in the River Tame. 	 During operation, land disturbed by construction of the pipeline would be restored to former uses (e.g. agricultural). In the long term, 15 years after initial operation, planting would mature and hedgerow connections re-established,

Option Type	Element Name	Element Ref.	Construction Mitigation	Operation Mitigation
			 Use of plant silencers, damping down of workings, temporary site screening measures, use of wheel wash equipment, approved traffic routes, use of directional drilling of the pipeline laying is also proposed to reduce the scale of disruption at river, road and rail crossings. All as dug material will be retained on site. Resources for construction of the scheme would be sourced locally where possible. Flood risk; dewatering and treatment of the groundwater prior to discharge (in line with discharge permit conditions). Earthworks sequencing will include coffer dam formation to avoid flooding of borrow areas during construction. There may be a requirement for flood plain compensation to be provided. During detailed design, the possibility of rerouting pipeline sections to avoid listed buildings, Blythe Hall Packhorse Bridge and Water Orton Bridge will be explored. Screening of heritage assets from construction would be undertaken 	 aiding integration of the new facilities into the landscape. Major reduction in summer flows in the River Tame; further investigation is required to determine, with more certainty, likely impact to aquatic flora and fauna under low flow conditions.
Raw Water Transfer	Netheridge Final Effluent Transfer	RES-RWTS-NTH	 Use of plant silencers, damping down of workings, temporary site screening measures, use of wheel wash equipment, and approved traffic routes. Use of directional drilling of the pipeline laying is also proposed to reduce the scale of disruption at river and road crossings. Any temporary flow diversions will be subject to agreement with the Environment Agency. Impacts on fish species in watercourses would be avoided by reducing, removing 	 Water will be subject to aeration over a flow cascade structure to oxygenate the water prior to discharge into the River Severn. Every effort will be made to ensure the final pipeline route avoids the need for the removal of trees, hedgerows or other important vegetation, or adverse effect on supporting root structures. Any hedgerows affected will be reinstated.

Option Type	Element Name	Element Ref.	Construction Mitigation	Operation Mitigation
			 (where possible) and preventing barriers to migratory species. Flood risk; dewatering and treatment of the groundwater prior to discharge (in line with discharge permit conditions). Additionally, earthworks sequencing will include coffer dam formation to avoid flooding of borrow areas during construction. 	
Raw Water Transfer	River Wye to Deerhurst 60.3MI/d	RES- RWTS-WYE- 60.3	 Use of plant silencers, damping down of workings, temporary site screening measures and use of wheel wash equipment, and approved traffic routes. Groundwater quality; mitigation measures will be included in Flood Defence Consents applications where these are required for the river crossing construction works (where works are in or within 8m of a main river). Flood compensation ponds will be constructed as part of the enabling works. For conserving and enhancing historic environments mitigation such as screening is possible to avoid disturbance to the setting of heritage assets. 	 Further information is required to fully understand the frequency, duration an impact of the scheme at low flow conditions in the Wye. Following this, operational controls could be applied to reduce identified adverse effects on flows in the River Wye. To mitigate adverse effects on visual amenity in the surrounding area, hedgerows, trees, fields and walls would be retained wherever possible or reinstated. The intake structure would require sensitive design, scale of site layouts, treatment of buildings and landscaping to ensure it is integrated into the landscape and to minimise visual impacts on the AONB.
Raw water systems	Abingdon to Farmoor	CON RWS ABI FMR	 Cothill Fen SAC; exclusion fencing around SAC and adjacent functional habitat from the construction zone and informing personnel of the sensitivity of nearby habitats. Groundwater/surface water flows; install the pipeline at a depth below ground level of less than 2.5m (possibly only 1.5m deep) to avoid interfering with groundwater levels or 	In operation, field boundaries and planting would be reinstated.

Option Type	Element Name	Element Ref.	Construction Mitigation	Operation Mitigation
			 movement towards Cothill Fen. The pipeline would be backfilled with gravel to help maintain the permeability around the pipeline. As groundwater data around Cothill Fen SAC are limited, a groundwater survey of the site would be required to confirm the exact location of the groundwater divide and ensure the pipeline is routed to the west of the divide to avoid impact on groundwater flow to the SAC. Air quality, including dust; dampening haul roads and earthworks. Flood Defence Consents will also be obtained in all areas where works are in or within 8m of a main river and flood compensation ponds will be constructed as part of the enabling works. Additionally, earthworks sequencing will include coffer dam formation to avoid flooding of borrow areas during construction. Best-practice soil management techniques will be implemented during construction within areas of the pipeline route which pass through Grade 2 agricultural land. Screening will be implemented to minimise visual intrusion from these sites during construction. 	
SWA south	Medmenham raw water intake and transfer 53	CON RWS MMM 53	 Dug material will be retained on site and reused where practicable. This will minimise waste generation and encourage its reuse. Earthworks drainage will be controlled by temporary use of settlement ponds during construction and standard bunding will be used to prevent run-off from works. 	• During operation, the intake and pump station would be new features in the landscape within the context of the AONB. Sensitive design and landscape treatment, screen mounds and planting would be used to aid integration into the landscape.

Option Type	Element Name	Element Ref.	Construction Mitigation	Operation Mitigation
			 Flood risk; dewatering and treatment of the groundwater prior to discharge (in line with discharge permit conditions). Flood Defence Consents will also be obtained in all areas where works are in or within 8m of a main river. Landscape and heritage receptors; use of existing planting for screening, site temporary compounds away from sensitive receptors, minimise land take for construction to reduce landscape and visual impact and subsequent extent of area to be reinstated, minimise stockpiling of materials where visual amenity may be affected. Temporary lighting to be strategically located for safe construction requirements and where possible, will be directional to minimise increase in light levels. 	
Raw water transfer	Oxford Canal Duke's Cut to Farmoor 15	CON RWS OXC FMR 15	 Biodiversity; pipeline trench backfilled with gravel as an extra measure to help maintain the permeability around the pipeline. During construction compensatory flood mitigation measures will be required to ensure no impact on flood storage. Mitigation measures such as screening, specified working hours and planning of haul routes are to be employed to minimise issues relating to the setting and access of heritage assets. 	 Ongoing monitoring of the canal and its source water would be carried out during operation so that the risks of INNS can be monitored. Sensitive design and build finish will be considered to integrate this development into the landscape and reduce effects on visual amenity, particularly due to its location near to PRoW on the Oxford Canal.
Network reinforcement	Shalford to Netley Mill	NET-GUI-SFD- NML	• Due to the proximity of construction sites to heritage properties and location in the AONB, consideration will be given to working hours and the selection of building materials.	 In operation, field boundaries and planting would be reinstated and the pipeline would not be visible. In the long term, 15 years after initial operation, planting would mature and

Option Type	Element Name	Element Ref.	Construction Mitigation	Operation Mitigation
			 Any diversions of watercourses would be agreed with the EA to minimise adverse effects on the river environment. Flood risk; topsoil and sub-soil strip to be stored in a way to minimise impact on natural drainage flow paths with particular attention to flood plains. Construction compounds would be sited sensitively away from any flood risk zones where possible. 	hedgerow connections re-established, aiding integration of the new facility and into the landscape and setting of the AONB.
SWA north	Abingdon treated water transfer to SWA (SWOX to SWA)	NET-IZT-AB-LC- 48	 Cothill Fen SAC; exclusion fencing around SAC and adjacent functional habitat from the construction zone and informing personnel of the sensitivity of nearby habitats. Groundwater/surface water flows; install the pipeline at a depth below ground level of less than 2.5m (possibly only 1.5m deep) to avoid interfering with groundwater levels or movement towards Cothill Fen. As groundwater data around Cothill Fen SAC are limited, a groundwater survey of the site would be required to confirm the exact location of the groundwater divide and ensure the pipeline is routed to the west of the divide to avoid impact on groundwater flow to the SAC. The pipeline would be backfilled with gravel to help maintain the permeability around the pipeline. Air quality, including dust; dampening haul roads and earthworks. For the service reservoirs and pumping station sites the land area is sufficient to retain topsoil and spoil on site with suitable cut and fill balance carried out during later 	

Option Type	Element Name	Element Ref.	Construction Mitigation	Operation Mitigation
			 design stages including landscaping around reservoirs and visual screening, minimising the generation of waste. Surface water flows; use of trenchless crossings to minimise impacts on navigation and disruption flows during construction. The crossings of the River Ock will be tunnelled. 	
Raw Water Transfer	Oxford Canal to Cropredy Resource 15MI/d	RES-RWTS-OXC- CRP-15	• To reduce flood risk, there will be a small amount of flood plain storage compensation required for above ground land-take in the flood plain.	 Sensitive kiosk design, build finish and location would be considered during detailed design with regard to the setting of listed buildings. Mitigation measures will be reviewed as part of further planned investigations by Canal & River Trust and Thames Water, working with the Environment Agency to confirm the environmental impacts from operation.
	Medmenham intake 80	CON-RWS-MMM- 80	 The pipeline route has been designed to avoid SSSIs and ancient woodland areas As scheme is within Chilterns AONB and close to the Thames Path National Trail, landscape mitigation will be required. These measures will include use of existing planting for screening, site temporary compounds away from sensitive receptors, minimise land take for construction to reduce landscape and visual impact and subsequent extent of area to be reinstated, minimise stockpiling of materials where visual amenity may be affected. 	 Operationally, planting would mature and aid integration of the intake into the landscape and the setting of the AONB.
SWA North	SWOX to SWA 48MI/d	NET-IZT-AB-LC- 48	• Cothill Fen SAC; exclusion fencing around SAC and adjacent functional habitat from the construction zone and informing personnel of the sensitivity of nearby habitats.	•

Option Type	Element Name	Element Ref.	Construction Mitigation	Operation Mitigation
			 As groundwater data around Cothill Fen SAC are limited, a groundwater survey of the site would be required to confirm the exact location of the groundwater divide and ensure the pipeline is routed to the west of the divide to avoid impact on groundwater flow to the SAC. Groundwater/surface water flows; install the pipeline at a depth below ground level of less than 2.5m (possibly only 1.5m deep) to avoid interfering with groundwater levels or movement towards Cothill Fen. The pipeline would be backfilled with gravel to help maintain the permeability around the pipeline. Air quality, including dust; dampening haul roads and earthworks. Land-use impacts from the pipeline will be mitigated by retaining top soil and spoil which would be reused on the pipeline easement / site where possible. For the service reservoirs and pumping station sites the land area is sufficient to retain topsoil and spoil on site with suitable cut and fill balance carried out during later design stages, including landscaping around reservoirs and visual screening 	
SWA North	SWOX to SWA 72MI/d	NET-IZT-AB-LC- 72	As above	• N/A •
Conveyance: Raw Water System	KGV Reservoir to Break Tank	CON-RWS-KGV- BPT-300	 Wintering birds; avoid disruptive construction activities during the winter period (October to March inclusive) and visual screening and use of plant silencers to be employed during the summer to lessen any potential 	• N/A

Option Type	Element Name	Element Ref.	Construction Mitigation	Operation Mitigation
			 disturbance impact on Lee Valley SPA/Ramsar as has been demonstrated previously in relation to construction works at the nearby Deephams sewage treatment works Noise assessment to be completed during the detailed design and planning/permit applications and associated HRA, prior to commencement of works to ensure mitigation measures will be effective (if not, seasonal avoidance to be used). 	
Raw Water Transfer	Netheridge STW to River Severn 35 Mld	RES-RWTS-NTH	No specific measures required	• N/A •
Raw Water Transfer	Transfer of Minworth Effluent 115MI/d	RES-RWTS-MIN	 Narrower working width of 20m when within proximity of ancient woodland. 	 As the transfer would increase low flows in the River Avon, potentially changing the normal pattern of flows, the outfall is located to enable appropriate buffering and dilution within the River Avon at times of low flow to reduce the significance of these effects on water quality, water chemistry, water temperature and consequent effects on algae and plant communities, fish and invertebrates.
Groundwater Resource	New River Head - Removal of Constraints	RES-RC-NRV	•	• Turbidity monitoring would be undertaken to assess the weight of sand per litre of water extracted to assist in quantifying future ground loss.
Resource: Removal of Constraints	RC Epsom borehole pumps	RES-RC-EPS	 Prior to the start of construction an assessment of potential borehole development options will be undertaken. If acidisation is considered appropriate, control of substances hazardous to health (COSHH) 	 Mitigation measures will be reviewed as part of planned investigations by Thames Water in AMP7.

Option Type	Element Name	Element Ref.	Construction Mitigation	Operation Mitigation
			 assessment will be undertaken and agreed prior to acidisation taking place to ensure that appropriate mitigation is in place to minimise risks to human health of both those working on site and any nearby residents. A monitoring programme will be undertaken during the test pumping of the new borehole to check the potential impacts on surface water and groundwater as well as other groundwater users. In the event that impacts are identified mitigation measures will be agreed with the Environment Agency and any third party groundwater abstractors. 	
Groundwater Resource	Britwell – Removal of Constraints	RES-RC-BTW	 A monitoring programme will be undertaken during the test pumping of the borehole to check the potential impacts on surface water features fed by both the Upper Greensand and Chalk aquifers, and groundwater as well as other groundwater users. Generic low flows investigation and two new observation boreholes (one in the Chalk, one in the Upper Greensand), will be undertaken to investigate the connectivity between the Upper Greensand and Chalk aquifers. In the event that impacts are identified mitigation measures will be agreed with the Environment Agency and any third party groundwater abstractors. 	 Mitigation measures will be reviewed as part of planned investigations by Thames Water in AMP7.
Groundwater Resource	Honor Oak	RES-GW-HON	 Compensation will be provided to the golf course for the inconvenience and loss of earning during construction. Prior to the start of construction an assessment of potential borehole development options will be undertaken. If 	• N/A

Option Type	Element Name	Element Ref.	Construction Mitigation	Operation Mitigation
Groundwater Resource	Aquifer Storage and Recovery (ASR) Horton Kirby	RES-ASR-HTK	 acidisation is considered appropriate, control of substances hazardous to health (COSHH) assessment will be undertaken and agreed prior to acidisation taking place to ensure that appropriate mitigation is in place to minimise risks to human health of both those working on site and any nearby residents. A monitoring programme will be undertaken during the test pumping of the new borehole to check the potential impacts on surface water and groundwater as well as other groundwater users. In the event that impacts are identified mitigation measures will be agreed with the Environment Agency and any third party groundwater abstractors Earthworks sequencing will include coffer dam formation to avoid flooding of borrow areas during The test pumping. 	•
			requirement for flood plain compensation to be provided	
Raw Water Transfer	Culham to Farmoor 180 MLD	CON-RWS-CUL- FMR-180	 Cothill Fen SAC; exclusion fencing around SAC and adjacent functional habitat from the construction zone and informing personnel of the sensitivity of nearby habitats. When construction of the pipeline passes the SAC boundary at its closest point any construction activities will be undertaken from the far side of the pipeline route to the SAC boundary. As groundwater data around Cothill Fen SAC are limited, a groundwater survey of the site would be required to confirm the exact location of the groundwater divide and ensure the pipeline is routed to the west of 	• N/A
Option Type	Element Name	Element Ref.	Construction Mitigation	Operation Mitigation
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			 the divide to avoid impact on groundwater flow to the SAC. The pipeline would be backfilled with gravel to help maintain the permeability around the pipeline. Air quality, including dust, mitigated by dampening haul roads and earthworks. Mitigation measures such as screening, specified working hours and planning of haul routes are to be employed to minimise issues relating to the setting and access of heritage assets. Hedgerows, trees, fields, walls would be retained wherever possible and also will be reinstated. 	
Raw Water Transfer	South East London Pipelines		 Best practice soil management techniques will be implemented during construction in urban areas. For conserving and enhancing historic environments mitigation such as screening is possible to avoid disturbance to the setting of heritage assets. Hedgerows, trees, fields, walls would be retained wherever possible and also will be reinstated 	•
Raw Water Transfer	South West London Pipelines (chalk streams)		 Timing of most disruptive construction activities to avoid the winter period (October – March inclusive) Use of plant silencers and visual screening within 250m of the SPA (or offsite functional habitat). Minimising the works footprint of the pipeline corridor to maximise the effectiveness of any visual screening employed. 	• N/A •

Option Type	Element Name	Element Ref.	Construction Mitigation	Operation Mitigation
			 Noise assessment to be completed during the detailed design and planning/permit applications and associated HRA, prior to commencement of works to ensure mitigation measures will be effective (if not, seasonal avoidance to be used). Use of plant silencers, damping down of workings, temporary site screening measures, use of wheel wash equipment, and approved traffic routes. Flood compensation may be required to negate effects of construction on the flood plain, and standard flood risk mitigations would be detailed in a CEMP. Detailed noise abatement and visual disturbance mitigation measures to be developed in co-ordination with Natural England, taking account of local site knowledge from the site managers and follow professional mitigation guidance, in particular the Waterbird Disturbance Mitigation Toolkit Informing Estuarine Planning and Construction Projects produced by the Institute of Estuarine and Coastal Studies (IECS) at Hull University. Sensitive lighting design to be developed following professional guidance to address identified risks relating to light pollution that is applicable to birds in flight, such as that developed by the Institute of Lighting Engineers (Guidance Note 8 Bats and Artificial Lighting, 2018) and others, to ensure no adverse effects on site integrity from light spill. 	

Option Type	Element Name	Element Ref.	Construction Mitigation	Operation Mitigation
			 In combination studies to be conducted to identify the key flight paths of the wintering birds that use the designated site (and associated functional habitat), and an assessment to be made of the impact of the construction activities on these key flight paths. Agreed mitigation measures to be included in the project-specific HRA of each scheme to support applications for planning permissions and environmental permits. Implementation of planning conditions and/or conditions of relevant environmental permits to be managed through contractual obligations with supervision from an Environmental Clerk of Works appointed by Thames Water 	
Raw Water Transfer	River Lee New Gauge pipeline (chalk streams)		 Timing of most disruptive construction activities to avoid the winter period (October – March inclusive) Use of plant silencers and visual screening within 250m of the SPA (or offsite functional habitat). Minimising the works footprint of the pipeline corridor to maximise the effectiveness of any visual screening employed. Noise assessment to be completed during the detailed design and planning/permit applications and associated HRA, prior to commencement of works to ensure mitigation measures will be effective (if not, seasonal avoidance to be used). Use of plant silencers, damping down of workings, temporary site screening 	• N/A •

Option Type	Element Name	Element Ref.	Construction Mitigation	Operation Mitigation
			measures, use of wheel wash equipment, and approved traffic routes.	
Raw Water Transfer	SWA Pipelines (chalk streams)		 Provision of landscaping bunds or noise barriers to be provided as required around the perimeter of the site construction areas (excluding those areas associated with the pipeline) at the start of construction. Pipejacking is proposed to mitigate potential impacts on Ancient Woodland Use of plant silencers, damping down of workings, temporary site screening measures, use of wheel wash equipment, and approved traffic routes 	• N/A

