Southern Water Services

Annex 20: Habitats Regulations Assessment of the Water Resource Management Plan 2024

Information to support an assessment under Regulation 63 of the *Conservation of Habitats and Species Regulations 2017*

from Southern Water

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Appendix E Appropriate Assessments

Introduction

Water Resource Management Plans set out how water supply-demand balances and water supply security will be maintained over the next 25 years and beyond. These plans are subject to the provisions of the *Conservation of Habitats and Species Regulations 2017* (as amended).

Southern Water's Water Resources Management Plan 2024

The Water Act 2003 requires that all water companies in England and Wales prepare and maintain Water Resources Management Plans (WRMPs). These plans set out how public water supply (PWS) will be maintained over a minimum of 25 years in a way that is economically, socially and environmentally sustainable. The WRMPs must be revised every five years.

Southern Water Services (SWS) is preparing its WRMP (WRMP24) for the period 2023 – 2075 and has published a draft ('the draft WRMP') for consultation. The draft WRMP sets out SWS's preferred resource and demand management options ('the preferred options') for meeting predicted deficits in the water available for PWS, and for ensuring security of supply.

The draft WRMP24 is based on the Water Resources South East (WRSE) draft Best Value Plan[1] and it is SWS's intention to adopt the final regional plan prepared by WRSE into the final WRMP24. The Regional Plan for the period 2025 to 2075 will address long-term regional and inter-regional, multi-sectoral water resources management pressures and will draw on water resource options from the member water companies' WRMP24s, as well as the Strategic Resource Options (SROs) being taken forward by the companies.

Habitats Regulations Assessment

Water company WRMPs are subject to the provisions of the *Conservation of Habitats and Species Regulations 2017* (as amended) (the 'Habitats Regulations')[2].

Regulations 63 and 64 transposed the provisions of Articles 6(3) and 6(4) of Council Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora (the 'Habitats Directive') as they related to plans or projects in England and Wales.

[1] WRSE (2022) *Futureproofing our water supplies: A Consultation On Our Emerging Regional Plan For South East England*. Available at: https://wrse.uk.engagementhq.com/the-proposed-solution.

[2] The 2017 Regulations have been amended by the Conservation of Habitats and Species (Amendment) (EU Exit) Regulations 2019 to reflect the UK's exit from the EU, although these largely carried forward the provisions and terminology of the 2017 Regulations and do not fundamentally alter their interpretation. This report therefore primarily refers to the 2017 Regulations and (where appropriate for clarity) the relevant provisions of the Habitats Directive.

Regulation 63 states that if a plan or project is "*(a) is likely to have a significant effect on a European site*[3] *or a European offshore marine site*[4] *(either alone or in combination with other plans or projects); and (b) is not directly connected with or necessary to the management of the site*" then the competent authority must "*…make an appropriate assessment of the implications for the site in view of that site's conservation objectives*" before the giving consent or authorisation. The plan or project can only be given effect if it can be concluded (following an 'appropriate assessment') that it "*…will not adversely affect the integrity*" of a site, unless the provisions of Regulation 64 are met.

This assessment process is known as Habitats Regulations Assessment (HRA)[5]. An HRA determines whether there will be any 'likely significant effects' (LSE) on any European site as a result of a plan's implementation (either on its own or 'in combination' with other plans or projects)[6] and, if so, whether there will be any 'adverse effects on site integrity'[7].

This Report

SWS has a statutory duty to prepare a WRMP and is therefore the Competent Authority for the HRA of that plan. SWS has appointed appointed Wood Group UK Limited (Wood), supported by Royal Haskoning DHV and APEM, to assist with its assessment of WRMP24 against Regulations 63 and (if required) 64.

This report accompanies the draft WRMP24 that has been published for consultation and summarises the current assessment of SWS's preferred options against the requirements of the Habitats Regulations. It also documents the iterative HRA process that has been applied through the development of the draft WRMP24. The report is structured as follows:

- **Section 2** provides a brief summary of the draft WRMP and the preferred options;

[3] As noted, the 2019 amendment to the Habitats Regulations largely carried forward the provisions and terminology of the 2017 Regulations, and so the term 'European site' is currently retained and for all practical purposes the definition is essentially unchanged. European sites are therefore: any Special Area of Conservation (SAC) from the point at which the European Commission and the UK Government agreed the site as a 'Site of Community Importance' (SCI) (if this was before 31 Jan 2020); any classified Special Protection Area (SPA); and any candidate SAC (cSAC). However, the term is also commonly used when referring to potential SPAs (pSPAs), to which the provisions of Article 4(4) of Directive 2009/147/EC (the 'new wild birds directive') are applied; and to possible SACs (pSACs) and listed Ramsar Sites, to which the provisions of the Habitats Regulations are applied a matter of Government policy (NPPF para. 181) when considering development proposals that may affect them. "European site" is therefore used in this document in its broadest sense, as an umbrella term for all of the above designated sites. Note, it is likely that this term will be supplanted at some point in the future although an appropriate UK-wide alternative has not yet been agreed (e.g. the NPPF in England has adopted the term 'Habitats sites' to refer collectively to those sites defined by Regulation 8; the *Conservation of Habitats and Species (Amendment) (EU Exit) Regulations 2019* does not offer a direct alternative to "European site" but uses the term 'National Site Network' in place of 'Natura 2000').

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

[5] The term 'Appropriate Assessment' has been historically used to describe the process of assessment; however, the process is more typically referred to as 'Habitats Regulations Assessment' (HRA), with the term 'Appropriate Assessment' limited to a specific stage within the process.

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

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

- **Section 3** sets out the approach to HRA of WRMP24, including the key issues for these strategic plans (**Section 3**);
- **Section 4** documents the 'screening' of the preferred options;
- **Section 5** summarises the 'appropriate assessments' completed in Appendices E1 – E15, including option-specific 'in combination' assessments;
- **Section 6** summarises the plan-level 'in combination' assessment; and
- **Section 7** sets out the proposed conclusion of the HRA of SWS's WRMP24 (assuming that final WRMP reflects the draft WRMP, and subject to any additional data gathering that may be required to resolve residual uncertainties).

The report necessarily focuses on the assessment of the preferred options; the iterative HRA-related processes used to inform the development of the plan (including the feasible options assessments) are documented separately in WRSE 'screening' reports[8]. In addition, the assessment is of the draft WRMP only and not the WRSE Regional Plan.

Note that the HRA draws on the environmental data and assessments undertaken within other assessments, particularly in relation to operational effects and the hydrological zone of influence. These include the Water Framework Directive (WFD) assessment; this HRA report should therefore be read in conjunction with these reports.

In addition, it should be noted that any conclusions are necessarily preliminary (since the HRA is only finalised based on the plan intended for adoption), based on the available data and information on the options; where there are uncertainties, either in option operation or in the likely response of European sites and features, these are identified and approaches for resolution identified.

This report provides a strategic, plan-level assessment to support the WRMP and is not an application-specific ('project-level') assessment. It is based on data and information that can be reasonably gathered at the plan-level and so does not include option-specific survey data or similar. More detailed, application-specific HRAs will be needed to support future planning applications and environmental permits/consents.

Southern Water's WRMP24

The WRMP process identifies potential deficits between the water available for supply and the projected demand. Southern Water has identified 66 'supply-side' options and eight 'demand-side' options to resolve predicted deficits in its supply area.

[8] WRSE (2022) *WRSE Regional Plan Habitats Regulations Assessment Stage 1 Screening Report*. Report for WRSE by Mott MacDonald. A copy of this can be made available to statutory consultees, if required.

Water Resources Planning

The WRMP process establishes supply and demand balances for each Water Resource Zone[9] (WRZ) operated by the water company, identifying potential deficits between the water available for supply and the projected demand. Each supply-demand balance calculation is structured around a consistent central set of planning assumptions and is used to identify WRZs in deficit over the plan period. Options are then proposed to resolve these deficits.

The supply-demand balance calculations are based on deployable output (DO) and demand forecasts. The estimation of DO is based on:

- abstraction volumes allowed under current statutory licences, as impacted by actual source yield;
- any future reductions in abstraction expected under environmental improvement regimes; and
- predicted future demand for water based on government data for population and housing growth plans (including Local Plans) and information on major infrastructure schemes likely to have high water demand.

Demand forecasts are completed in accordance with the *Water Resources Planning Guideline*[10]) and consider (*inter alia*):

- Estimates of baseline demand from:
  - household customers;
  - non-household customers;
  - water leaks;
  - any other losses or uses of water such as water taken unbilled.
- Future demands which will be subject to many influences, including:
- housing development and population changes, including changes in occupancy;
- the impact of prolonged high demand;
- changes in water use behaviour and distribution of demand (in both household and non-household users);
- metering and smart metering;
- changes in government policy and expectations, for example water efficiency standards in new homes and water labelling;

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

[10] UK Government (2022). Water resources planning guideline [online.]. Available at: https://www.gov.uk/government/publications/water-resources-planning-guideline/water-resources-planning-guideline. [Accessed April 2022].

- changing water efficiency and sustainable water use practices;
- changing design standards of devices that use water such as more efficient washing machines;
- changes in technology and practices for leakage detection and repair;
- a changing climate;
- weather patterns;
- potential changes in demand from the energy sector as it moves to low carbon technology.

The WRMP process initially identifies as many potential deficit solutions as possible (the 'unconstrained list' of options) irrespective of cost or technical merit. These are then refined to identify '**feasible options**' and subsequently the '**preferred options**' for meeting any supply-demand deficits. All zones with deficits are subject to a decision-making process using a Multi-Criteria Analysis (MCA), and other methods where appropriate, to identify a preferred plan (comprising 'preferred options') to address the supply demand deficit. The decision-making method factors in multiple costs and benefits and considers the interaction between zones to establish a best value plan for the region (and individual company). This staged filtering process allows various assessments, including HRA, to inform the plan development.

WRMP options are typically characterised as **supply-side** (measures that increase supply, such as new abstractions) or **demand-side** (measures which reduce consumption post-treatment, such as metering or leakage detection and reduction). HRAs generally focus on supply-side options[11] and their potential effects; these options would typically involve one or more of the following:

- development of new surface or groundwater sources, or desalination of sea water ('new water');
- modification of an existing licence to alter the operational and network regimes (e.g. additional abstraction; changes in timing of abstractions; etc);
- use of 'spare water' from existing licensed sources through operational adjustments or capital works (e.g. new treatment facilities);
- re-instatement of existing, mothballed sources (with or without current licences);
- capital works to the distribution network (e.g. to improve resilience);
- transferring water from adjacent water companies or third-parties with a supply / demand surplus; or

[11] 'Demand management' options (i.e. options designed to reduce treated water use such as metering or provision of water butts) are generally considered unlikely to have any significant or adverse effects on any European sites (see Section 3.2).

- Strategic Resource Options[12] involving multiple companies and sources.

Southern Water's WRMP24 and Relationship with the Regional Plan

Southern Water's Supply Area

SWS supplies water to ~1 million homes and businesses in Kent, Sussex, Hampshire and the Isle of Wight. The supply area comprises three areas, the Western, Central and Eastern , which are supplied as follows:

- For the Western Area, covering the Isle of Wight and much of Hampshire:
  - North Hampshire takes all of its water from groundwater;
  - South Hampshire takes one-third from groundwater and two-thirds from the River Test and the River Itchen;
  - The Isle of Wight takes its water from the River Yar, the River Medina and groundwater, but also relies on water pumped across from south Hampshire for a third of its drinking water.
- For the Central Area, covering parts of West Sussex and Brighton:
  - Brighton, Worthing and the surrounding areas take all their water from groundwater;
  - North Sussex has a mix of water from rivers, groundwater, a reservoir and a water supply from Portsmouth Water.
- For the Eastern Area, which covers isolated zones in around Medway, Thanet / Deal and Hastings:
  - Medway East is supplied from groundwater;
  - Medway West is supplied 56/44 surface water vs. groundwater;
  - Thanet is mostly groundwater, with around 21% from transfers;
  - Hastings is a mix of groundwater (5%), reservoir (79%) and transfers (16%).

The WRMP and Regional Plan

National guidance[13] requires alignment of water company WRMPs with the regional plan. In consequence, SWS has worked with Water Resources South East (WRSE), a collaboration of the six[14] water companies that supply water in south east England, to develop and apply

[12] There are six Strategic Resource Options (SROs) being taken forward by the companies (the Severn Thames transfer, Grand Union Canal transfer, Minworth Effluent Reuse, Severn Trent Sources, Vyrnwy Reservoir Source, United Utilities Sources).

[13] UK Government (2022) *Water Resource Planning Guideline* [online]. Available at: https://www.gov.uk/government/publications/water-resources-planning-guideline/water-resources-planning-guideline.

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

a consistent framework for water resource plan development, with work split between the regional and company level. This included the following stages:

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

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

In line with the steps identified, SWS has developed a supply-demand balance to identify those water resource zones[15] (WRZs) in deficit over the lifetime of the plan (and so where additional water resources are required). The WRMP presents options for the resolution of the WRZ deficit.

SWS has identified the following WRZs as being in deficit in deficit over the lifetime of the plan:

- **Western Area** – comprising the following seven WRZs:
  - Hants Kingsclere (HKZ)
  - Hants Andover (HAZ)
  - Isle of Wight (IOW)
  - Hants Rural (HRZ)
  - Hants Winchester (HWZ)
  - Hants Southampton East (HSE)
  - Hants Southampton West (HSW)
- **Central Area** – comprising the following three WRZs:
  - Sussex North (SNZ)
  - Sussex Worthing (SWZ)

[15] UK Government (2022) *Water Resource Planning Guideline [online*]. Available at: https://www.gov.uk/government/publications/waterresources-planning-guideline/water-resources-planning-guideline

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

- Sussex Brighton (SBZ)

- **Eastern Area** – comprising the following four WRZs:
  - Kent Medway East (KME)
  - Kent Medway West (KMW)
  - Kent Thanet (KTZ)
  - Sussex Hastings (SHZ)

SWS has identified some 300 constrained options and following evaluation, 122 preferred options have been selected for inclusion in the best value draft WRMP24. These are reflected in the strategies for each area.

Western Area Strategy

Reducing consumption by household customers in order to reduce average per capita consumption to less than 110 litres per person per day across the company by 2050

- Leakage reduction: reduce leakage so as to achieve a minimum 50% reduction in leakage across the company by 2050
- Catchment First: implementing a catchment solution to improve environmental resilience
- Hampshire Water Transfer and Water Recycling Project (a Strategic Resource Option)
- Recycling water at Sandown Water Treatment Works
- Recycling water at Woolston Water Treatment Works
- River Test Managed Aquifer Recharge
- Newbury groundwater option
- Romsey groundwater option
- Newchurch groundwater option
- Bulk imports – both continuation of existing imports and new transfers from Portsmouth Water and Thames Water
- Drought Interventions (Temporary Use Bans and Non-Essential Use Bans) and Test Drought Permit/Order

Central Area Strategy

- Reducing consumption by household customers in order to reduce average per capita consumption to less than 110 litres per person per day across the company by 2050
- Leakage reduction: reduce leakage so as to achieve a minimum 50% reduction in leakage across the company by 2050
- Recycling at Littlehampton Water Treatment Works
- Recycling at Horsham Water Treatment Works

- Desalination on the Sussex Coast
- River Adur Offline Reservoir
- Pulborough groundwater option
- Western Rother licence change and water storage
- Bulk transfers – both continuation of existing import and new transfer from Portsmouth Water, SES Water and South East Water
- Drought Interventions (Temporary Use Bans and Non-Essential Use Bans) and Pulborough, North Arundel and East Worthing Drought Permit/Orders

Eastern Area Strategy

- Reducing consumption by household customers in order to reduce average per capita consumption to less than 110 litres per person per day across the company by 2050
- Leakage reduction: reduce leakage so as to achieve a minimum 50% reduction in leakage across the company by 2050
- Recycling at Medway Water Treatment Works
- Recycling at Hastings Water Treatment Works
- Desalination on the East Thanet Coast
- Desalination on the Thames Estuary
- Desalination on the Isle of Sheppey
- Recommissioning of Gravesend groundwater source
- Reconfiguration of Rye groundwater source
- Raising Bewl Reservoir
- Bulk transfers – both continuation of existing import and new transfer from Affinity Water and South East Water
- Drought Interventions (Temporary Use Bans and Non-Essential Use Bans) and River Medway Scheme and Sandwich Drought Permit/Orders

Once the final WRMP24 has been published later in 2023, the preferred options for managing water supply and demand contained in it will need to be implemented through specific projects. As part of this process, each project may be subject to further assessment to understand and manage its potential environmental and social impacts. These assessments, which may include HRA and EIA, will take account of the issues discussed in this Environmental Report but will also be informed by the greater detail available as the work progresses about construction techniques, building materials, agreed locations and routes.

Supply-side options

The 66 preferred portfolio supply-side options (including intended yield and approximate year by which the option would be required) are summarised in **Table 2.1**.

It should be noted that seven of these are existing imports or transfers that are currently operational (so essentially part of the supply baseline) and which have been 'carried forward' for modelling purposes. These are as follows, and are not subject to HRA (in common with existing SWS licences that form the supply baseline):

- SWS_HSE_EF-TFR_REP_ALL_pwg_res2 (Import from Portsmouth Water to Moor Hill reservoir extension (30Ml/d))
- SWS_HSE_HI-IMP_PRT_ALL_pwg (Import from Portsmouth Water to Moor Hill reservoir (30Ml/d))
- SWS_HSE_HI-TFR_HRZ_ALL_sla (Transfer: Sandy Lane Abbotswood (HSE-HRZ) (1.1Ml/d))
- SWS_SBZ_HI-TFR_SWZ_ALL_v6b (Transfer: SWZ-SBZ v6 valve (17Ml/d))
- SWS_SBZ_HI-TFR_SWZ_ALL_v6b 2026 (Transfer: SWZ-SBZ additional through v6 valve (13Ml/d))
- SWS_SNZ_HI-IMP_PRT_ALL_pwh (Import: PWC to Pulborough (15Ml/d))
- SWS_SNZ_HI-IMP_SWZ_ALL_rrn (Transfer: Rock Road bi-directional transfer (SWZ-SNZ) (15Ml/d))

In addition, four options are effectively part of the same SRO (Thames to Southern Transfer):

- SWS_T2S_HI-ROC_WT1_CNO_culham120pot (Culham (120) - potable – Construction)
- SWS_T2S_HI-ROC_WT1_CNO_culham50pot (Culham (50) - potable – Construction)
- SWS_HSE_HI-TFR_T2S_CNO_spar to ott 120 pot (HWZ to Otterbourne (120) Potable – Construction)
- SWS_HSE_HI-TFR_T2S_CNO_spar to ott 50 pot (HWZ to Otterbourne (50) Potable – Construction)

As a result, 59 options are assessed through the HRA.

Table 0.1 Preferred portfolio supply-side options

Option Ref	Option Name	Option Description / Summary	Yield (Ml/d)	Year req'd?
SWS_HAZ_HI-TFR_HWZ_ALL_oan2	Transfer: Hampshire grid (reversible link HW-HA) (30Ml/d)	Transfer from Otterbourne to Andover to near Basingstoke. This scheme is designed to support network improvements needed for UTMRD transfer to Hampshire and/or the strategic scheme from IoW/South Hampshire	30	2028
SWS_HKZ_HI-ROC_ALL_ALL_ewo	Groundwater: Newbury WSW (1.3Ml/d)	The scheme is located within the Hampshire Kingsclere WRZ (which consists of and is served by Near Basingstoke and Newbury WSWs). The scheme will increase the yield of the Newbury source within the existing licence by removing the present constraint imposed by mains leaving the site. This option will involve the construction of a dedicated, 7.1 km 300mm DN300 pipe from Newbury water supply works (WSW) and additional pumps and treatment facilities to increase the supply to Beacon Hill WSR. Additional high-lift pumping capacity would be required at Newbury. WSW abstracts water from the underlying chalk aquifer. It is considered that the River Enbourne will not be affected by the increased abstractions due to its perched nature above London Clay.	1.3	2028
SWS_HKZ_HI-TFR_HAZ_ALL_oan3	Transfer: Hampshire grid (reversible link HA-HK) (10Ml/d)	Transfer from Otterbourne to Andover to Near Basingstoke. This scheme is designed to support network improvements needed for UTMRD transfer to Hampshire and/or the strategic scheme from IoW/South Hampshire	10	2040
SWS_HRZ_HI-GRW_ALL_ALL_nw_gwa_tim_westi	Groundwater: Romsey - new BHs (4.8Ml/d)	The existing boreholes and well/adits that supply Romsey WSW are either out of service or operating below their full capacity due to quality issues. This option proposes 3 replacement boreholes to increase DO on site. Scheme output is 13.7Ml/d. No additional treatment is required. Replacement borehole locations are distant from existing borehole locations and require new pipelines to connect to WSW.	4.8	2032
SWS_HRZ_HI-IMP_HSW_ALL_rob1	Transfer: Romsey Town & Broadlands valve (HSW-HRZ) (3.1Ml//d)	Romsey Town & Broadlands valve (HSW-HRZ)	3.1	2026
SWS_HRZ_HI-TFR_HSW_ALL_bro	Transfer: Romsey Town & Broadlands valve (HSW to HRZ)	Modelling suggests a new WBS in Palmerstone Street with a flow-rate of 5Ml/d is viable.	5	2026

Option Ref	Option Name	Option Description / Summary	Yield (Ml/d)	Year req'd?
SWS_HSE_EF-TFR_REP_ALL_pwc1	Import from Portsmouth Water (9Ml/d)	Additional 9Ml/d bulk import from Portsmouth Water to Otterbourne distribution network using spare capacity of existing 30Ml/d main, dependent on resource development (World's End WTW) by PWC. 22 h/d operation assumed.	9	2026
SWS_HSE_EF-TFR_REP_ALL_pwg_res2	Import from Portsmouth Water to Moor Hill reservoir extension (30Ml/d)	Extension of Bulk Transfer agreement - Import from Portsmouth Water to Moor Hill Reservoir	24	2030
SWS_HSE_HI-IMP_PRT_ALL_pwg	Import from Portsmouth Water to Moor Hill reservoir (30Ml/d)	Import from Portsmouth Water to Moor Hill reservoir	30	2030
SWS_HSE_HI-REU_RE1_ALL_wol8	Recycling: Woolston WwTW (7.1Ml/d)	This option is for additional treatment to the effluent at Woolston WwTW and sending this to Otterbourne WSW (circa 7.5Ml/d), from where it is sent to discharge to the River Itchen upstream of the abstraction. The scheme also involves discharge pipe from Otterbourne WSW to the River Itchen.	7.1	
SWS_HSE_HI-ROC_WT1_ALL_cpy_ott_30	Treatment capacity: Upgrade Otterbourne WSW (30Ml/d)	30Ml/d treatment train of surface water, possible augmented with Recycled Water. This would be a separate process stream from the existing raw water feed through to delivery to the network.	30	2031
SWS_HSE_HI-TFR_HRZ_ALL_sla	Transfer: Sandy Lane Abbotswood (HSE-HRZ) (1.1Ml/d)	Sandy Lane Abbotswood	1.1	2026
SWS_HSE_HI-TFR_PRT_ALL_pwc2	Import from Portsmouth Water (21Ml/d)	Additional 21Ml/d using a new pipeline from Portsmouth Water to Otterbourne, dependent on resource development (Havant Thicket reservoir) by PWC. 22 h/d operation assumed.	21	2030
SWS_HSE_HI-TFR_T2S_CNO_spar to ott 120 pot	HWZ to Otterbourne (120) Potable - Construction	HWZ to Otterbourne (120) Potable	120	2040
SWS_HSE_HI-TFR_T2S_CNO_spar to ott 50 pot	HWZ to Otterbourne (50) Potable - Construction	HWZ to Otterbourne (50) Potable	50	2040

Option Ref	Option Name	Option Description / Summary	Yield (Ml/d)	Year req'd?
SWS_HSW_HI-GRW_RE1_ALL_str_asr_tes_westi	Groundwater: Test MAR (5.5Ml/d)	Managed Aquifer Recharge (MAR). Recharge of the confined chalk aquifer from mains water in winter months, with subsequent onsite abstraction from the same aquifer ins summer/autumn critical low flow periods. Treatment is available on site and it is assumed that there is sufficient treatment capacity for the abstracted water. The scheme assumes an extended pilot trial period, with subsequent development of the MAR scheme.	5.5	2041
SWS_HSW_HI-ROC_WT1_ALL_cpy_tst_60	Treatment capacity: Upgrade Test surface water WSW (60Ml/d)	60Ml/d treatment train of surface water, possible augmented with Recycled Water. This would be a separate process stream from the existing raw water feed through to delivery to the network.	60	2031
SWS_HWZ_HI-TFR_HSE_CNO_oan1	Transfer: Hampshire grid (reversible link HSE-HW) (30Ml/d)	Transfer from Otterbourne to Andover to Near Basingstoke. This scheme is designed to support network improvements needed for UTMRD transfer to Hampshire and/or the strategic scheme from IoW/South Hampshire.	30	2028
SWS_IOW_HI-GRW_ALL_ALL_br_less	Groundwater: Eatern Yar3 replacement BH (1.5Ml/d)	The option is to drill a new replacement borehole, 100m deep, for Eastern Yar3 Augmentation well on the Isle of Wight. The existing Eastern Yar3 borehole has c. 90%+ loss in performance, and previous well rehabilitation and cleaning has not provided a notable improvement. A replacement well is required to regain resilience within the augmentation well field.	1.5	2040
SWS_IOW_HI-GRW_ALL_ALL_nw_gwa_kni_westi	Groundwater: Newchurch LGS	This option proposes replacing all 3 Lower Greensand boreholes on site so that the source can operate to its licenced capacity. Currently BH4 is non-operational. BH1 and BH2 are operational but at reduced capacity due to screen-dewatering. No additional treatment is proposed. Scheme output: 4.5Ml/d	4.5	2035
SWS_IOW_HI-REU_RE1_ALL_sey9	Recycling: Sandown WwTW (8.1Ml/d)	This option proposes the transfer of treated effluent from Sandown WwTW (currently discharged to sea), to support flows in the Eastern River Yar upstream of the Sandown WSW abstraction at Alverstone. Treated water in excess of the local demand will be transferred through a new transfer pipeline to the Alvington High Level WSR, near Newport, for supply to much of the island. This option is reliant on the WSR enlargements carried out in IZT_CSM Cross-Solent upgrade. (2) Option 2 also includes upgrades to Sandown WSW to achieve the extra flow.	8.05	2028

Option Ref	Option Name	Option Description / Summary	Yield (Ml/d)	Year req'd?
SWS_KME_HI-DES_ALL_ALL_ios10	Desalination: Isle of Sheppey (10Ml/d)	This option proposes a 10Ml/d desalination plant to meet demand on the Isle of Sheppey. Locating a desalination plant on the Isle of Sheppey has a clear advantage: it would meet local demand while significantly reducing the need for transfers along the main from Deans Hill BPT. This option could be enhanced to transfer treated water from the Isle of Sheppey to the wider Kent-Medway WRZ. A number of sites for a desalination plant were investigated and the most suitable would be located on land south of Sheerness Docks, currently used for storage of car imports. Water treated at this site would then be pumped to Southdown WSR and Kins Borough WSR on the island for distribution to customers. This site will be investigated further in the feasibility appraisal.	10	2057
SWS_KME_HI-DES_ALL_ALL_ios10	Desalination: Isle of Sheppey (20Ml/d) Phase 2	This option proposes a 20Ml/d desalination plant to meet demand on the Isle of Sheppey. Locating a desalination plant on the Isle of Sheppey has a clear advantage: it would meet local demand while significantly reducing the need for transfers along the main from Deans Hill BPT. This option could be enhanced to transfer treated water from the Isle of Sheppey to the wider Kent-Medway WRZ. A number of sites for a desalination plant were investigated and the most suitable would be located on land south of Sheerness Docks, currently used for storage of car imports. Water treated at this site would then be pumped to Southdown WSR and Kins Borough WSR on the island for distribution to customers. This site will be investigated further in the feasibility appraisal.	20	2057
SWS_KME_HI-DES_ALL_ALL_ios20	Desalination: Isle of Sheppey (20Ml/d)	This option proposes a 20Ml/d desalination plant to meet demand on the Isle of Sheppey. Locating a desalination plant on the Isle of Sheppey has a clear advantage: it would meet local demand while significantly reducing the need for transfers along the main from Deans Hill BPT. This option could be enhanced to transfer treated water from the Isle of Sheppey to the wider Kent-Medway WRZ.A number of sites for a desalination plant were investigated and the most suitable would be located on land south of Sheerness Docks, currently used for storage of car imports. Water treated at this site would then be pumped to Southdown WSR and Kins Borough WSR on the island for distribution to customers. This site will be investigated further in the feasibility appraisal.	20	2049

Option Ref	Option Name	Option Description / Summary	Yield (Ml/d)	Year req'd?
SWS_KME_HI-GRW_ALL_ALL_nw_gwa_win_eastn	Groundwater: Recommission Gravesend source (2.7Ml/d)	Gravesend source is a well and adit system that was decommissioned in 2007 due to high nitrate levels. A new nitrate treatment plant was constructed on site in 2006. A Source Investigation & Optimisation Study (SIOS) by Atkins in 2008 suggests that the nitrate problem was likely to be a faulty nitrate monitor. The report recommends a) Undertake a long-term step test with steps of seven days duration at rates of 3.0Ml/d, 3.3Ml/d and maximum pump capacity (approximately 3.66Ml/d) subject to stabilisation of pumping water levels during each step b) Recalibrate or repair the online raw water nitrate monitor, c) Modify the cover to the satellite well chamber to facilitate improved access Refurbishment of the existing nitrate plant will be required. Scheme Output: 5Ml/d	2.65	2040
SWS_KME_HI-REU_RE1_ALL_sit8	Recycling: Sittingbourne industrial reuse (7.5Mld)	This option is to use the reuse scheme to free up additional volume from an industrial user to increase the scope of the licence trading. The industrial user utilises the groundwater in its processes. It has been assumed at this stage that the RO wastewater can be discharged through Sittingbourne WwTW existing outfall.	7.5	2031
SWS_KMW_HI-DES_ALL_ALL_swa10	Desalination: River Thames estuary (10Ml/d)	This option proposes the development of a desalination plant on the Swanscombe Peninsula, which would be capable of producing 10Ml/d, and would combine discharge with Swanscombe WwTW's existing outfall. Treated water would be transferred to Singlewell WSR for distribution to the Kent Medway WRZ.	10	2042
SWS_KMW_HI-DES_ALL_ALL_swa10_p2	Desalination: River Thames estuary (10Ml/d) Phase 2	This option proposes the development of a desalination plant on the Swanscombe Peninsula, which would be capable of producing 10Ml/d, and would combine discharge with Swanscombe WwTW's existing outfall. Treated water would be transferred to Singlewell WSR for distribution to the Kent Medway WRZ.	10	2057
SWS_KMW_HI-DES_ALL_ALL_swa20	Desalination: River Thames estuary (20Ml/d)	This option proposes the development of a desalination plant on the Swanscombe Peninsula, which would be capable of producing 20Ml/d, and would combine discharge with Swanscombe WwTW's existing outfall. Treated water would be transferred to Singlewell WSR for distribution to the Kent Medway WRZ.	20	2040

Option Ref	Option Name	Option Description / Summary	Yield (Ml/d)	Year req'd?
SWS_KMW_HI-DES_ALL_ALL_swa20_p2	Desalination: River Thames estuary (20Ml/d) Phase 2	This option proposes the development of a desalination plant on the Swanscombe Peninsula, which would be capable of producing 20Ml/d, and would combine discharge with Swanscombe WwTW's existing outfall. Treated water would be transferred to Singlewell WSR for distribution to the Kent Medway WRZ.	20	2041
SWS_KMW_HI-REU_RE1_ALL_ecc18	Recycling: Medway WwTW (12.8Ml/d)	This option involves the transfer of 12.8Ml/d of treated effluent from Medway WWTW to near Rochester WSW's raw water storage reservoir Eccles Lake.	12.8	2031
SWS_KMW_HI-RSR_RE1_ALL_rab1	Storage: Raising Bewl by 0.4m (3Ml/d)	The scheme involves the raising of Bewl Water, by 0.4m to increase storage and yield. The major works for raising Bewl to higher TWL levels will include: • Raise the dam crest and build new wave wall;• Raise overflow and valve chamber shafts; and • Many ancillary works around the perimeter of the reservoir.	3	2042
SWS_KTZ_HI-DES_ALL_ALL_tha10_p2	Desalination: East Thanet coast & transfer (10Ml/d) Phase 2	This option would see a desalination plant constructed near to the North Thanet Coast, and would supply potable desalinated water to the Kent Thanet WRZ. Phase 2	10	2046
SWS_KTZ_HI-DES_ALL_ALL_tha20	Desalination: East Thanet coast & transfer (20Ml/d)	This option would see a desalination plant constructed near to the North Thanet Coast, and would supply potable desalinated water to the Kent Thanet WRZ.	20	2041
SWS_KTZ_HI-DES_ALL_ALL_tha20_p2	Desalination: East Thanet coast & transfer (20Ml/d) Phase 2	This option would see a desalination plant constructed near to the North Thanet Coast, and would supply potable desalinated water to the Kent Thanet WRZ. Phase 2	20	2046
SWS_KTZ_HI-TFR_AZ7_ALL_win	Import: SEW Kingston to KTZ Near Canterbury (2Ml/d)	2Ml/d import from SEW Kingston to SWS near Canterbury WSW	2	2026
SWS_KTZ_HI-TFR_KME_ALL_sel3	Transfer: Utilise full existing KME-KTZ transfer capacity (9Ml/d)	The operational transfer is limited to the output from Faversham4. This option enables flows from the Throwley source to be directed, via an existing main, towards Faversham4 WSW. A soakaway is installed at Faversham4 to allow for reconditioning of the existing main and the addition of UV treatment at Faversham4 permits disinfection of the Throwley flows.	9	2040
SWS_KTZ_HI-TFR_KME_ALL_sfl	Transfer: KTZ-KME (14Ml/d)	Transfer: KTZ-KME (Faversham4 WSR to KME WSR)	14	2026

Option Ref	Option Name	Option Description / Summary	Yield (Ml/d)	Year req'd?
SWS_KTZ_HI-TFR_RZ8_ALL_canterb-wingha p 20	Canterbury (Broad Oak) to Near Canterbury GW	Transfer from Broad Oak to near Canterbury	20	2050
SWS_KTZ_HI-TFR_RZ8_ALL_win	Import: SEW Kingston to KTZ Near Canterbury (2Ml/d)	2Ml/d import from SEW Kingston to SWS near Canterbury WSW	2	2026
SWS_PRT_HI-TFR_HSE_ALL_otterbo-gaters p	Otterbourne to Gaters Mill: 45Ml/d	A pipe connecting SWS Otterbourne WSW to Portsmouth Water	45	2049
SWS_PWE_HI-REU_RE1_ALL_60toht v0.1	Recycling: Recharge of Havant Thicket reservoir from Portsmouth Harbour WTW and new WRP (60Ml/d)	60Ml/d Recycled water sent to Otterbourne via Havant Thicket Reservoir. Portsmouth Harbour WTW transfer to new WRP transfer to Havant Thicket, then direct raw water transfer to Otterbourne for treatment. Replaces SRO B4.	60	2031
SWS_SBZ_EF-TFR_REP_ALL_har2 res	Transfer: Winter transfer Stage 2: New main Shoreham/North Shoreham and Brighton A (4Ml/d)	Pipeline which allows excess winter supply from Pulborough WSW to be transferred to Sussex Brighton WRZ	2	2041
SWS_SBZ_HI-DES_ALL_ALL_shom10	Desalination: Sussex Coast (Modular 0-10Ml/d) (10Ml/d)	A site in Shoreham Harbour was originally identified as the most feasible location for a coastal desalination plant that could supply the Central Area WRZs. An alternative location along the Sussex Coast is being sought as the original site at Shoreham Harbour is no longer available. The treated water would be supplied to the Sussex WRZ distribution network.	10	2028
SWS_SBZ_HI-DES_ALL_ALL_shom20	Desalination: Sussex Coast (Modular 10-20Ml/d) (10Ml/d)	A site in Shoreham Harbour was originally identified as the most feasible location for a coastal desalination plant that could supply the Central Area WRZs. An alternative location along the Sussex Coast is being sought as the original site at Shoreham Harbour is no longer available. The treated water would be supplied to the Sussex WRZ distribution network.	20	2042

Option Ref	Option Name	Option Description / Summary	Yield (Ml/d)	Year req'd?
SWS_SBZ_HI-DES_ALL_ALL_shom40	Desalination: Sussex Coast (Modular 10-20Ml/d) (40Ml/d)	A site in Shoreham Harbour was identified as a the most feasible location for a coastal desalination plant that could supply the Central Area WRZs. The new desalination plant would be constructed within the site of an existing power station and make use of its abstraction and discharge structures. The treated water would be supplied to the Sussex WRZ distribution network.	40	2057
SWS_SBZ_HI-TFR_SWZ_ALL_v6b	Transfer: SWZ-SBZ v6 valve (17Ml/d)	Trunk main at v6 valve (SWZ to SBZ)	17	2026
SWS_SBZ_HI-TFR_SWZ_ALL_v6b 2026	Transfer: SWZ-SBZ additional through v6 valve (13Ml/d)	Trunk main at v6 valve (SWZ to SBZ) additional capacity (from 2026/27) (negates need for IZT_Har3)	13	2026
SWS_SHZ_HI-GRW_ALL_ALL_ass_br_bre_eastn	Groundwater: Rye Wells reconfiguration (1.5Ml/d))	Rye groundwater source is a well & adit system that is over 100 years old, and has reached the end of its asset life. It abstracts from the Ashdown Beds. Operational wells 1 and 3 are to be replaced by boreholes. Additional land may be required for at least one of the boreholes due to space constraints on site. Wells 2 and 4 are out of service and do not require replacement. Scheme output is 1.5Ml/d. There is an existing surface water WSW on site and no further treatment is required.	1.5	2041
SWS_SHZ_HI-REU_RE1_ALL_dar10	Recycling: Hastings WTW to augment storage in Darwell reservoir (9.5Ml/d)	This option proposes the transfer of treated effluent from Hastings WTW, currently being discharged to sea at Pebsham Gap, in order to augment storage in Darwell reservoir. This option includes tertiary treatment of Hastings wastewater, this may include Membrane Bio Reactors and Reverse Osmosis. Additional GAC and UV treatment may be required at Rye WSW.	9.47	
SWS_SHZ_HI-REU_RE1_ALL_env_cu_bew1_conju	Recycling: Tunbridge Wells WTW conjunctive use with Bewl reservoir (3.6Ml/d)	New resource. This option is a new 5Ml/d water recycling plant producing a DO of 3.6Ml/d near Tunbridge Wells WwTW and a transfer of the treated effluent to Bewl reservoir, which feeds Darwell reservoir, Bewl WSW and near Rochester WSW. Process losses have been included.	3.6	2046
SWS_SNZ_HI-IMP_PRT_ALL_pwh	Import: PWC to Pulborough WSW (15Ml/d)	Import from Portsmouth Water at Pulborough	15	2027

Option Ref	Option Name	Option Description / Summary	Yield (Ml/d)	Year req'd?
SWS_SNZ_HI-IMP_SWZ_ALL_rrn	Transfer: Rock Road bi-directional transfer (SWZ-SNZ) (15Ml/d)	Rock Road bi-directional transfer (SWZ-SNZ)	15	2026
SWS_SNZ_HI-REU_RE1_ALL_env_cu_chu2_conju	Recycling: Horsham WTW conjunctive use with Arun Reservoir, Pulborough (6.8Ml/d)	New resource. This option is a new 9.5Ml/d water recycling plant producing a DO of 6.8Ml/d near Horsham WwTW and a transfer of the treated effluent to Arun Reservoir, which feeds into Pulborough WSW. Process losses have been included.	6.8	2055
SWS_SNZ_HI-REU_RE1_ALL_for20	Recycling: Littlehampton WwTW (15Ml/d)	This scheme proposes the transfer of treated effluent from Littlehampton WwTW to a new discharge point to the western River Rother upstream of the Pulborough WSW abstraction. This would support flows over the Pulborough weir as the MRF is approached, therefore prolong production at Pulborough during a drought. 20Ml/d represents the upper end of the reliable flow that could be expected from Littlehampton WwTW. Once abstracted at Pulborough WSW this water would be used to meet demand in the Sussex North WRZ.	14.96	2028
SWS_SNZ_HI-ROC_RE1_ALL_hsb-rcm	Groundwater: Petworth WSW return to service with a new borehole (4.0Ml/d)	Petworth WSW - return WSW to service with a new borehole. The option is to drill a new replacement borehole for Petworth WSW in Sussex North Area. Borehole to be minimum c. 300mm dia ID, and c. 80m depth.	4	2044
SWS_SNZ_HI-RSR_RE1_ALL_bla	Storage: River Adur offline reservoir (19.5Ml/d)	The option involves the construction of an earth embankment reservoir at River Adur with a proposed storage capacity of up to 4,600 Ml. The option will allow treated water to enter the distribution network to supply either the Sussex coastal block or the Pulborough area. The reservoir will be filled with water pumped from the eastern branch of the river Adur. The abstraction of raw water from the river to the reservoir would have a maximum flow of 30Ml/d.	19.5	2045
SWS_SNZ_HI-TFR_PWE_ALL_havant - hardha r 20	Havant Thicket To Pulborough WSW: 20Ml/d	A bidirectional raw water transfer from Pulborough to Havant Thicket. INNS treatment to be provided at Pulborough.	20	2050
SWS_SNZ_HI-TFR_PWE_ALL_havant - hardha r 50	Havant Thicket To Pulborough WSW: 50Ml/d	A bidirectional raw water transfer from Pulborough to Havant Thicket. INNS treatment to be provided at Pulborough.	50	2040

Option Ref	Option Name	Option Description / Summary	Yield (Ml/d)	Year req'd?
SWS_SNZ_HI-TFR_RZ5_ALL_tilmore-hardha p 10	Tilmore to Pulborough: 10Ml/d	A transfer between Tilmore and Pulborough	10	2031
SWS_SNZ_HI-TFR_SES_ALL_outwood-turner p 10	Outwood To Turners Hill: 10Ml/d	Proposed new transfer from Outwood to Buchan Hill, Crawley. 10Ml/d transfer flow rate	10	2031
SWS_SWZ_HI-DES_ALL_ALL_aru10	Desalination: Tidal River Arun (10Ml/d)	This option proposes a desalination plant to treat estuarine water from the tidal River Arun to supply treated water to the Sussex Worthing WRZ. It is assumed that the water could be used during drought conditions to meet demand in Sussex Worthing WRZ. There is bi-directional transfer between Sussex Worthing WRZ and Sussex North WRZ which means this option could have result in additional benefit to Sussex North WRZ. An investigation in AMP4 indicated that land adjacent to Littlehampton WwTW showed the greatest potential for a new desalination site because of the existing land use, the availability of services (access roads, power, etc.) and the potential savings if it is possible to use Littlehampton's existing long-sea outfall.	10	2062
SWS_SWZ_HI-LRE_ALL_ALL_har1	Transfer: Winter transfer stage 1 - Provision of a permanent sludge treatment facility at Pulborough WSW (2Ml/d)	During the winter there is surplus surface water within the River Rother. This scheme would allow the surplus to be used at Pulborough WSW (within licence constraints) which in turn would allow coastal groundwater sources to be rested. This increase in groundwater can be utilised through new transfer mains from Worthing to Brighton A WSR via Shoreham WSW, providing the additional 2Ml/d of water to Brighton WRZ during the summer and autumn of a drought year. This is Phase 1, which is to provide a permanent sludge treatment facility at Pulborough WSW.	2	2031
SWS_SWZ_HI-TFR_SNZ_ALL_hardham-tenant p 30	Pulborough to Worthing: 30Ml/d	Additional pipeline to provide extra capacity.	40	2040
SWS_T2S_HI-ROC_WT1_CNO_culham120 pot	Culham (120) - potable - Construction	New 120Ml/d WTW at Culham for potable water options	120	2040

Option Ref	Option Name	Option Description / Summary	Yield (Ml/d)	Year req'd?
SWS_T2S_HI-ROC_WT1_CNO_culham50pot	Culham (50) - potable - Construction	New 50Ml/d WTW at Culham for potable water options	50	2049

Demand-side options

The demand side options are summarised in **Table 2.2**. It is assumed that these will be employed across the planning period. It should be noted that the '**demand side**' measures are not geographically specific at the WRMP level, and could be applied anywhere within SWS's network. Location-specific information on the measures is not available without specific investigations, which would form part of the package (for example, the location and severity of most leakages is not known).

Table 0.2 Preferred demand-side options

Option Ref / Name	Summary	Yield (Ml/d)
SWS_T100 Audits (all)	A co-ordinated programme of water audits. Contains the following sub options: - Normal Water Audits (audit a) - Smart metering assisted water audits (audit b)	2.5
SWS_T100 Comms (all)	A marketing and comms campaign to promote behaviour change to reduce the amount of water used. Contains three sub-options: - National Campaign - Local Campaign - Awareness Campaign	9.12 (by end of programme)
SWS_T100 Education (all)	Educational talks (schools and groups and Water Efficiency events). Aim to raise awareness and the importance of water efficiency to ensure water supplies and the environment are sustainable in the future. School children will be the future bill payers and can also take home the messages to parents. This engagement sits alongside areas such as smart metering to help homes and families understand the context behind which these initiatives reside. We Are Futures: Currently engaged to create water efficiency course content and other mechanisms for embedding T100 values at an early age.	3 (by end of programme)
SWS_T100 Products and innovation (all)	A co-ordinated programme of water efficiency products, services and innovation to reduce water consumption. Contains the following sub options: - Colour changing/more efficient showers - Supply of products to reduce garden water use - Leaky loo campaign - Goal setting templates - Innovation programme	32 (by end of programme)
SWS_T100 Reg and Policy (all)	This is a programme of changes to regulation and policy with regard to new building standards and appliances to reduce water consumption. Contains three sub options: - New building standards to 100l/p/d (from 2030) - New building standards to 85l/p/day (from 2035) - New water efficiency labelling on products (from 2030)	6.5
SWS_T100 Smart Metering (all)	Rollout of AMI Smart meters to all households over the 2025-2030 period.	11

Option Ref / Name	Summary	Yield (Ml/d)
SWS_T100 Tariffs (all)	Applying differential tariffs such as a summer/winter tariff or a rising block tariff to deliver a dual benefit of reducing water wastage and reducing bills. The AMI smart metering programme acts as an enabler to implement different tariffs structures in future. This option could be utilised, for example, to change tariffs during dry weather events to peak lop demand or reduce demand over the year on average. The operating cost of the option is unlikely to vary year on year as it is a billing tool, however, it would have a net positive impact on carbon through reduced water consumption.	14.6
SWS_Leakage_[RZ]	This is an integrated strategy of activities to reduce leakage to meet the long term-ambition of at least a 50% reduction. This programme is made up from the following core elements implemented across each Resource Zone: • Traditional find and fix • Enhanced find and fix • Smart metering • Digital networks • Advanced Pressure Management • Asset renewal • Mains renewal • Communication pie renewal	46

Drought Options

In addition, the WRMP includes 56 drought options that are proposed in the emerging Drought Plan (**and which have been assessed as part of the HRA of that plan**). These options do not deviate from the Drought Plan proposals, but are identified as WRMP options for modelling purposes (i.e. they are assumed to still be available for use beyond the end of the current Drought Plan period, although this would necessarily be reviewed each time the Drought Plan is updated). As these have already been subject to assessment in the Drought Plan HRA (available from SWS) they are are only considered 'in combination' with the preferred supply-side options.

Table 0.3 Preferred drought options

Option Ref	Option Name	Summary	Yield (Ml/d)
SWS_IOW_RE-DRO_ALL_ALL_env_lv_cal_westi	Drought option: Caul Bourne reduce MRF (1.5Ml/d)	Caul Bourne reduce MRF	1.5

Option Ref	Option Name	Summary	Yield (Ml/d)
SWS_HSE_RE-DRO_ALL_ALL_si_can2	Drought option: Candover Drought Permit/Order (2027-2029 only) (15.4Ml/d)	To allow up to 27Ml/d and 3750Ml/year (average of 20.8Ml/d over 6 months) to be abstracted from the Preston Candover boreholes. Abstraction would be increased over a period of several days up to the full required discharge rate so as to prevent a sudden increase in flow in the River Itchen. Abstraction and discharges will only be permitted when flows in the River Itchen at Allbrook and Highbridge are at or below a trigger flow of 220Ml/d. 2Ml/d environmental support (within the limits above) at the existing discharge to the Candover Stream. Operated during, and potentially after, discharges to the River Itchen.	14.37
SWS_SHZ_RE-DRO_ALL_ALL_si_dar2	Drought option: Darwell Reservoir (stages 1 (freshet removal) to 3) Drought Permit/Order (2025 onwards) (1.2Ml/d)	Drought option: The drought order involves a proposed reduction in the statutory Minimum Residual Flow (MRF) as gauged at the Robertsbridge flow gauging weir on the River Rother. MRF would be reduced to 10Ml/d to enable abstraction to take place when flows are sufficiently high. The proposed drought order reduction varies depending on the time of year. The drought order would be sought in order to increase the volume of water available for abstraction at the Robertsbridge intake to pump up to Darwell Reservoir to augment the remaining storage. The drought order will influence flows in the watercourses downstream of Robertsbridge.	3.1
SWS_SNZ_RE-DRO_ALL_ALL_si_har_2	Drought option: Pulborough surface (Phases 1 to 3) Drought Permit/Order (2025 onwards)	Pulborough surface water (Phases 1 to 3) Drought permit/order (2025 onwards)	23
SWS_HSE_RE-DRO_ALL_ALL_si_ott2	Drought option: Lower Itchen (g/w and s/w sources) Drought Permit/Order (from 2027 onwards) (61.5Ml/d)	Increase current licenced quantity. The implementation of the drought permit would result in a major adverse effect on flows in the River Rother in summer. There would be associated moderate adverse impact on water quality and ecology, notably migratory fish and the Least Water Snipe Fly. The reduction in river flows and levels would have a minor adverse effect on visual amenity.	38

Option Ref	Option Name	Summary	Yield (Ml/d)
SWS_SWZ_RE-DRO_ALL_ALL_si_mad_2	North Arundel Drought Permit/Order (2025 onwards)	Drought option: Under more severe droughts, where resources in Sussex Coast themselves are under threat, and drought measures in Sussex North (such as the Pulborough MRF reduction) are not sufficient or suitable to address the situation, then a drought permit/order may be sought to increase licensed abstraction at North Arundel. The proposed drought option involves increasing groundwater abstraction at North Arundel PS through the application for and implementation of a Drought Order. This source typically pumps at 4.5Ml/d and is constrained by the licence. The drought action would seek to increase the daily abstraction rate by 2.5Ml/d to 7Ml/d, which is the peak deployable output of the source. Increasing the abstraction from North Arundel will provide additional supply for Sussex Coast and possibly support bulk transfers to Sussex North. However, this is only a severe drought option due to the sensitivity of Swanbourne Lake.	2.5
SWS_SWZ_RE-DRO_ALL_ALL_si_mad_2_v2	North Arundel Drought Permit/Order (2025 onwards)	Drought option: Under more severe droughts, where resources in Sussex Coast themselves are under threat, and drought measures in Sussex North (such as the Pulborough MRF reduction) are not sufficient or suitable to address the situation, then a drought permit/order may be sought to increase licensed abstraction at North Arundel. The proposed drought option involves increasing groundwater abstraction at North Arundel PS through the application for and implementation of a Drought Order. This source typically pumps at 4.5Ml/d and is constrained by the licence. The drought action would seek to increase the daily abstraction rate by 2.5Ml/d to 7Ml/d, which is the peak deployable output of the source. Increasing the abstraction from North Arundel will provide additional supply for Sussex Coast and possibly support bulk transfers to Sussex North. However, this is only a severe drought option due to the sensitivity of Swanbourne Lake.	2.5
SWS_IOW_HI-ROC_ALL_ALL_env_lv_yar_westi	Drought option: Modification of operational rules for the Eastern Yar scheme	Modification of operational rules for the Eastern Yar scheme.	0

Option Ref	Option Name	Summary	Yield (Ml/d)
SWS_SNZ_RE-DRO_ALL_ALL_si_wei_2	Weir Wood reservoir Drought Permit/Order (2025 onwards)	Drought option: The Company can apply for a Drought Permit or Order to reduce the compensation flow from Weir Wood reservoir to maintain water levels. This is a possibility for both summer and winter conditions but typically will only be sought when a specific drought issue is affecting the integrity of the reservoir. This Drought Permit is concerned with a reduction in compensation flow from Weir Wood Reservoir and Weir Wood WSW to maximise available resources for public water supply	3.14
SWS_KMW_RE-DRO_ALL_ALL_si_bew2	Drought option: Bewl Water/River Medway Scheme (stages 1 to 4) Drought Permit/Order (2025 onwards) (17Ml/d)	Bewl Water is a pumped storage reservoir with abstractions from the River Teise at Smallbridge and the River Medway near Maidstone. The Permit may take the form of authorisations to allow increased re-filling and conservation of existing storage of Bewl. The precise conditions applied for will depend upon the severity and timing of each drought.	17
SWS_SWZ_RE-DRO_ALL_ALL_dp_nor_2	East Worthing Drought Permit/Order (2025 onwards)	East Worthing Drought permit/order (2025 onwards)	2.5
SWS_IOW_RE-DRP_ALL_ALL_env_lv_bow_westi	Drought option: Relaxation of Lukely Brook MRF from Lower Chalk in Lukely Brook Valley	Relaxation of Lukely Brook MRF from Lower Chalk in Lukely Brook Valley	3
SWS_HSW_RE-DRO_ALL_ALL_si_tesdo2	Drought option: Test surface water Drought Order (from 2027 onwards) (80Ml/d)	Test surface water Drought Order (from 2027 onwards)	80
Various	Drought option: NEUBs (All WRZs)	Non-essential use ban.	17.05
Various	Drought option: Reduce transfer to other commercial customers (All WRZs)	Drought option: In the event of a drought the Company would hold discussions with a commercial customer with regards to the resources position and their supply.	1.1
Various	Drought option: TUBs (All WRZs)	Temporary use bans.	31.49

* The drought options do not provide additional yield on a day to day basis; rather, they are included in the long-term modelling for the WRMP when selecting the WRMP preferred options.

Approach to HRA

The nature of the WRMP (a long-term strategic plan with specific projects) presents challenges for a 'strategic' or plan-level HRA and it is therefore important to understand how the WRMP is developed and hence how it might consequently affect European sites.

Key Guidance

The key guidance document for HRA of WRMPs is **UKWIR (2021). *Environmental Assessment Guidance for Water Resources Management Plans and Drought Plans*. UK Water Industry Research Limited, London**.

Other relevant guidance and case-practice includes:

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Application of HRA of WRMPs

Process Overview

European Commission guidance[16] and established case-practice suggests a four-stage process for addressing Articles 6(3) and 6(4), and hence Regulations 63 and 64 (see **Box 1**), although not all stages will necessarily be required:

[16] *Methodological guidance on the provisions of Article 6(3) and (4) of the Habitats Directive 92/43/EEC* (EC 2002).

Box 1 – Stages of HRA

Stage 1 – Screening or 'Test of significance'

This stage identifies the likely effects of a project or plan on a European site, either alone or 'in combination' with other projects or plans, and considers whether these effects are likely to be significant. The 'screening' test or 'test of significance' is a low bar, intended as a trigger rather than a threshold test: a plan should be considered 'likely' to have an effect if the competent authority is unable (on the basis of objective information) to exclude the possibility that the plan or project could have significant effects on any European site, either alone or in combination with other plans or projects; an effect will be 'significant' simply if it could undermine the site's conservation objectives. Note that mitigation measures should not be considered at the 'screening' stage, in accordance with the **People over Wind** (Court of Justice of the European Union (ECJ) Case C-323/17); this reinforces the idea of screening as a 'low bar' and makes 'appropriate assessments' more common.

Stage 2 – Appropriate Assessment (including the 'Integrity test')

An 'appropriate assessment' (if required) involves a closer examination of the plan or project where the effects on relevant European sites are significant or uncertain, to determine whether any sites will be subject to 'adverse effects on integrity' if the plan or project is given effect, taking into account the sites' conservation objectives and conservation status. Site integrity (in HRA terms) is "*the coherent sum of the site's ecological structure, function and ecological processes, across its whole area, which enables it to sustain the habitats, complex of habitats and/or populations of species for which the site is designated*" (EC Guidance 'Managing Natura 2000' (2018)). The scope of any 'appropriate assessment' stage is not set, and the assessments will not be extremely detailed in every case (particularly if mitigation is clearly available, achievable, and likely to be effective). The assessments must be 'appropriate' to the effects and proposal being considered, and sufficient to ensure that there is no reasonable doubt that adverse effects on site integrity will not occur (or sufficient for those effects to be appropriately quantified should Stages 3 and 4 be required).

Stage 3 – Assessment of Alternative Solutions

Where adverse effects remain after the inclusion of mitigation, Stage 3 examines alternative ways of achieving the objectives of the project or plan that avoid adverse impacts on the integrity of European sites. A plan or project that has adverse effects on the integrity of a European site cannot be permitted if alternative solutions are available, except for imperative reasons of overriding public interest (IROPI; see Stage 4).

Stage 4 – Assessment Where No Alternative Solutions Exist and Where Adverse Impacts Remain

This stage assesses compensatory measures where it is deemed that there are no alternatives that have no or lesser adverse effects on European sites, and the project or plan should proceed for imperative reasons of overriding public interest (IROPI). The EC guidance does not deal with the assessment of IROPI, although the IROPI need to be sufficient to override the adverse effects on European site integrity, taking into account the compensatory measures that can be secured (which must ensure the overall coherence of the 'national site network'.

The stages in Box 1 (if required) are used to ensure compliance with the Habitats Regulations and so principally reflect the stepwise legislative tests applied to the final, submitted project or plan; **there is no statutory requirement for HRA (or its specific stages) to be completed for draft plans or similar developmental stages**.

Consequently, there is flexibility for the HRA *process* to be run in a manner that provides maximum benefit for plan-development and sound decision-making, whilst still ultimately meeting the legislative tests.

In practice, HRAs of WRMPs usually have two functional components: they informally guide each water company as it considers which water resource options will be included in the published plan; and subsequently provide a formal assessment of the published WRMP against Regulation 63. A degree of separation between these functions is therefore sometimes necessary, and the rigid application of the stages in Box 1 to the emerging or

interim stages of strategic plans[17] is not always appropriate, reducing the clarity and usefulness of the HRA as a plan-shaping process for both plan-makers and consultees. For WRMPs this is especially true for the assessment of the emerging feasible options and the application of the 'People over Wind' (PoW)[18] case.

Therefore, whilst the principles of HRA have been applied to the emerging WRMP and the feasible options (principally by WRSE as part of its optioneering process), **the specific tests associated with Regulation 63 are applied to the preferred programme of options only**. The overarching HRA *process* for the WRMP has therefore included the following key steps:

- An initial **'screening' of the supply-side[19] feasible options, undertaken by WRSE** (WRSE 2022), that applied the assessment practices of HRA to the options identified within the Emerging Regional Plan to identify those where 'likely significant effects' on European sites could not be excluded[20].
- A '**verification review**' of the 'screening' for the preferred options selected by WRSE for SWS, to support SWS's June 2022 submission (Wood 2022). The review of the options applied the normal principles and practices associated with 'HRA screening' but also took account of the deliverability of the options including potential mitigation opportunities[21] (for clarity, this review process is not documented in this report).
- The **assessment of the preferred programme of options** against the provisions of Regulation 63, comprising formal 'screening' and an 'appropriate assessment' designed to meet the legislative tests or identify key uncertainties requiring resolution prior to the final plan being adopted (this report).

Key Challenges and Assumptions

[17] Particularly those (such as WRMPs) where the guideline HRA stages do not map easily on to the agreed or statutory stages in the plan development process.

[18] *People Over Wind and Sweetman v Coillte Teoranta* (C-323/17)

[19] Demand-side options designed to reduce treated water use (such as metering, provision of water butts or leakage reduction options) are not systematically reviewed at this stage as they are invariably generic and geographically unspecified activities or groups of actions that cannot negatively affect any European sites (or be meaningfully assessed at the strategy level). Since they will form part of the adopted WRMP they are formally subject to Regulation 63 as part of the final HRA, but this is typically a simple screening exercise or 'down-the-line' deferral, depending on the nature of the option.

[20] Note, this was not a formal legislatively compliant screening of the regional plan or the SWS options as this cannot be completed for developmental stages of plans and did not include an in combination assessment.

[21] Applying a PoW-compliant 'screening' assessment to the feasible options would have little value for plan-development since mitigation opportunities, including effective and well-established measures for marginal effects, would be ignored. All options with 'likely significant effects' would therefore be treated equally, with no distinction between options that would (from an HRA perspective) be easily achievable in practice and those that would be extremely challenging or impossible. The review of the feasible options is not therefore intended to be, or replicate, a formal and fully compliant 'HRA screening' or be a 'draft HRA' or similar. It takes a broad view of the 'HRA-related risk' associated with an option that captures both the risk to Southern Water and the delivery of the WRMP within the statutory timescales (for example, the data collection required to definitively demonstrate that an option is acceptable might not be achievable in the time available for delivery of the WRMP) and the risks of the option to European site integrity (i.e. where adverse effects would appear to be an unavoidable outcome of the option as presented). The terminology intentionally reflects a typical RAG risk assessment to provide clarity for Southern Water and to avoid the perception of premature assessment conclusions.

The fundamental nature of the WRMP (a long-term strategic plan with specific projects) presents a number of distinct challenges for a 'strategic' or plan-level HRA and it is therefore important to understand how the WRMP is developed, its objectives, and hence how it might consequently affect European sites. In particular this report provides a strategic, plan-level assessment to support the WRMP and is not an application-specific ('project-level') assessment. It is based on data and information that can be reasonably gathered at the plan-level and so does not include option-specific survey data or similar. More detailed, application-specific HRAs will be needed to support future planning applications and environmental permits/consents.

Uncertainty and plan-level mitigation

HRAs of plans and strategies typically have to deal with a degree of uncertainty; very often, it is not possible to provide a detailed assessment of the effects of a proposal as many aspects simply cannot be fully defined at the strategy-level in the planning hierarchy. This is particularly true for options that will only be required over longer-term planning horizons, which are inevitably less defined than options that are required in the near term.

Where the available information is fundamentally insufficient to complete a meaningful appropriate assessment, then case-practice (both for WRMPs and strategic plans in general) suggests some assessment may be deferred 'down the line' to a lower planning tier provided that certain criteria are met.

This is usually only appropriate where there is sufficient certainty that the proposal can (with the implementation of established scheme-level measures that are known to be effective) avoid adverse effects on the integrity of European sites; and/or if appropriate investigation schemes are identified to resolve the uncertainty and commitments are made within the plan to not pursue an option if adverse effects are identified through these investigations.

Case-practice in WRMP HRAs[22] suggests it may be acceptable to include Preferred Programme options with residual uncertainties provided that:

- there is sufficient flexibility within the terms of the WRMP to ensure adverse effects can be avoided at the project level (e.g. the plan does not dictate specific pipeline routes or yields that cannot be deviated from); and/or
- the option is not required within the first five years of the plan period, so allowing time for additional investigations to be completed; and
- the uncertainty that this creates is mitigated at the plan-level by the inclusion of alternative options which:
  - will meet the required demand / deficit should the Preferred Programme option prove to have an unavoidable risk of adverse effects on the European sites in question; **and**
  - will not themselves have any adverse effect on any European sites.

Note, this is not intended to provide a mechanism for the inclusion of options where there appears to be no reasonable way of avoiding adverse effects. It should be noted that this flexibility

[22] For example, in relation to UU's WRMP14.

is perhaps desirable in any case, since it is possible that a 'no adverse effect' option might be subsequently proven to have adverse effects when brought to the design stage. This approach allows for the WRMP to be compliant with the Habitats Regulations, since certainty over outcomes for the plan as a whole is provided.

However, it is important to note that some uncertainties will invariably remain (particularly with regard to 'in combination' effects) and for some options it will only be possible to fully assess any potential effects at the pre-project planning stage, when certain specific details are known; for example: construction techniques; site specific survey information; the precise timing of implementation; or the status of other projects that may operate 'in combination'. In addition, it may be several years before an option is employed, during which time other factors may alter the baseline or the likely effects of the option.

WRMP development parameters and relevance to HRA

The modelling underpinning the WRMP development and option selection process incorporates several assumptions that influence the scope of the HRA:

- The WRMP development process takes account of the existing consents regime, and any known (or reasonably anticipated) amendments that are likely to be required (e.g. following WINEP investigations or similar) since there has to be a starting point / basis for the assessment (i.e. the modelling / optioneering process cannot start with the assumption that no current consents are reliable). Any required licence amendments are factored into the supply-deficit calculations, and the EA will have confirmed that these are valid for the planning period when the WRMP modelling is undertaken. The existing consents regime (taking into account any required sustainability reductions) is therefore 'the baseline'[23] and, by extension the HRA of the WRMP necessarily focuses on the additional effects introduced by the WRMP options and does not (and cannot) reassess or reconfirm the existing consents regime.

- In some instances, when considering water that may be available from existing sources, consultees have indicated that consideration of 'recent actual' abstraction is more appropriate than the currently licenced maximum, particularly for waterbodies that are considered 'over-licensed'; it is understood that these licences have been identified to SWS during the plan-development process and factored into the supply-demand balance calculations.

- The modelling takes account of predicted local and regional growth when identifying risk areas and potential solutions, based (*inter alia*) on Local Plans and population growth models. 'In combination' effects with respect to land-use plans and specific options are therefore inherently considered and accounted for as part of the WRMP option development process (i.e. an option that does not account for local growth is

[23] It is recognised that, occasionally, the sustainability reductions agreed through the RoC process have been subsequently shown to be insufficient to address the effects of PWS abstraction on some sites (the most notable example is the River Ehen in Cumbria); it is assumed that these will be identified to the water companies as part of the WRMP development process.

not a solution) and this can be relied on by the HRA. Likewise, the modelling accounts for climate change.

- Unless otherwise stated by the EA during the options development process, it is assumed that the relevant Catchment Abstraction Management Strategy (CAMS) documents are correct and reliable, and that there is 'water available' where this is confirmed by the CAMS.

In combination effects with SROs

With regard to schemes involving multiple water companies (particularly some SROs) the assessment will necessarily focus on those European sites directly exposed to the activities proposed and managed by SWS, rather than sites that will only be affected by those scheme elements proposed and managed by other water companies; i.e. when undertaking the 'in combination' assessment of a scheme that appears in multiple plans the effects from source/donor will be considered distinct from supply/beneficiary.

For example, the source/donor plan will only consider the implications of the abstraction, etc. on relevant European sites and water bodies within its catchment (and downstream catchments where relevant), and the supply/beneficiary plan would consider any implications on European sites / water bodies from the application of the supplied water within its catchment/s[24]. This approach is intended to ensure unnecessary duplication is avoided, and pragmatism will be applied to address indirect, downstream effects and effects on functional habitat.

HRA of the Preferred Options

Geographical Scope

'Arbitrary' buffers are not generally appropriate for HRA. However, as distance is a strong determinant of the scale and likelihood of effects, the application of a suitably precautionary study area (based on a thorough understanding of both the options and European site interest features) has some important advantages due to the number of options and the benefits of a consistent approach:

- using buffers allows the systematic identification of European sites using GIS, so minimising the risk of sites or features being overlooked;
- it ensures that sites for which there are no reasonable impact pathways can be quickly and transparently excluded from any further screening or assessment; and
- when assessing multiple options it provides a consistent point of reference for consultees following the assessment process, and the 'screening' can therefore focus on the assessment of effects, rather than on explaining why certain sites may or may not have been considered in relation to a particular option.

Professional experience and case-practice relating to typical water industry schemes demonstrates that environmental changes associated with construction in terrestrial environments are

[24] Note: for the Severn Thames transfer we would expect the in-combination assessment of impacts on the Severn to feature in both WRW and WRSEs plans. This is due to the complex interaction of releases and abstractions particular to this scheme.

rarely notable more than 2 km from a source, and the UKWIR (2021) guidance includes accepted 'zones of influence' for certain aspects (for example, noise impacts would almost never be significant over 1km from the source). Operational effects can extend further, depending on the scale and nature of the option, and so an intentionally precautionary overarching assessment scope has been used as a starting point for the assessment; this includes:

- All European sites that are within 10km of any operational facilities or new infrastructure required to deliver each option (including temporary infrastructure)). This is an intentionally large buffer that can also reliably capture the vast majority of possible interactions with 'mobile species' in terrestrial environments.
- All European sites that are downstream of any operational facilities or new infrastructure required to deliver each option (including temporary infrastructure)), or upstream sites that support migratory fish (no distance thresholds). This reflects the potential for hydrological impacts to operate over greater distances, and to address the potential for catchment-scale in combination effects from operation.

These parameters are used as a starting point for identifying potentially exposed sites**. It is not a 'hard buffer' and in some instances it may be appropriate to consider more distant sites**[25]; however, unless otherwise noted, sites over 10km from the options that are not hydrologically linked and which do not support wide-ranging mobile species are typically considered sufficiently remote such that any environmental changes will be effectively nil, and so there will be 'no effects' on sites beyond this distance (and so no possibility of 'in combination' effects).

The European sites and interest features considered potentially exposed to the outcomes of the WRMP are listed in **Appendix A**.

Data Collection

European site data collection and conservation objectives

The screening and appropriate assessment stages take account of the baseline condition of the European sites and their interest features[26], including (where reported) data on

- the site boundaries and the boundaries of the component SSSIs;
- the conservation objectives;
- information on the attributes of the European sites that contribute to and define their integrity;

[25] For example, where an option is likely to directly affect the marine environment (e.g. through desalination schemes) and so potentially result in environmental changes that could coincide with areas used by wide-ranging marine species; however, wide-ranging marine / marine dependent species associated with marine sites that are not directly connected to the hydrological zone of influence are not typically considered to be both sensitive and exposed to the effects of the options.

[26] The interest features are taken to be the qualifying features; and other within-site features that may be relevant to site integrity, particularly 'typical species' (for SACs) and within-site supporting habitats for SPAs. 'Functional land' would not usually be considered an interest feature of the site (although it may be important to the integrity of some interest features).

- the condition, vulnerabilities and sensitivities of the sites and their interest features, including known pressures and threats;
- the approximate locations of the interest features within each site (if reported); and
- designated or non-designated 'functional habitats' (if identified).

These data were derived from:

- the most recent JNCC-hosted GIS datasets;
- the Standard Data forms for SACs and SPAs and Information Sheets for Ramsar sites;
- Article 12 and 17 reporting;
- the published site Conservation Objectives;
- Supplementary Advice to the conservation objectives (SACO) where available[27];
- Site Improvement Plans (SIPs);
- Core Management Plans (Wales); and
- the supporting Site of Special Scientific Interest's favourable condition tables where relevant and where no SACOs applicable to the features are available.

Note:

- For SPAs, the qualifying features are taken as those identified on the most recent JNCC datasets and citations where these post-date the 2nd SPA Review (i.e. it will be assumed that any amendments suggested by the SPA review have been made) unless otherwise identified to us by NE or NRW; any site-specific issues relating to the SPA Review can be addressed in the screening and appropriate assessment of the preferred options (see below).
- The conservation objectives for Ramsar sites are taken to be the same as for the corresponding SACs / SPAs (where sites overlap); SSSI Definition of Favourable Condition (FCTs) will be used for those features not covered by SAC/SPA designations.

Where possible the site data is used to identify other features that may be relevant to site integrity, particularly '**typical species**' (for SACs), within-site **supporting habitats**, and designated or non-designated '**functional habitats**'.

A '**typical species**' is broadly described by EC guidance as being any species (or community of species) which is particularly characteristic of, confined to, and/or dependent upon the qualifying Annex I habitat feature at a particular site. This may include those species which:

[27] NE has published '*Supplementary advice on conserving and restoring site features*' for most European sites in England which describe in more detail the range of ecological attributes which are most likely to contribute to a site's overall integrity, and the targets each qualifying feature needs to achieve in order for the site's conservation objectives to be met.

- are critical to the composition or structure of an Annex I habitat (e.g. constant species identified by the National Vegetation Classification (NVC) community classification);
- exert a critical positive influence on the Annex I habitat's structure or function (e.g. a bioturbator (mixer of soil/sediment), grazer, surface borer or predator);
- are consistently associated with, and dependent upon, the Annex I habitat feature for specific ecological needs (e.g. feeding, sheltering), completion of life-cycle stages (e.g. egg-laying) and/or during certain seasons/times; or
- are particularly distinctive or representative of the Annex I habitat feature at a particular site.

Within-site **supporting habitats** are those which support the population(s) of the qualifying species and which are therefore critical to the integrity of the feature.

'**Functional habitats**' are generally taken to be habitats or features outside a European site boundary that are important or critical to the functional integrity of the site habitats and / or its interest features. These might include, for example:

- 'buffer' areas around a site (e.g. dense scrub areas preventing public access; areas of land that reduce the effects of agricultural run-off; etc.);
- specific features or habitats relied on by mobile species during their lifecycle (e.g. high-tide roosts for waders; significant maternity colonies for bats known to hibernate within an SAC; areas that are critical for foraging or migration; etc).

Conservation Objectives benchmark Favourable Conservation Status (FCS) for each feature. Guidance[28] from the UK Statutory Nature Conservation Bodies (SNCBs) provides a broad characterisation of FCS, stating that it "*relates to the long-term distribution and abundance of the populations of species in their natural range, and for habitats to the long-term natural distribution, structure and functions as well as the long-term survival of its typical species in their natural range. It describes a situation in which individual habitats and species are maintaining themselves at all relevant geographical scales and with good prospects to continue to do so in the future*".

The conservation objectives for European sites in England have been revised by Natural England in recent years to improve the consistency of assessment and reporting. As a result, the high-level conservation objectives for all sites are effectively the same (depending on the site features):

For SACs:

- *With regard to the SAC and the natural habitats and/or species for which the site has been designated (the 'Qualifying Features'...), and subject to natural change; ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site*

[28] JNCC (2018). *Favourable Conservation Status: UK Statutory Nature Conservation Bodies Common Statement* [online]. Available at: https://data.jncc.gov.uk/data/b9c7f55f-ed9d-4d3c-b484-c21758cec4fe/FCS18-InterAgency-Statement.pdf. [Accessed March 2022].

contributes to achieving the Favourable Conservation Status of its Qualifying Features, by maintaining or restoring [as applicable to each site];

- *The extent and distribution of the qualifying natural habitats;*
- *The extent and distribution of the habitats of qualifying species;*
- *The structure and function (including typical species) of the qualifying natural habitats;*
- *The structure and function of the habitats of qualifying species;*
- *The supporting processes on which the qualifying natural habitats rely;*
- *The supporting processes on which the habitats of qualifying species rely;*
- *The populations of qualifying species; and,*
- *The distribution of qualifying species within the site*.

For SPAs:

- *With regard to the SPA and the individual species and/or assemblage of species for which the site has been classified (the 'Qualifying Features'…), and subject to natural change; ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the aims of the Wild Birds Directive, by maintaining or restoring:*
  - *The extent and distribution of the habitats of the qualifying features;*
  - *The structure and function of the habitats of the qualifying features;*
  - *The supporting processes on which the habitats of the qualifying features rely;*
  - *The population of each of the qualifying features; and*
  - *The distribution of the qualifying features within the site*.

The conservation objectives for Ramsar sites are taken to be the same as for the corresponding SACs / SPAs (where sites overlap); where Ramsar sites do not coincide with an SAC or SPA, or where the Ramsar features are not ecologically coincident with SAC or SPA features, the conservation objectives and definitions of favourable condition for the underlying SSSIs are used.

The conservation objectives are considered when assessing the potential effects of plans and policies on the sites; information on the sensitivities of the interest features also informs the assessment.

NE has published '*Supplementary advice on conserving and restoring site features*' for most sites, which describe in more detail the range of ecological attributes which are most likely to contribute to a site's overall integrity, and the minimum targets each qualifying feature needs to achieve in order to meet the site's conservation objectives. These are considered at the screening and appropriate assessment stages, as necessary.

Water resources baseline data

Information on the water resources baseline in the region is drawn from other assessment reports (e.g. the WFD), SWS (e.g. groundwater (GW) and surface water (SW) abstraction locations, source operational parameters, WRZ operation, emergency or drought plan operations) and the EA (PWS and other GW/ SW abstractions, CAMS documentation).

Note, unless otherwise stated by the EA during the options development process, it is assumed that the relevant Catchment Abstraction Management Strategy (CAMS) documents are correct and reliable, and that there is 'water available' where this is confirmed by the CAMS.

Option data

Information on the preferred options is provided by SWS. This includes an outline of how the option will function, including the intended outcomes (design yields/capacities); and the scheme delivery requirements, including the type and indicative location of any permanent or temporary infrastructure.

It should be noted that the location of some scheme aspects cannot always be established at the WRMP level: whilst some elements are self-evident (for example, new plant will often be located within or close to existing water company assets) the exact routes of pipelines (etc.) cannot be finalised at this stage. In most instances an indicative design route is provided for option costing purposes, which has been informed by the feasible options review process at the stage (i.e. in most cases direct impacts on designated sites would be avoided if possible); however, **it must be recognised that these are not fixed or defined proposals for delivery that cannot be deviated from**; alternative pipeline routes will almost always be available if unavoidable adverse effects are identified at the scheme level. Similarly there will be many aspects (particularly relating to construction) that cannot be defined at the strategy level ahead of scheme-specific investigations (e.g. the location of any temporary enabling works; precise locations for additional storage; etc.)).

Preferred Options Assessment

Overview

For each option (or group of options, as appropriate), the assessment comprises:

- a 'screening' to identify those options that cannot have significant effects due to the fundamental nature of the option (this might include, for example, options that are designed to reduce demand but which do not involve any direct physical changes, such as education programmes to reduce water use);
- a 'screening' of European sites within the study area to identify those sites and features where there will self-evidently be 'no effect', 'no likely significant effects', or positive effects due to the option[29], and those where significant effects are likely or uncertain; and

[29] Note, for options with 'no effects' or positive effects there is no possibility of 'in combination' effects.

- an 'appropriate assessment' of any European sites where significant effects cannot be excluded (this may include 'down-the-line' deferral of some options in accordance with established HRA practice, where appropriate).

The conservation objectives are taken into account at the screening and appropriate assessment stages as necessary.

General Assumptions

Most environmental changes associated with construction and operation will have an inherent range over which they naturally attenuate[30], and many interest features will have little or no sensitivity to the likely magnitude of the environmental changes expected as the result of an option. Broad or universal assumptions that can be robustly applied to the assessments of the individual options or interest features are set out in **Appendix B,** and referred to as necessary in the assessments.

In addition:

- It is assumed that all normal licensing, consenting and management procedures will be employed at option delivery and throughout operation, and that established best-practice avoidance and mitigation measures will be employed throughout scheme design and construction to safeguard environmental receptors, including European site interest features. The HRA will not therefore assess speculative or hypothetical effects based on assumptions of non-compliance (e.g. accidental spillages of treatment chemicals from a new WTW).
- Guidance from the EA suggests that significant direct effects on groundwater dependent terrestrial ecosystems (GWDTEs) from drawdown associated with abstraction are unlikely for European sites over 5 km from the abstraction (*National EA guidance: Habitats Directive Stage 2 Review: Water Resources Authorisations – Practical Advice for Agency Water Resources Staff*).
- Options that are within the terms of existing licences and recent actual abstractions (e.g. options to repair underperforming boreholes) are typically considered to be acceptable where these have not been identified to SWS or the EA as licences requiring investigation, and where CAMS indicates water is available for use.

Screening

The screening (see **Appendix D**) identifies possible effects on European sites based on:

- the anticipated operation of each option and predicted hydrological zone of influence;
- the anticipated scope of any construction or enabling works required for each option;
- the European site interest features and their sensitivities; and

[30] For example, construction noise will almost invariably be indistinguishable from background levels over 600m from the source due to natural attenuation alone; several studies have demonstrated that visual disturbance of wading birds by construction plant or personnel is inconsequential over ~500m.

- the exposure of the site or features to the likely effects of the option (i.e. presence of reasonable impact pathways, taking into account species mobility and the likelihood of functional habitats being affected[31]).

The screening therefore identifies:

- those European sites where significant effects are considered likely as the result of an option;
- those European sites where significant effects are considered uncertain as the result of an option;
- those European sites where significant effects were considered unlikely (alone) as the result of an option (but where in combination effects might still be possible); and
- those options that will have no effects on any European sites due to their nature or location (and hence no possibility of 'in combination' effects).

The 'low-bar' principle is used for the screening of the preferred options[32]; in general, unless the possibility of significant effects can be simply and self-evidently excluded then an 'appropriate assessment' is completed (rather than a more detailed 'secondary screening' or similar). This applies to the options alone and in combination (i.e. unless it is evident that there will be 'no effects' from any options the possibility of 'in combination' effects is not excluded and these are taken forward to 'appropriate assessment'). This approach simplifies the overall assessment and ensures procedural clarity.

The 'low bar' approach is consistent with the 'People Over Wind'[33] case law, which requires that mitigation not be considered at screening. Historically, HRAs of plans typically assumed that established best-practice avoidance and mitigation measures (see **Appendix C**) would be employed at the project level to safeguard environmental receptors, including European site interest features, and accounted for this at the screening stage. However, it is arguable that an assumption such as this, albeit in relation to a lower-tier project that would itself be subject to HRA, might constitute an 'avoidance measure' that the WRMP is effectively relying on to ensure that significant effects do not occur.

In this instance, therefore, mitigation measures (including the established best-practice avoidance and mitigation measures noted in **Appendix C**) <u>are not</u> taken into account at screening, but are instead introduced at the 'appropriate assessment' stage (if required).

Appropriate Assessments

The 'appropriate assessments' (see **Appendices E1 – E15**) are an extension of the assessment processes undertaken at the screening stage, with significant effects (or areas of

[31] With regard to functional habitat, it should be noted that field investigations would not be undertaken for a plan-level assessment except in very exceptional circumstances, and so specific areas of 'functional habitat' may not be identifiable for assessment at the plan level unless explicitly noted in the site documentation.

[32] The low-bar nature of the screening test is characterised in case-law (*C-258/11 - Sweetman and Others*) as '*should we bother to check?*' – i.e. is a closer examination of possible effects required (i.e. appropriate assessment) or can effects self-evidently be excluded as nil or entirely nugatory?

[33] Case *C 323/17 Court of Justice of the European Union: People Over Wind*

uncertainty) examined to determine whether there will be any adverse effects on the integrity of any European sites taking into account the conservation objectives.

The presentation of the assessments in **Appendices E1 – E15** depends on the nature of the options and European sites that might be exposed to effects. In this case the assessments are 'option led' (i.e. each assessment appendix relates to a specific option or group of co-located options, rather than being grouped by European sites). Shared evidence applicable to multiple sites or features (for example, in relation to birds and construction noise) are provided in **Appendix B** to reduce repetition.

There are essentially three 'types' of assessment appendix:

- A 'simple' appropriate assessment (**Appendix E15**) covering all options and/or European sites that would have historically been 'screened out with mitigation', typically where there is a theoretical possibility of construction-related effects that (if they occur) will be of a magnitude that can be reliably avoided with established best-practice measures or construction design. These assessments are 'appropriate' to the nature of the WRMP as a strategic plan, the option under consideration, and the scale and likelihood of any effects.
- More detailed appropriate assessments (**Appendices E1 – E12**) for those options with unavoidable construction or operational effects on a site (i.e. direct or close-proximity construction effects, or environmental changes that are inherent to the operation of the scheme).
- 'Summary' assessment appendices that cross-reference the more detailed HRA-related studies undertaken for the Gate 2 SROs (**Appendices E13 – E14**).

In addition, whilst the overall structure of the appendices is similar, there are necessarily some variations in format and layout that reflect the varied nature of the options and the effects on the European sites, as well as existing data and assessments that have been used to inform the appropriate assessments.

It should be noted that many of the options were included in WRMP19 and so were subject to HRA at that point. The previous HRA assessments (screening and appropriate assessment) are therefore reviewed and re-applied to the WRMP24 where there are no substantive changes in either the scheme scope, the European site baseline, or HRA case-law and case-practice.

As noted, it must be recognised that many construction aspects of the options (particularly new pipeline routes), are essentially indicative only at the WRMP level and are not definitive design proposals that cannot be deviated from. Therefore, to some extent, it is more appropriate for the assessments to identify and focus on those effects that are likely to be unavoidable at the project-stage irrespective of how the option is delivered, rather than attempt to exhaustively assess speculative effects based on indicative pipeline routes, that could clearly be re-routed if necessary. In practice such unavoidable effects are more likely for scheme operation rather than construction. It is also necessary to recognise that there are substantial limits on the level of assessment achievable at the plan-level, particularly for 'in combination' effects for options that are not defined in detail and which are not likely to be required for several years or even decades.

Plan-Level In Combination Assessments

HRA requires that the effects of other projects, plans or programmes be considered for effects on European sites 'in combination' with the WRMP. There is limited guidance on the precise scope of 'in combination' assessments for strategies, particularly with respect to the levels within the planning hierarchy at which 'in combination' effects should be considered, although guidance is provided by the ACWG.

Broadly, it is considered that the SWS WRMP could have the following in combination effects:

- Within-plan effects, i.e. separate options within the WRMP affecting the same European site(s); these are addressed as part of the option assessment process outlined above.
- Between-plan abstraction effects, i.e. effects with other abstractions, in association with or driven by other plans (for example, other water company WRMPs);
- Other between-plan effects, i.e. 'in combination' with non-abstraction activities promoted by other plans – for example, with flood risk management plans.
- Between-project effects, i.e. effects of a specific option with other specific projects and developments.

In undertaking the 'in combination' assessment it is important to note the following:

- The WRMP development process explicitly accounts for land-use plans, growth forecasts and population projections when determining future treatment and water management requirements.
- The detailed examination of non-water company consents for 'in combination' effects can only be undertaken by the EA or NRW through their permitting procedures.
- Likely water resource demands of known major projects are also taken into account during the development of the WRMPs, unless otherwise noted.

Therefore:

- It is considered that (for the HRA) potential 'in combination' effects in respect of water-resource demands associated with known plans or projects will not occur since these demands are explicitly considered when developing the WRMP and its associated and related plans (including the SROs). The main exception to this is other water company WRMPs, which are developed concurrently.
- With regard to other strategic plans, the list of plans included within the SEA of the emerging UU WRMP is used as the basis for a high-level 'in combination' assessment. The SEA is used to provide information on the themes, policies and objectives of the 'in combination' plans, with the plans themselves examined in more detail as necessary. Plans are obtained from the SEA datasets or internet sources where possible.
- With regard to projects:

- The WRMP development process explicitly accounts for the water-resource demands of known major projects (e.g. power station decommissioning; large-scale housing development) during its development, and so these 'in combination' effects are not considered in detail.
- Potential 'in combination' effects between individual options and Nationally Significant Infrastructure Projects (NSIPs) identified by The Planning Inspectorate, and other known major projects, are assessed.
- It is not possible to produce a definitive list of minor existing or anticipated planning applications within the zone of influence of each proposed option to review possible local 'in combination' effects. The nature of the WRMP and the timescales over which it operates ensure that generating a list of local planning applications at this stage would be of very little value, and this aspect can only be meaningfully undertaken at the scheme-level.

Preferred Options Screening Summary

The 'screening' adopts a low-bar approach; in general, unless the possibility of significant effects can be simply and self-evidently excluded then an 'appropriate assessment' is completed (rather than a more detailed 'secondary screening' or similar). This applies to the options alone and in combination.

Demand-side options

The demand side options are set out in **Table 2.2** (**Section 2**). In summary, the options are either

- 'water efficiency support' measures that are designed to reduce water use without the need for significant physical intervention in the network or other development; or
- leakage reduction measures that may require construction works.

Of these, the 'water efficiency support' options cannot have significant effects due to the nature of the option (based on established guidance for similar policies and proposals in other strategic planning documents, i.e. not locationally specific; which do not promote development or similar changes; and which are designed to reduce water use [34]). **These options would all be categorised as having 'no significant effect, alone or in combination.**

The leakage reduction options are likely to require some form of physical intervention or amendment to the network. The works required for the vast majority of these interventions will be very minor with virtually no risk of significant effects on European sites. In some instances effect pathways might be conceivable (for example, a hypothetical leaking pipe might be located in or near a European site) but it is not possible to predict

[34] e.g. Tyldesley, D. & Chapman, C. (2021). The Habitats Regulations Assessment Handbook [online]. DTA Publications Limited. Available at: https://www.dtapublications.co.uk/handbook/.

or identify specific locations where such measures might be applied at the WRMP-level and so effects on specific European sites cannot be identified.

Non-specific residual risks such as these can almost always be avoided with established scheme-level mitigation measures and it is very unlikely that significant or significant and adverse effects as the result of a particular demand-side measure would be unavoidable at the scheme level; however, these options are carried forward to the 'appropriate assessment' stage for procedural reasons and to avoid potential conflict with the 'People over Wind' case.

Supply-side options

Existing Imports / Transfer Arrangements

As noted (**Section 2.2**) seven of the preferred supply-side options are existing imports or transfers that are essentially considered as options for water resource modelling purposes; these a part of the water resources baseline for SWS and (as with existing licences and consents) are not assessed within the HRA (which necessarily focuses on the new supply-side options rather than the existing consents regime).

New Supply Side Options

The initial 'alone' screening assessments for each preferred option are set out in **Appendix D**. **Table 4.2** below summarises those options and European sites where significant effects **cannot** be excluded in the absence of mitigation, and/or where there are uncertainties over construction or operation that require appropriate assessment (i.e. the table does not include options and sites that are screened out; this screening information is available in **Appendix D**).

In summary, the assessment aims to identify those European site features that are potentially vulnerable to a particular option – i.e. which have features that are both exposed and sensitive to the likely outcomes (see **Table 4.1**), taking into account the baseline for the site including the conservation objectives. Features that are both exposed and sensitive to an environmental change are assumed to be subject to 'likely significant effects' unless there is a clear over-riding reason why significant effects cannot occur.

For all other European sites it is considered that there are no reasonable pathways by which the options could affect the site (hence there will be 'no effects' on these sites and no possibility of 'in combination' effects).

Table 0.1 Summary of screening criteria

LSE?	Notes
0	Sites or features that are not exposed to the effects of an option via any reasonable impact pathways and so there will be 'no effect' (hence no risk of 'in combination' effects)
No (N)	Sites or features that are potentially exposed and sensitive to the predicted environmental changes, but where effects are not considered significant (alone) due to their scale, nature etc. based on the information within the EARs and other contextual assessment information.

LSE?	Notes
Uncertain (U)	Sites or features where a potential effect is clear and identifiable, which cannot be self-evidently excluded and which require additional consideration through 'appropriate assessment' (including options relying on mitigation to ensure significant effects do not occur).
Uncertain* (U*)	Sites where a potential effect pathway is evident, but where this is typically minor / precautionary and can be clearly avoided or mitigated at the project-level with the application of established best-practice measures; these sites are taken through AA to avoid potential conflict with PoW.
Yes (Y)	Sites or features where significant effects are very likely or certain due to the scale/nature of the option proposals, or the vulnerability and distribution of the interest features on the European site. Adverse effects may be more likely and there is more certainty that (at scheme level) the option would have to rely on specific mitigation or compensation rather than general / simple environmental avoidance measures.

Table 0.2 Summary of options and European sites where LSE due to construction (C) or operation (O) could not be excluded

Option and European sites	Dist (km)*	LSE (C)	LSE (O)	Notes
SWS_HAZ_HI-TFR_HWZ_ALL_oan2: Transfer: Hampshire grid (reversible link HW-HA) (30Ml/d)				
River Itchen SAC	0.3/DS	U*	0	Construction: Indicative pipeline route is within the catchment of this site (although surface watercourses connecting to the site are limited by geology) and construction will be required relatively close to the SAC; significant and/or significant adverse effects almost certainly avoidable with established measures / normal best-practice, although these must necessarily be accounted for at AA (hence 'screened in'). Operation: No pathways for operational effects (network scheme only); pipeline operation would not result in other environmental changes (e.g. noise, lighting) likely to affect the features of the site).
Solent and Dorset Coast SPA	8.4/DS	U*	0	Construction: Indicative pipeline route crosses tributaries of this site at several points; significant and/or significant adverse effects almost certainly avoidable with established measures / normal best-practice, although these must necessarily be accounted for at AA (hence 'screened in'). Mobile species of site will not be functionally associated with habitats affected by construction. Operation: No pathways for operational effects (network scheme only).
Solent and Southampton Water Ramsar	10.7/DS	U*	0	Construction: Indicative pipeline route crosses tributaries of this site at several points; significant and/or significant adverse effects almost certainly avoidable with established measures / normal best-practice, although these must necessarily be accounted for at AA (hence 'screened in'). Mobile species of site will not be functionally associated with habitats affected by construction. Operation: No pathways for operational effects (network scheme only).

Option and European sites	Dist (km)*	LSE (C)	LSE (O)	Notes
Solent and Southampton Water SPA	10.7/DS	U*	0	Construction: Indicative pipeline route crosses tributaries of this site at several points; significant and/or significant adverse effects almost certainly avoidable with established measures / normal best-practice, although these must necessarily be accounted for at AA (hence 'screened in'). Mobile species of site will not be functionally associated with habitats affected by construction. Operation: No pathways for operational effects (network scheme only).
SWS_HKZ_HI-TFR_HAZ_ALL_oan3: Transfer: Hampshire grid (reversible link HA-HK) (10Ml/d)				
River Itchen SAC	0.3/DS	U*	0	Construction: Indicative pipeline route is within the catchment of this site (although surface watercourses connecting to the site are limited by geology) and construction will be required relatively close to the SAC; significant and/or significant adverse effects almost certainly avoidable with established measures / normal best-practice, although these must necessarily be accounted for at AA (hence 'screened in'). Operation: No pathways for operational effects (network scheme only); pipeline operation would not result in other environmental changes (e.g. noise, lighting) likely to affect the features of the site).
Solent and Dorset Coast SPA	8.4/DS	U*	0	Construction: Indicative pipeline route crosses tributaries of this site at several points; significant and/or significant adverse effects almost certainly avoidable with established measures / normal best-practice, although these must necessarily be accounted for at AA (hence 'screened in'). Mobile species of site will not be functionally associated with habitats affected by construction. Operation: No pathways for operational effects (network scheme only).

Option and European sites	Dist (km)*	LSE (C)	LSE (O)	Notes
Solent and Southampton Water Ramsar	10.7/DS	U*	0	Construction: Indicative pipeline route crosses tributaries of this site at several points; significant and/or significant adverse effects almost certainly avoidable with established measures / normal best-practice, although these must necessarily be accounted for at AA (hence 'screened in'). Mobile species of site will not be functionally associated with habitats affected by construction. Operation: No pathways for operational effects (network scheme only).
Solent and Southampton Water SPA	10.7/DS	U*	0	Construction: Indicative pipeline route crosses tributaries of this site at several points; significant and/or significant adverse effects almost certainly avoidable with established measures / normal best-practice, although these must necessarily be accounted for at AA (hence 'screened in'). Mobile species of site will not be functionally associated with habitats affected by construction. Operation: No pathways for operational effects (network scheme only).
SWS_HRZ_HI-GRW_ALL_ALL_nw_gwa_tim_westi: Groundwater: Romsey - new BHs (4.8Ml/d)				
Mottisfont Bats SAC	2.9	U*	0	Construction: Site not exposed to construction effects (distance, no pollutant pathways, separate catchment); construction likely within Core Sustenance Zone (CSZ; see Appendix B) defined for the mobile interest features of the site, and effects on supporting habitats cannot be excluded at the plan level (although the risk of significant effects would be low based on the nature of the works). Significant and/or significant adverse effects almost certainly avoidable with established measures / normal best-practice, although these must necessarily be accounted for at AA (hence 'screened in'). Operation: No pathways for operational effects (separate catchment).

Option and European sites	Dist (km)*	LSE (C)	LSE (O)	Notes
Solent and Southampton Water Ramsar	10/DS	0	U	Construction: Construction works are relatively small-scale and minor, and there are no surface water courses linking to the Test; effects from site-derived pollutants would not therefore occur irrespective of additional mitigation measures. Operation: Romsey is part of Southern Water's 'no deterioration' investigations – specifically considering the risk of Recent Actual to Fully Licensed abstraction increases. There is no expectation of significant increase in pumping because of the tightened flow constraints of the River Test SSSI, and because of the largest intake on the river downstream which is going to be subject to tightened conditions. The freshwater flow conditions for the SSSI river are tighter than what would be reasonable for the transitional Southampton Water, and so effects on this site are uncertain.
Solent and Southampton Water SPA	10/DS	0	U	Construction: Construction works are relatively small-scale and minor, and there are no surface water courses linking to the Test; effects from site-derived pollutants would not therefore occur irrespective of additional mitigation measures. Operation: Romsey is part of Southern Water's 'no deterioration' investigations – specifically considering the risk of Recent Actual to Fully Licensed abstraction increases. There is no expectation of significant increase in pumping because of the tightened flow constraints of the River Test SSSI, and because of the largest intake on the river downstream which is going to be subject to tightened conditions. The freshwater flow conditions for the SSSI river are tighter than what would be reasonable for the transitional Southampton Water, and so effects on this site are uncertain.

Option and European sites	Dist (km)*	LSE (C)	LSE (O)	Notes
Solent Maritime SAC	10.6/DS	0	U	Construction: Construction works are relatively small-scale and minor, and there are no surface water courses linking to the Test; effects from site-derived pollutants would not therefore occur irrespective of additional mitigation measures. Operation: Romsey is part of Southern Water's 'no deterioration' investigations – specifically considering the risk of Recent Actual to Fully Licensed abstraction increases. There is no expectation of significant increase in pumping because of the tightened flow constraints of the River Test SSSI, and because of the largest intake on the river downstream which is going to be subject to tightened conditions. The freshwater flow conditions for the SSSI river are tighter than what would be reasonable for the transitional Southampton Water, and so effects on this site are uncertain.
Solent and Dorset Coast SPA	11.9/DS	0	U	Construction: Construction works are relatively small-scale and minor, and there are no surface water courses linking to the Test; effects from site-derived pollutants would not therefore occur irrespective of additional mitigation measures. Operation: Romsey is part of Southern Water's 'no deterioration' investigations – specifically considering the risk of Recent Actual to Fully Licensed abstraction increases. There is no expectation of significant increase in pumping because of the tightened flow constraints of the River Test SSSI, and because of the largest intake on the river downstream which is going to be subject to tightened conditions. The freshwater flow conditions for the SSSI river are tighter than what would be reasonable for the transitional Southampton Water, and so effects on this site are uncertain (although the site and features will have a low sensitivity to the likely changes).
SWS_HRZ_HI-IMP_HSW_ALL_rob1: Transfer: Romsey Town & Broadlands valve (HSW-HRZ) (3.1Ml//d)				

Option and European sites	Dist (km)*	LSE (C)	LSE (O)	Notes
Solent and Southampton Water Ramsar	5.1/DS	U*	0	Construction: Construction required in parkland within 500m of the River Test; effects on the habitats of this site likely to be nil irrespective of mitigation given the distance downstream and very small scale of the construction; mobile interest features will not be functionally linked to the parkland habitats affected by the scheme. Significant and/or significant adverse effects are certainly avoidable with established measures / normal best-practice, although these must necessarily be accounted for at AA (hence 'screened in'). Operation: No pathways for operational effects (network scheme).
Solent and Southampton Water SPA	5.2/DS	U*	0	Construction: Construction required in parkland within 500m of the River Test; effects on the habitats of this site likely to be nil irrespective of mitigation given the distance downstream and very small scale of the construction; mobile interest features will not be functionally linked to the parkland habitats affected by the scheme. Significant and/or significant adverse effects are certainly avoidable with established measures / normal best-practice, although these must necessarily be accounted for at AA (hence 'screened in'). Operation: No pathways for operational effects (network scheme).
Solent Maritime SAC	5.8/DS	U*	0	Construction: Construction required in parkland within 500m of the River Test; effects on the habitats of this site likely to be nil irrespective of mitigation given the distance downstream and very small scale of the construction; mobile interest features will not be functionally linked to the parkland habitats affected by the scheme. Significant and/or significant adverse effects are certainly avoidable with established measures / normal best-practice, although these must necessarily be accounted for at AA (hence 'screened in'). Operation: No pathways for operational effects (network scheme).

Option and European sites	Dist (km)*	LSE (C)	LSE (O)	Notes
Solent and Dorset Coast SPA	7.1/DS	U*	0	Construction: Construction required in parkland within 500m of the River Test; effects on the habitats of this site likely to be nil irrespective of mitigation given the distance downstream and very small scale of the construction; mobile interest features will not be functionally linked to the parkland habitats affected by the scheme. Significant and/or significant adverse effects are certainly avoidable with established measures / normal best-practice, although these must necessarily be accounted for at AA (hence 'screened in'). Operation: No pathways for operational effects (network scheme).
SWS_HRZ_HI-TFR_HSW_ALL_bro: Transfer: Romsey Town & Broadlands valve (HSW to HRZ)				
Solent and Southampton Water Ramsar	5.1/DS	U*	0	Construction: Construction required in parkland within 500m of the River Test; effects on the habitats of this site likely to be nil irrespective of mitigation given the distance downstream and very small scale of the construction; mobile interest features will not be functionally linked to the parkland habitats affected by the scheme. Significant and/or significant adverse effects are certainly avoidable with established measures / normal best-practice, although these must necessarily be accounted for at AA (hence 'screened in'). Operation: No pathways for operational effects (network scheme).
Solent and Southampton Water SPA	5.2/DS	U*	0	Construction: Construction required in parkland within 500m of the River Test; effects on the habitats of this site likely to be nil irrespective of mitigation given the distance downstream and very small scale of the construction; mobile interest features will not be functionally linked to the parkland habitats affected by the scheme. Significant and/or significant adverse effects are certainly avoidable with established measures / normal best-practice, although these must necessarily be accounted for at AA (hence 'screened in'). Operation: No pathways for operational effects (network scheme).

Option and European sites	Dist (km)*	LSE (C)	LSE (O)	Notes
Solent Maritime SAC	5.8/DS	U*	0	Construction: Construction required in parkland within 500m of the River Test; effects on the habitats of this site likely to be nil irrespective of mitigation given the distance downstream and very small scale of the construction; mobile interest features will not be functionally linked to the parkland habitats affected by the scheme. Significant and/or significant adverse effects are certainly avoidable with established measures / normal best-practice, although these must necessarily be accounted for at AA (hence 'screened in'). Operation: No pathways for operational effects (network scheme).
Solent and Dorset Coast SPA	7.1/DS	U*	0	Construction: Construction required in parkland within 500m of the River Test; effects on the habitats of this site likely to be nil irrespective of mitigation given the distance downstream and very small scale of the construction; mobile interest features will not be functionally linked to the parkland habitats affected by the scheme. Significant and/or significant adverse effects are certainly avoidable with established measures / normal best-practice, although these must necessarily be accounted for at AA (hence 'screened in'). Operation: No pathways for operational effects (network scheme).
SWS_HSE_EF-TFR_REP_ALL_pwc1: Import from Portsmouth Water (9Ml/d)				
River Itchen SAC	0/DS	Y	0	Construction: Indicative pipeline route crosses this site or nearby tributaries at several points. Operation: No pathways for operational effects (water not sourced from Itchen catchment; pipeline operation would not result in other environmental changes (e.g. noise, lighting) likely to affect the features of the site).

Option and European sites	Dist (km)*	LSE (C)	LSE (O)	Notes
Solent and Dorset Coast SPA	1.5/DS	U*	0	Construction: Option uses existing pipeline so potential effects will only be associated with works required (e.g. new pumping arrangements etc.); significant and/or significant adverse effects almost certainly avoidable with established measures / normal best-practice, although these must necessarily be accounted for at AA (hence 'screened in'). Mobile species of site will not be functionally associated with habitats affected by construction. Operation: No pathways for operational effects (network scheme only).
Solent and Southampton Water SPA	3/DS	U*	0	Construction: Option uses existing pipeline so potential effects will only be associated with works required (e.g. new pumping arrangements etc.); significant and/or significant adverse effects almost certainly avoidable with established measures / normal best-practice, although these must necessarily be accounted for at AA (hence 'screened in'). Mobile species of site will not be functionally associated with habitats affected by construction. Operation: No pathways for operational effects (network scheme only).
Solent and Southampton Water Ramsar	3/DS	U*	0	Construction: Option uses existing pipeline so potential effects will only be associated with works required (e.g. new pumping arrangements etc.); significant and/or significant adverse effects almost certainly avoidable with established measures / normal best-practice, although these must necessarily be accounted for at AA (hence 'screened in'). Mobile species of site will not be functionally associated with habitats affected by construction. Operation: No pathways for operational effects (network scheme only).

Option and European sites	Dist (km)*	LSE (C)	LSE (O)	Notes
Solent Maritime SAC	5.7/DS	U*	0	Construction: Indicative pipeline route crosses tributaries of this site at several points; significant and/or significant adverse effects almost certainly avoidable with established measures / normal best-practice, although these must necessarily be accounted for at AA (hence 'screened in'). Mobile species of site will not be functionally associated with habitats affected by construction. Operation: No pathways for operational effects (network scheme only).
SWS_HSE_HI-REU_RE1_ALL_wol8: Recycling: Woolston WwTW (7.1Ml/d)				
Solent and Dorset Coast SPA	0/DS	U*	U	Construction: Works required in close proximity to this site and its tributaries; site features unlikely to utilise habitats affected by option however. Significant and/or significant adverse effects almost certainly avoidable with established measures / normal best-practice, although these must necessarily be accounted for at AA (hence 'screened in'). Operation: Operation of the Woolston WwTW Indirect Potable Reuse option will change abstractions and discharges on the River Itchen resulting in changes to flow and water quality. A redirection of discharge from the Woolston WwTW outfall could affect the habitats of this site; sensitivity of the habitats and interest features is likely to be low but this requires additional investigation through AA.
River Itchen SAC	0/DS	Y	Y	Construction: Indicative pipeline route crosses this site or nearby tributaries at several points; works required and construction of a new discharge may be required in the Itchen. Operation: Operation of the Woolston WwTW Indirect Potable Reuse option would include discharge of treated effluent at the new discharge location and change to abstraction. This could adversely affect the achievement of rCSMG on the river which are being used to determine favourable condition, and return the river to functioning under natural processes and with 'chalky' water. Therefore LSEs are anticipated and further assessment is required.

Option and European sites	Dist (km)*	LSE (C)	LSE (O)	Notes
Solent and Southampton Water SPA	0/DS	U*	U	Construction: Works required in close proximity to this site and its tributaries; site features may also utilise functional habitats outside the site boundary. Significant and/or significant adverse effects almost certainly avoidable with established measures / normal best-practice, although these must necessarily be accounted for at AA (hence 'screened in'). Operation: Operation of the Woolston WwTW Indirect Potable Reuse option will change abstractions and discharges on the River Itchen resulting in changes to flow and water quality. A redirection of discharge from the Woolston WwTW outfall could change species composition and distribution in the habitats at Weston Point. From priority habitat mapping, the habitat in this area is mudflats. A change to water flows could result in a change in the functioning of the habitat, although considered to be less sensitive to freshwater inputs than saltmarsh for example. However, any resultant changes to invertebrate communities supported by the habitats could result in an impact to foraging patterns of the qualifying features.
Solent and Southampton Water Ramsar	0.1/DS	U*	U	Construction: Works required in close proximity to this site and its tributaries; site features may also utilise functional habitats outside the site boundary. Significant and/or significant adverse effects almost certainly avoidable with established measures / normal best-practice, although these must necessarily be accounted for at AA (hence 'screened in'). Operation: Operation of the Woolston WwTW Indirect Potable Reuse option will change abstractions and discharges on the River Itchen resulting in changes to flow and water quality. A redirection of discharge from the Woolston WwTW outfall could change species composition and distribution in the habitats at Weston Point. From priority habitat mapping, the habitat in this area is mudflats. A change to water flows could result in a change in the functioning of the habitat, although considered to be less sensitive to freshwater inputs than saltmarsh for example. However, any resultant changes to invertebrate communities supported by the habitats could result in an impact to foraging patterns of the qualifying features.
SWS_HSE_HI-ROC_WT1_ALL_cpy_ott_30: Treatment capacity: Upgrade Otterbourne WSW (30Ml/d)				

Option and European sites	Dist (km)*	LSE (C)	LSE (O)	Notes
Solent and Southampton Water SPA	10.6/DS	U*	0	Construction: Construction for this option would be required at the existing Otterbourne operational works; this site is a downstream receptor for site-derived pollutants, although the distance is likely to ensure that any effects are attenuated irrespective of mitigation. The mobile features of the site will not be reliant on habitats directly affected by construction. Significant and/or significant adverse effects certainly avoidable with established measures / normal best-practice, although these must necessarily be accounted for at AA (hence 'screened in'). Operation: No pathways for operational effects (distance, effects restricted to Otterbourne operational site).
Solent and Southampton Water Ramsar	10.6/DS	U*	0	Construction: Construction for this option would be required at the existing Otterbourne operational works; this site is a downstream receptor for site-derived pollutants, although the distance is likely to ensure that any effects are attenuated irrespective of mitigation. The mobile features of the site will not be reliant on habitats directly affected by construction. Significant and/or significant adverse effects certainly avoidable with established measures / normal best-practice, although these must necessarily be accounted for at AA (hence 'screened in'). Operation: No pathways for operational effects (distance, effects restricted to Otterbourne operational site).
River Itchen SAC	0.3/DS	U*	0	Construction: Construction for this option would be required at the existing Otterbourne operational works; the Itchen runs close to the site and is a downstream receptor for site-derived pollutants; mobile features may be vulnerable to noise / vibration associated with construction. Significant and/or significant adverse effects certainly avoidable with established measures / normal best-practice, although these must necessarily be accounted for at AA (hence 'screened in'). Operation: No pathways for operational effects (distance, effects restricted to Otterbourne operational site).

Option and European sites	Dist (km)*	LSE (C)	LSE (O)	Notes
Solent and Dorset Coast SPA	8.4/DS	U*	0	Construction: Construction for this option would be required at the existing Otterbourne operational works; this site is a downstream receptor for site-derived pollutants, although the distance is likely to ensure that any effects are attenuated irrespective of mitigation. The mobile features of the site will not be reliant on habitats directly affected by construction. Significant and/or significant adverse effects certainly avoidable with established measures / normal best-practice, although these must necessarily be accounted for at AA (hence 'screened in'). Operation: No pathways for operational effects (distance, effects restricted to Otterbourne operational site).
SWS_HSE_HI-TFR_PRT_ALL_pwc2: Import from Portsmouth Water (21Ml/d)				
River Itchen SAC	0/DS	Y	0	Construction: Indicative pipeline route crosses this site or nearby tributaries at several points. Therefore screened in? Operation: No pathways for operational effects (water sourced from Havant Thicket; pipeline operation would not result in other environmental changes (e.g. noise, lighting) likely to affect the features of the site).
Solent and Dorset Coast SPA	1.5/DS	U*	0	Construction: Indicative pipeline route crosses tributaries of this site at several points; significant and/or significant adverse effects almost certainly avoidable with established measures / normal best-practice, although these must necessarily be accounted for at AA (hence 'screened in'). Mobile species of site will not be functionally associated with habitats affected by construction. Operation: No pathways for operational effects (water sourced from Havant Thicket; pipeline operation would not result in other environmental changes (e.g. noise, lighting) likely to affect the features of the site).

Option and European sites	Dist (km)*	LSE (C)	LSE (O)	Notes
Solent and Southampton Water SPA	3/DS	U*	0	Construction: Indicative pipeline route crosses tributaries of this site at several points; significant and/or significant adverse effects almost certainly avoidable with established measures / normal best-practice, although these must necessarily be accounted for at AA (hence 'screened in'). Mobile species of site will not be functionally associated with habitats affected by construction. Operation: No pathways for operational effects (water sourced from Havant Thicket; pipeline operation would not result in other environmental changes (e.g. noise, lighting) likely to affect the features of the site).
Solent and Southampton Water Ramsar	3/DS	U*	0	Construction: Indicative pipeline route crosses tributaries of this site at several points; significant and/or significant adverse effects almost certainly avoidable with established measures / normal best-practice, although these must necessarily be accounted for at AA (hence 'screened in'). Mobile species of site will not be functionally associated with habitats affected by construction. Operation: No pathways for operational effects (water sourced from Havant Thicket; pipeline operation would not result in other environmental changes (e.g. noise, lighting) likely to affect the features of the site).
Solent Maritime SAC	5.7/DS	U*	0	Construction: Indicative pipeline route crosses tributaries of this site at several points; significant and/or significant adverse effects almost certainly avoidable with established measures / normal best-practice, although these must necessarily be accounted for at AA (hence 'screened in'). Operation: No pathways for operational effects (water sourced from Havant Thicket; pipeline operation would not result in other environmental changes (e.g. noise, lighting) likely to affect the features of the site).
SWS_HSW_HI-GRW_RE1_ALL_str_asr_tes_westi: Groundwater: Test MAR (5.5Ml/d)				

Option and European sites	Dist (km)*	LSE (C)	LSE (O)	Notes
Solent and Southampton Water SPA	0.3/DS	U*	0	Construction: Construction for this option would likely be required at the existing Test Surface Water WSW operational works; this site is a downstream receptor for site-derived pollutants, although the mobile features of the site will not be reliant on habitats directly affected by construction. Significant and/or significant adverse effects almost certainly avoidable with established measures / normal best-practice, although these must necessarily be accounted for at AA (hence 'screened in'). Operation: This option effectively uses the confined aquifer as a reservoir; the aquifer is known to be deeply confined beneath the London Clay and so there are no pathways by which the scheme operation could affect this site.
Solent and Southampton Water Ramsar	0.3/DS	U*	0	Construction: Construction for this option would likely be required at the existing Test Surface Water WSW operational works; this site is a downstream receptor for site-derived pollutants, although the mobile features of the site will not be reliant on habitats directly affected by construction. Significant and/or significant adverse effects almost certainly avoidable with established measures / normal best-practice, although these must necessarily be accounted for at AA (hence 'screened in'). Operation: This option effectively uses the confined aquifer as a reservoir; the aquifer is known to be deeply confined beneath the London Clay and so there are no pathways by which the scheme operation could affect this site.
Solent Maritime SAC	1/DS	U*	0	Construction: Construction for this option would likely be required at the existing Test Surface Water WSW operational works; this site is a downstream receptor for site-derived pollutants, although the mobile features of the site will not be reliant on habitats directly affected by construction. Significant and/or significant adverse effects almost certainly avoidable with established measures / normal best-practice, although these must necessarily be accounted for at AA (hence 'screened in'). Operation: This option effectively uses the confined aquifer as a reservoir; the aquifer is known to be deeply confined beneath the London Clay and so there are no pathways by which the scheme operation could affect this site.

Option and European sites	Dist (km)*	LSE (C)	LSE (O)	Notes
Solent and Dorset Coast SPA	2/DS	U*	0	Construction: Construction for this option would likely be required at the existing Test Surface Water WSW operational works; this site is a downstream receptor for site-derived pollutants, although the mobile features of the site will not be reliant on habitats directly affected by construction. Significant and/or significant adverse effects almost certainly avoidable with established measures / normal best-practice, although these must necessarily be accounted for at AA (hence 'screened in'). Operation: This option effectively uses the confined aquifer as a reservoir; the aquifer is known to be deeply confined beneath the London Clay and so there are no pathways by which the scheme operation could affect this site.
SWS_HSW_HI-ROC_WT1_ALL_cpy_tst_60: Treatment capacity: Upgrade Test Surface Water WSW (60Ml/d)				
Solent and Southampton Water SPA	0.3/DS	U*	0	Construction: Construction for this option would likely be required at the existing Test Surface Water WSW operational works; this site is a downstream receptor for site-derived pollutants, although the mobile features of the site will not be reliant on habitats directly affected by construction. Significant and/or significant adverse effects almost certainly avoidable with established measures / normal best-practice, although these must necessarily be accounted for at AA (hence 'screened in'). Operation: No pathways for operational effects (option simply provides additional treatment capacity; effects restricted to Test Surface Water operational site)
Solent and Southampton Water Ramsar	0.3/DS	U*	0	Construction: Construction for this option would likely be required at the existing Test Surface Water WSW operational works; this site is a downstream receptor for site-derived pollutants, although the mobile features of the site will not be reliant on habitats directly affected by construction. Significant and/or significant adverse effects almost certainly avoidable with established measures / normal best-practice, although these must necessarily be accounted for at AA (hence 'screened in'). Operation: No pathways for operational effects (option simply provides additional treatment capacity; effects restricted to Test Surface Water operational site)

Option and European sites	Dist (km)*	LSE (C)	LSE (O)	Notes
Solent Maritime SAC	1/DS	U*	0	Construction: Construction for this option would likely be required at the existing Test surface water WSW operational works; this site is a downstream receptor for site-derived pollutants, although the mobile features of the site will not be reliant on habitats directly affected by construction. Significant and/or significant adverse effects almost certainly avoidable with established measures / normal best-practice, although these must necessarily be accounted for at AA (hence 'screened in'). Operation: No pathways for operational effects (option simply provides additional treatment capacity; effects restricted to Test surface water operational site)
Solent and Dorset Coast SPA	2/DS	U*	0	Construction: Construction for this option would likely be required at the existing Test surface water WSW operational works; this site is a downstream receptor for site-derived pollutants, although the mobile features of the site will not be reliant on habitats directly affected by construction. Significant and/or significant adverse effects almost certainly avoidable with established measures / normal best-practice, although these must necessarily be accounted for at AA (hence 'screened in'). Operation: No pathways for operational effects (option simply provides additional treatment capacity; effects restricted to Test surface water operational site)
SWS_HWZ_HI-TFR_HSE_CNO_oan1: Transfer: Hampshire grid (reversible link HSE-HW) (30Ml/d)				
River Itchen SAC	0.3/DS	U*	0	Construction: Indicative pipeline route is within the catchment of this site (although surface watercourses connecting to the site are limited by geology) and construction will be required relatively close to the SAC; significant and/or significant adverse effects almost certainly avoidable with established measures / normal best-practice, although these must necessarily be accounted for at AA (hence 'screened in'). Operation: No pathways for operational effects (network scheme only); pipeline operation would not result in other environmental changes (e.g. noise, lighting) likely to affect the features of the site).

Option and European sites	Dist (km)*	LSE (C)	LSE (O)	Notes
Solent and Dorset Coast SPA	8.4/DS	U*	0	Construction: Indicative pipeline route crosses tributaries of this site at several points; significant and/or significant adverse effects almost certainly avoidable with established measures / normal best-practice, although these must necessarily be accounted for at AA (hence 'screened in'). Mobile species of site will not be functionally associated with habitats affected by construction. Operation: No pathways for operational effects (network scheme only).
Solent and Southampton Water Ramsar	10.7/DS	U*	0	Construction: Indicative pipeline route crosses tributaries of this site at several points; significant and/or significant adverse effects almost certainly avoidable with established measures / normal best-practice, although these must necessarily be accounted for at AA (hence 'screened in'). Mobile species of site will not be functionally associated with habitats affected by construction. Operation: No pathways for operational effects (network scheme only).
Solent and Southampton Water SPA	10.7/DS	U*	0	Construction: Indicative pipeline route crosses tributaries of this site at several points; significant and/or significant adverse effects almost certainly avoidable with established measures / normal best-practice, although these must necessarily be accounted for at AA (hence 'screened in'). Mobile species of site will not be functionally associated with habitats affected by construction. Operation: No pathways for operational effects (network scheme only).
SWS_IOW_HI-GRW_ALL_ALL_nw_gwa_kni_westi: Groundwater: Newchurch LGS (1.9Ml/d)				

Option and European sites	Dist (km)*	LSE (C)	LSE (O)	Notes
Solent and Southampton Water Ramsar	4.2/DS	0	U	Construction: Works are very small scale (borehole replacements) located in open fields and so construction effects would not be anticipated irrespective of any additional mitigation measures. There will be 'no effects' on this site or its features. Operation: The option would operate within licence, although the availability of the licensed volumes vs. recent actual abstraction requires confirmation as CAMS suggests restricted GW available, and restricted or no SW for this location depending on flows.
Solent and Southampton Water SPA	4.2/DS	0	U	Construction: Works are very small scale (borehole replacements) located in open fields and so construction effects would not be anticipated irrespective of any additional mitigation measures. There will be 'no effects' on this site or its features. Operation: The option would operate within licence, although the availability of the licensed volumes vs. recent actual abstraction requires confirmation as CAMS suggests restricted GW available, and restricted or no SW for this location depending on flows.
SWS_IOW_HI-REU_RE1_ALL_sey9: Recycling: Sandown WwTW (8.1Ml/d)				

Option and European sites	Dist (km)*	LSE (C)	LSE (O)	Notes
Solent and Dorset Coast SPA	0.8/DS	U*	0	Construction: Indicative pipeline route crosses tributaries of this site and works likely required in the Yar. Significant and/or significant adverse effects almost certainly avoidable with established measures / normal best-practice, although these must necessarily be accounted for at AA (hence 'screened in'). Mobile species unlikely to be reliant on non-designated habitats affected by construction. Operation: The discharge of treated effluent into the Eastern Yar; this site is located outside Bembridge harbour and is predominantly marine at this location, and so exposure to environmental changes associated with the option operation will be low. It is understood that the treated water would be used on a put and take basis and that flows in the Yar below the abstraction would remain largely the same, and so this site would not be exposed to potentially significant changes in FW input. The discharge will be treated to tertiary standards for ammonia, phosphate and BOD, and therefore, there will be a low risk of impacting the physico-chemical quality elements of this water body (currently at high status). The proposed treatment will also include a process (either UV AOP or reverse osmosis) to remove the majority organic chemical contaminants. Therefore, there will be a low risk of organic chemicals such as endocrine disruptors causing deterioration to fish status.

Option and European sites	Dist (km)*	LSE (C)	LSE (O)	Notes
Solent and Southampton Water SPA	1.7/DS	U*	0	Construction: Indicative pipeline route crosses tributaries of this site and works likely required in the Yar. Significant and/or significant adverse effects almost certainly avoidable with established measures / normal best-practice, although these must necessarily be accounted for at AA (hence 'screened in'). Mobile species unlikely to be reliant on non-designated habitats affected by construction. Operation: The discharge of treated effluent into the Eastern Yar, approximately 9km upstream of Bembridge harbour / Brading Marshes, will need to comply with Environment Agency discharge standards to secure a permit. It is understood that the treated water would be used on a put and take basis and that flows in the Yar below the abstraction would remain largely the same, and so the estuary would not be exposed to potentially significant changes in FW input. The discharge will be treated to tertiary standards for ammonia, phosphate and BOD, and therefore, there will be a low risk of impacting the physico-chemical quality elements of this water body (currently at high status). The proposed treatment will also include a process (either UV AOP or reverse osmosis) to remove the majority organic chemical contaminants. Therefore, there will be a low risk of organic chemicals such as endocrine disruptors causing deterioration to fish status (hence affecting qualifying features).

Option and European sites	Dist (km)*	LSE (C)	LSE (O)	Notes
Solent and Southampton Water Ramsar	1.7/DS	U*	0	Construction: Indicative pipeline route crosses tributaries of this site and works likely required in the Yar. Significant and/or significant adverse effects almost certainly avoidable with established measures / normal best-practice, although these must necessarily be accounted for at AA (hence 'screened in'). Mobile species unlikely to be reliant on non-designated habitats affected by construction. Operation: The discharge of treated effluent into the Eastern Yar, approximately 9km upstream of Bembridge harbour / Brading Marshes, will need to comply with Environment Agency discharge standards to secure a permit. It is understood that the treated water would be used on a put and take basis and that flows in the Yar below the abstraction would remain largely the same, and so the estuary would not be exposed to potentially significant changes in FW input. The discharge will be treated to tertiary standards for ammonia, phosphate and BOD, and therefore, there will be a low risk of impacting the physico-chemical quality elements of this water body (currently at high status). The proposed treatment will also include a process (either UV AOP or reverse osmosis) to remove the majority organic chemical contaminants. Therefore, there will be a low risk of organic chemicals such as endocrine disruptors causing deterioration.
Briddlesford Copses SAC	3.6	U*	0	Construction: Site not exposed to construction effects (distance, no pollutant pathways, separate catchment); pipeline close to Core Sustenance Zone (CSZ; see Appendix B) defined for the mobile interest features of the site, and effects on supporting habitats cannot be excluded at the plan level (although the risk of significant effects would be low based on the nature of the works). Significant and/or significant adverse effects almost certainly avoidable with established measures / normal best-practice, although these must necessarily be accounted for at AA (hence 'screened in'). Operation: No pathways for operational effects (separate catchment).

Option and European sites	Dist (km)*	LSE (C)	LSE (O)	Notes
Solent and Isle of Wight Lagoons SAC	4/DS	U*	0	Construction: Works likely required in / near the Yar. Little / no exposure to construction risks due to location of lagoon relative to Yar; significant and/or significant adverse effects almost certainly avoidable with established measures / normal best-practice, although these must necessarily be accounted for at AA (hence 'screened in'). Operation: The discharge of treated effluent into the Eastern Yar, approximately 9km upstream of Solent and Isle of Wight Lagoon SAC will need to comply with Environment Agency discharge standards to secure a permit. There is likely to be little / no exposure to operational effects due to location / relationship of lagoon relative to Yar; reduced salinity is a key risk for saline lagoons but it is understood that the treated water would be used on a put and take basis and that flows in the Yar below the abstraction would remain largely the same, and so the lagoon would not be exposed to possible increases in FW input. The discharge will be treated to tertiary standards for ammonia, phosphate and BOD, and therefore, there will be a low risk of impacting the physico-chemical quality elements of this water body (currently at high status). The proposed treatment will also include a process (either UV AOP or reverse osmosis) to remove the majority organic chemical contaminants. Therefore, there will be a low risk of organic chemicals such as endocrine disruptors causing deterioration to fish status.
SWS_KME_HI-DES_ALL_ALL_ios10: Desalination: Isle of Sheppey (10Ml/d)				
The Swale SPA	0	U*	U	Construction: Pipeline to Southdown WSR would cross this site, but would already have been constructed under SW022. Potential risk of disturbance effects associated construction at the desalination plant location, although avoidable with established measures. Operation: Operation will discharge hypersaline brine in the Medway estuary, although the exposure of the site itself to this is likely to be low; effects are possible for species utilising the Medway however.

Option and European sites	Dist (km)*	LSE (C)	LSE (O)	Notes
Medway Estuary and Marshes SPA	0/DS	U	Y	Construction: The intake / outfall and pipeline to Southdown WSR will have been constructed under SW022 and so effects would be limited to construction effects (including disturbance effects) associated construction at the desalination plant location, although these are likely to be avoidable with established measures Operation: Operation will discharge hypersaline brine offshore from this site; potential to affect supporting habitats.
Medway Estuary and Marshes Ramsar	0/DS	U	Y	Construction: The intake / outfall and pipeline to Southdown WSR will have been constructed under SW022 and so effects would be limited to construction effects (including disturbance effects) associated construction at the desalination plant location, although these are likely to be avoidable with established measures Operation: Operation will discharge hypersaline brine offshore from this site; potential to affect supporting habitats.
The Swale Ramsar	0	U*	U	Construction: Pipeline to Southdown WSR would cross this site, but would already have been constructed under SW022. Potential risk of disturbance effects associated construction at the desalination plant location, although avoidable with established measures. Operation: Operation will discharge hypersaline brine in the Medway estuary, although the exposure of the site itself to this is likely to be low; effects are possible for species utilising the Medway however.
Thames Estuary and Marshes Ramsar	1.8	U*	U	Construction: The intake / outfall will have been constructed under SW022 and so effects would be limited to construction effects (including disturbance effects) associated construction at the desalination plant location, although these are likely to be avoidable with established measures Operation: Operation will discharge hypersaline brine offshore from this site; potential to affect supporting habitats.

Option and European sites	Dist (km)*	LSE (C)	LSE (O)	Notes
Thames Estuary and Marshes SPA	1.9	U*	U	Construction: The intake / outfall will have been constructed under SW022 and so effects would be limited to construction effects (including disturbance effects) associated construction at the desalination plant location, although these are likely to be avoidable with established measures Operation: Operation will discharge hypersaline brine offshore from this site; potential to affect supporting habitats.
Outer Thames Estuary SPA	2.5	U*	U	Construction: The site itself will not be exposed / affected by environmental changes associated with construction (distance, attenuation provided by the tidal flux of the Thames estuary) although the mobile species may be exposed if utilising habitats closer to the construction areas; however, this can almost certainly be avoided with established measures. Operation: Operational effects are arguably unlikely due to designated site location relative to assumed location of intake / discharge and probability of dilution (noting that many studies have demonstrated that near-field dilution of brine to ambient levels typically occurs within a relatively short distance (tens or hundreds of metres rather than kilometres), plus the proportion of the site potentially affected would be very small; however, additional investigation relating to the plume is appropriate.
Benfleet and Southend Marshes SPA	8.5	U*	0	Construction: The site itself will not be exposed / affected by environmental changes associated with construction (distance, attenuation provided by the tidal flux of the Thames estuary) although the mobile species may be exposed if utilising habitats closer to the construction areas; however, this can almost certainly be avoided with established measures. Operation: Operational effects are unlikely due to designated site location relative to assumed location of intake / discharge and probability of dilution (noting that many studies have demonstrated that near-field dilution of brine to ambient levels typically occurs within a relatively short distance (tens or hundreds of metres rather than kilometres).

Option and European sites	Dist (km)*	LSE (C)	LSE (O)	Notes
Benfleet and Southend Marshes Ramsar	8.5	U*	0	Construction: The site itself will not be exposed / affected by environmental changes associated with construction (distance, attenuation provided by the tidal flux of the Thames estuary) although the mobile species may be exposed if utilising habitats closer to the construction areas; however, this can almost certainly be avoided with established measures. Operation: Operational effects are unlikely due to designated site location relative to assumed location of intake / discharge and probability of dilution (noting that many studies have demonstrated that near-field dilution of brine to ambient levels typically occurs within a relatively short distance (tens or hundreds of metres rather than kilometres).
Essex Estuaries SAC	8.6	U*	0	Construction: The site itself will not be exposed / affected by environmental changes associated with construction (distance, attenuation provided by the tidal flux of the Thames estuary) although the mobile species may be exposed if utilising habitats closer to the construction areas; however, this can almost certainly be avoided with established measures. Operation: Operational effects are unlikely due to designated site location relative to assumed location of intake / discharge and probability of dilution (noting that many studies have demonstrated that near-field dilution of brine to ambient levels typically occurs within a relatively short distance (tens or hundreds of metres rather than kilometres).
Foulness (Mid-Essex Coast Phase 5) Ramsar	8.8	U*	0	Construction: The site itself will not be exposed / affected by environmental changes associated with construction (distance, attenuation provided by the tidal flux of the Thames estuary) although the mobile species may be exposed if utilising habitats closer to the construction areas; however, this can almost certainly be avoided with established measures. Operation: Operational effects are unlikely due to designated site location relative to assumed location of intake / discharge and probability of dilution (noting that many studies have demonstrated that near-field dilution of brine to ambient levels typically occurs within a relatively short distance (tens or hundreds of metres rather than kilometres).

Option and European sites	Dist (km)*	LSE (C)	LSE (O)	Notes
Foulness (Mid-Essex Coast Phase 5) SPA	8.8	U*	0	Construction: The site itself will not be exposed / affected by environmental changes associated with construction (distance, attenuation provided by the tidal flux of the Thames estuary) although the mobile species may be exposed if utilising habitats closer to the construction areas; however, this can almost certainly be avoided with established measures. Operation: Operational effects are unlikely due to designated site location relative to assumed location of intake / discharge and probability of dilution (noting that many studies have demonstrated that near-field dilution of brine to ambient levels typically occurs within a relatively short distance (tens or hundreds of metres rather than kilometres).
SWS_KME_HI-DES_ALL_ALL_ios20: Desalination: Isle of Sheppey (20Ml/d)				
The Swale SPA	0/DS	Y	U	Construction: Pipeline to Southdown WSR would cross this site; this will almost certainly follow existing roads in this area although disturbance effects are possible. Operation: Operation will discharge hypersaline brine in the Medway estuary, although the exposure of the site itself to this is likely to be low; effects are possible for species utilising the Medway however.
Medway Estuary and Marshes SPA	0/DS	Y	Y	Construction: Intake / outfall will be located just outside this site, so effects on site habitats possible depending on construction approach; mobile features will be vulnerable to disturbance etc. Pipeline to Southdown WSR would cross this site; this will almost certainly follow existing roads in this area although disturbance effects are possible. Operation: Operation will discharge hypersaline brine offshore from this site; potential to affect supporting habitats.

Option and European sites	Dist (km)*	LSE (C)	LSE (O)	Notes
Medway Estuary and Marshes Ramsar	0/DS	Y	Y	Construction: Intake / outfall will be located just outside this site, so effects on site habitats possible depending on construction approach; mobile features will be vulnerable to disturbance etc. Pipeline to Southdown WSR would cross this site; this will almost certainly follow existing roads in this area although disturbance effects are possible. Operation: Operation will discharge hypersaline brine offshore from this site; potential to affect supporting habitats.
The Swale Ramsar	0/DS	Y	U	Construction: Pipeline to Southdown WSR would cross this site; this will almost certainly follow existing roads in this area although disturbance effects are possible. Operation: Operation will discharge hypersaline brine in the Medway estuary, although the exposure of the site itself to this is likely to be low; effects are possible for species utilising the Medway however.
Thames Estuary and Marshes Ramsar	1.8	U	U	Construction: A small proportion of this site will be within 2km of the likely Intake / outfall location in the Medway estuary; construction effects on site habitats likely to be limited but mobile features will be vulnerable to disturbance etc. Operation: Operation will discharge hypersaline brine offshore from this site; potential to affect supporting habitats.
Thames Estuary and Marshes SPA	1.9	U	U	Construction: A small proportion of this site will be within 2km of the likely Intake / outfall location in the Medway estuary; construction effects on site habitats likely to be limited but mobile features will be vulnerable to disturbance etc. Operation: Operation will discharge hypersaline brine offshore from this site; potential to affect supporting habitats.

Option and European sites	Dist (km)*	LSE (C)	LSE (O)	Notes
Outer Thames Estuary SPA	2.5	U*	U	Construction: The site itself will not be exposed / affected by environmental changes associated with construction (distance, attenuation provided by the tidal flux of the Thames estuary) although the mobile species may be exposed if utilising habitats closer to the construction areas; however, this can almost certainly be avoided with established measures. Operation: Operational effects are arguably unlikely due to designated site location relative to assumed location of intake / discharge and probability of dilution (noting that many studies have demonstrated that near-field dilution of brine to ambient levels typically occurs within a relatively short distance (tens or hundreds of metres rather than kilometres), plus the proportion of the site potentially affected would be very small; however, additional investigation relating to the plume is appropriate.
Benfleet and Southend Marshes SPA	8.5	U*	0	Construction: The site itself will not be exposed / affected by environmental changes associated with construction (distance, attenuation provided by the tidal flux of the Thames estuary) although the mobile species may be exposed if utilising habitats closer to the construction areas; however, this can almost certainly be avoided with established measures. Operation: Operational effects are unlikely due to designated site location relative to assumed location of intake / discharge and probability of dilution (noting that many studies have demonstrated that near-field dilution of brine to ambient levels typically occurs within a relatively short distance (tens or hundreds of metres rather than kilometres).

Option and European sites	Dist (km)*	LSE (C)	LSE (O)	Notes
Benfleet and Southend Marshes Ramsar	8.5	U*	0	Construction: The site itself will not be exposed / affected by environmental changes associated with construction (distance, attenuation provided by the tidal flux of the Thames estuary) although the mobile species may be exposed if utilising habitats closer to the construction areas; however, this can almost certainly be avoided with established measures. Operation: Operational effects are unlikely due to designated site location relative to assumed location of intake / discharge and probability of dilution (noting that many studies have demonstrated that near-field dilution of brine to ambient levels typically occurs within a relatively short distance (tens or hundreds of metres rather than kilometres).
Essex Estuaries SAC	8.6	U*	0	Construction: The site itself will not be exposed / affected by environmental changes associated with construction (distance, attenuation provided by the tidal flux of the Thames estuary) although the mobile species may be exposed if utilising habitats closer to the construction areas; however, this can almost certainly be avoided with established measures. Operation: Operational effects are unlikely due to designated site location relative to assumed location of intake / discharge and probability of dilution (noting that many studies have demonstrated that near-field dilution of brine to ambient levels typically occurs within a relatively short distance (tens or hundreds of metres rather than kilometres).
Foulness (Mid-Essex Coast Phase 5) Ramsar	8.8	U*	0	Construction: The site itself will not be exposed / affected by environmental changes associated with construction (distance, attenuation provided by the tidal flux of the Thames estuary) although the mobile species may be exposed if utilising habitats closer to the construction areas; however, this can almost certainly be avoided with established measures. Operation: Operational effects are unlikely due to designated site location relative to assumed location of intake / discharge and probability of dilution (noting that many studies have demonstrated that near-field dilution of brine to ambient levels typically occurs within a relatively short distance (tens or hundreds of metres rather than kilometres).

Option and European sites	Dist (km)*	LSE (C)	LSE (O)	Notes
Foulness (Mid-Essex Coast Phase 5) SPA	8.8	U*	0	Construction: The site itself will not be exposed / affected by environmental changes associated with construction (distance, attenuation provided by the tidal flux of the Thames estuary) although the mobile species may be exposed if utilising habitats closer to the construction areas; however, this can almost certainly be avoided with established measures. Operation: Operational effects are unlikely due to designated site location relative to assumed location of intake / discharge and probability of dilution (noting that many studies have demonstrated that near-field dilution of brine to ambient levels typically occurs within a relatively short distance (tens or hundreds of metres rather than kilometres).
SWS_KME_HI-DES_ALL_ALL_ios20_p2: Desalination: Isle of Sheppey (20Ml/d) Phase 2				
The Swale SPA	0	U*	U	Construction: Pipeline to Southdown WSR would cross this site, but would already have been constructed under SW022. Potential risk of disturbance effects associated construction at the desalination plant location, although avoidable with established measures. Operation: Operation will discharge hypersaline brine in the Medway estuary, although the exposure of the site itself to this is likely to be low; effects are possible for species utilising the Medway however.
Medway Estuary and Marshes SPA	0/DS	U	Y	Construction: The intake / outfall and pipeline to Southdown WSR will have been constructed under SW022 and so effects would be limited to construction effects (including disturbance effects) associated construction at the desalination plant location, although these are likely to be avoidable with established measures Operation: Operation will discharge hypersaline brine offshore from this site; potential to affect supporting habitats.

Option and European sites	Dist (km)*	LSE (C)	LSE (O)	Notes
Medway Estuary and Marshes Ramsar	0/DS	U	Y	Construction: The intake / outfall and pipeline to Southdown WSR will have been constructed under SW022 and so effects would be limited to construction effects (including disturbance effects) associated construction at the desalination plant location, although these are likely to be avoidable with established measures Operation: Operation will discharge hypersaline brine offshore from this site; potential to affect supporting habitats.
The Swale Ramsar	0	U*	U	Construction: Pipeline to Southdown WSR would cross this site, but would already have been constructed under SW022. Potential risk of disturbance effects associated construction at the desalination plant location, although avoidable with established measures. Operation: Operation will discharge hypersaline brine in the Medway estuary, although the exposure of the site itself to this is likely to be low; effects are possible for species utilising the Medway however.
Thames Estuary and Marshes Ramsar	1.8	U*	U	Construction: The intake / outfall will have been constructed under SW022 and so effects would be limited to construction effects (including disturbance effects) associated construction at the desalination plant location, although these are likely to be avoidable with established measures Operation: Operation will discharge hypersaline brine offshore from this site; potential to affect supporting habitats.
Thames Estuary and Marshes SPA	1.9	U*	U	Construction: The intake / outfall will have been constructed under SW022 and so effects would be limited to construction effects (including disturbance effects) associated construction at the desalination plant location, although these are likely to be avoidable with established measures Operation: Operation will discharge hypersaline brine offshore from this site; potential to affect supporting habitats.

Option and European sites	Dist (km)*	LSE (C)	LSE (O)	Notes
Outer Thames Estuary SPA	2.5	U*	U	Construction: The site itself will not be exposed / affected by environmental changes associated with construction (distance, attenuation provided by the tidal flux of the Thames estuary) although the mobile species may be exposed if utilising habitats closer to the construction areas; however, this can almost certainly be avoided with established measures. Operation: Operational effects are arguably unlikely due to designated site location relative to assumed location of intake / discharge and probability of dilution (noting that many studies have demonstrated that near-field dilution of brine to ambient levels typically occurs within a relatively short distance (tens or hundreds of metres rather than kilometres), plus the proportion of the site potentially affected would be very small; however, additional investigation relating to the plume is appropriate.
Benfleet and Southend Marshes SPA	8.5	U*	0	Construction: The site itself will not be exposed / affected by environmental changes associated with construction (distance, attenuation provided by the tidal flux of the Thames estuary) although the mobile species may be exposed if utilising habitats closer to the construction areas; however, this can almost certainly be avoided with established measures. Operation: Operational effects are unlikely due to designated site location relative to assumed location of intake / discharge and probability of dilution (noting that many studies have demonstrated that near-field dilution of brine to ambient levels typically occurs within a relatively short distance (tens or hundreds of metres rather than kilometres).

Option and European sites	Dist (km)*	LSE (C)	LSE (O)	Notes
Benfleet and Southend Marshes Ramsar	8.5	U*	0	Construction: The site itself will not be exposed / affected by environmental changes associated with construction (distance, attenuation provided by the tidal flux of the Thames estuary) although the mobile species may be exposed if utilising habitats closer to the construction areas; however, this can almost certainly be avoided with established measures. Operation: Operational effects are unlikely due to designated site location relative to assumed location of intake / discharge and probability of dilution (noting that many studies have demonstrated that near-field dilution of brine to ambient levels typically occurs within a relatively short distance (tens or hundreds of metres rather than kilometres).
Essex Estuaries SAC	8.6	U*	0	Construction: The site itself will not be exposed / affected by environmental changes associated with construction (distance, attenuation provided by the tidal flux of the Thames estuary) although the mobile species may be exposed if utilising habitats closer to the construction areas; however, this can almost certainly be avoided with established measures. Operation: Operational effects are unlikely due to designated site location relative to assumed location of intake / discharge and probability of dilution (noting that many studies have demonstrated that near-field dilution of brine to ambient levels typically occurs within a relatively short distance (tens or hundreds of metres rather than kilometres).
Foulness (Mid-Essex Coast Phase 5) Ramsar	8.8	U*	0	Construction: The site itself will not be exposed / affected by environmental changes associated with construction (distance, attenuation provided by the tidal flux of the Thames estuary) although the mobile species may be exposed if utilising habitats closer to the construction areas; however, this can almost certainly be avoided with established measures. Operation: Operational effects are unlikely due to designated site location relative to assumed location of intake / discharge and probability of dilution (noting that many studies have demonstrated that near-field dilution of brine to ambient levels typically occurs within a relatively short distance (tens or hundreds of metres rather than kilometres).

Option and European sites	Dist (km)*	LSE (C)	LSE (O)	Notes
Foulness (Mid-Essex Coast Phase 5) SPA	8.8	U*	0	Construction: The site itself will not be exposed / affected by environmental changes associated with construction (distance, attenuation provided by the tidal flux of the Thames estuary) although the mobile species may be exposed if utilising habitats closer to the construction areas; however, this can almost certainly be avoided with established measures. Operation: Operational effects are unlikely due to designated site location relative to assumed location of intake / discharge and probability of dilution (noting that many studies have demonstrated that near-field dilution of brine to ambient levels typically occurs within a relatively short distance (tens or hundreds of metres rather than kilometres).
SWS_KME_HI-REU_RE1_ALL_sit8: Recycling: Sittingbourne industrial reuse (7.5Mld)				
The Swale SPA	0.1/DS	U*	Y	Construction: Works required close to this site; site features unlikely to utilise habitats affected by option but site may be vulnerable to site-derived pollutants. Significant and/or significant adverse effects almost certainly avoidable with established measures / normal best-practice, although these must necessarily be accounted for at AA (hence 'screened in'). Operation: The scheme would supply DS Smith with reuse water from Sittingbourne WwTW (discharges to Milton Creek), freeing up an equivalent volume for SWS to abstract from groundwater. There would be no increase in abstraction. A new tertiary treatment plant and groundwater treatment plant would be required, including distribution pipelines and a new discharge. There is a risk of adverse impacts to flows, as a consequence of 7.5Ml/d effluent being re-directed for industrial use. Some freshwater invertebrate taxa are more responsive to changes in flow than others. Relative abundance of certain groups may change locally in response to decreased freshwater flow, although the nature of the invertebrate community in this part of the tidal river is assumed to be strongly linked to the ambient salinity profile and tidal influence. However, the impact of these changes in invertebrate on the qualifying features of the SPA, and how the change in flows could impact the Ramsar features is uncertain. Therefore, adopting the precautionary principle, LSEs are anticipated.

Option and European sites	Dist (km)*	LSE (C)	LSE (O)	Notes
The Swale Ramsar	0.1/DS	U*	Y	Construction: Works required close to this site; site features unlikely to utilise habitats affected by option but site may be vulnerable to site-derived pollutants. Significant and/or significant adverse effects almost certainly avoidable with established measures / normal best-practice, although these must necessarily be accounted for at AA (hence 'screened in'). Operation: The scheme would supply DS Smith with reuse water from Sittingbourne WwTW (discharges to Milton Creek), freeing up an equivalent volume for SWS to abstract from groundwater. There would be no increase in abstraction. A new tertiary treatment plant and groundwater treatment plant would be required, including distribution pipelines and a new discharge. There is a risk of adverse impacts to flows, as a consequence of 7.5Ml/d effluent being re-directed for industrial use. Some freshwater invertebrate taxa are more responsive to changes in flow than others. Relative abundance of certain groups may change locally in response to decreased freshwater flow, although the nature of the invertebrate community in this part of the tidal river is assumed to be strongly linked to the ambient salinity profile and tidal influence. However, the impact of these changes in invertebrate on the qualifying features of the SPA, and how the change in flows could impact the Ramsar features is uncertain. Therefore, adopting the precautionary principle, LSEs are anticipated.
Medway Estuary and Marshes SPA	2.8/DS	U*	0	Construction: Works required close to this site; site features unlikely to utilise habitats affected by option but site may be vulnerable to site-derived pollutants. Significant and/or significant adverse effects almost certainly avoidable with established measures / normal best-practice, although these must necessarily be accounted for at AA (hence 'screened in'). Operation: The change in freshwater flows is considered to be limited to effects within Milton Creek only, therefore given the distance to the Medway SPA and Ramsar and size of waterbodies in between, no likely significant effects are anticipated.

Option and European sites	Dist (km)*	LSE (C)	LSE (O)	Notes
Medway Estuary and Marshes Ramsar	2.8/DS	U*	0	Construction: Works required close to this site; site features unlikely to utilise habitats affected by option but site may be vulnerable to site-derived pollutants. Significant and/or significant adverse effects almost certainly avoidable with established measures / normal best-practice, although these must necessarily be accounted for at AA (hence 'screened in'). Operation: The change in freshwater flows is considered to be limited to effects within Milton Creek only, therefore given the distance to the Medway SPA and Ramsar and size of waterbodies in between, no likely significant effects are anticipated.
SWS_KMW_HI-DES_ALL_ALL_swa10: Desalination: River Thames estuary (10Ml/d)				
Thames Estuary and Marshes Ramsar	3.8/DS	U*	U	Construction: This site is a down-estuary receptor; construction effects on site habitats likely to be limited but mobile features may be vulnerable to disturbance etc. Operation: Operation will discharge hypersaline brine upstream of this site, and although the distance and dilution provided by the estuary is likely to limit effects (noting that many studies have demonstrated that near-field dilution of brine to ambient levels typically occurs within a relatively short distance (tens or hundreds of metres rather than kilometres)), this may need additional contextual information or plume investigations to confirm this.
Thames Estuary and Marshes SPA	5.2/DS	U*	U	Construction: This site is a down-estuary receptor; construction effects on site habitats likely to be limited but mobile features may be vulnerable to disturbance etc. Operation: Operation will discharge hypersaline brine upstream of this site, and although the distance and dilution provided by the estuary is likely to limit effects (noting that many studies have demonstrated that near-field dilution of brine to ambient levels typically occurs within a relatively short distance (tens or hundreds of metres rather than kilometres)), this may need additional contextual information or plume investigations to confirm this.
SWS_KMW_HI-DES_ALL_ALL_swa10_p2: Desalination: River Thames estuary (10Ml/d) Phase 2				

Option and European sites	Dist (km)*	LSE (C)	LSE (O)	Notes
Thames Estuary and Marshes Ramsar	3.8/DS	U*	U	Construction: This site is a down-estuary receptor; construction effects on site habitats likely to be limited but mobile features may be vulnerable to disturbance etc. Operation: Operation will discharge hypersaline brine upstream of this site, and although the distance and dilution provided by the estuary is likely to limit effects (noting that many studies have demonstrated that near-field dilution of brine to ambient levels typically occurs within a relatively short distance (tens or hundreds of metres rather than kilometres)), this may need additional contextual information or plume investigations to confirm this.
Thames Estuary and Marshes SPA	5.2/DS	U*	U	Construction: This site is a down-estuary receptor; construction effects on site habitats likely to be limited but mobile features may be vulnerable to disturbance etc. Operation: Operation will discharge hypersaline brine upstream of this site, and although the distance and dilution provided by the estuary is likely to limit effects (noting that many studies have demonstrated that near-field dilution of brine to ambient levels typically occurs within a relatively short distance (tens or hundreds of metres rather than kilometres)), this may need additional contextual information or plume investigations to confirm this.
SWS_KMW_HI-DES_ALL_ALL_swa20: Desalination: River Thames estuary (20Ml/d)				
Thames Estuary and Marshes Ramsar	3.8/DS	U*	U	Construction: This site is a down-estuary receptor; construction effects on site habitats likely to be limited but mobile features may be vulnerable to disturbance etc. Operation: Operation will discharge hypersaline brine upstream of this site, and although the distance and dilution provided by the estuary is likely to limit effects (noting that many studies have demonstrated that near-field dilution of brine to ambient levels typically occurs within a relatively short distance (tens or hundreds of metres rather than kilometres)), this may need additional contextual information or plume investigations to confirm this.

Option and European sites	Dist (km)*	LSE (C)	LSE (O)	Notes
Thames Estuary and Marshes SPA	5.2/DS	U*	U	Construction: This site is a down-estuary receptor; construction effects on site habitats likely to be limited but mobile features may be vulnerable to disturbance etc. Operation: Operation will discharge hypersaline brine upstream of this site, and although the distance and dilution provided by the estuary is likely to limit effects (noting that many studies have demonstrated that near-field dilution of brine to ambient levels typically occurs within a relatively short distance (tens or hundreds of metres rather than kilometres)), this may need additional contextual information or plume investigations to confirm this.
SWS_KMW_HI-DES_ALL_ALL_swa20_p2: Desalination: River Thames estuary (20Ml/d) Phase 2				
Thames Estuary and Marshes Ramsar	3.8/DS	U*	U	Construction: This site is a down-estuary receptor; construction effects on site habitats likely to be limited but mobile features may be vulnerable to disturbance etc. Operation: Operation will discharge hypersaline brine upstream of this site, and although the distance and dilution provided by the estuary is likely to limit effects (noting that many studies have demonstrated that near-field dilution of brine to ambient levels typically occurs within a relatively short distance (tens or hundreds of metres rather than kilometres)), this may need additional contextual information or plume investigations to confirm this.
Thames Estuary and Marshes SPA	5.2/DS	U*	U	Construction: This site is a down-estuary receptor; construction effects on site habitats likely to be limited but mobile features may be vulnerable to disturbance etc. Operation: Operation will discharge hypersaline brine upstream of this site, and although the distance and dilution provided by the estuary is likely to limit effects (noting that many studies have demonstrated that near-field dilution of brine to ambient levels typically occurs within a relatively short distance (tens or hundreds of metres rather than kilometres)), this may need additional contextual information or plume investigations to confirm this.
SWS_KMW_HI-REU_RE1_ALL_ecc18: Recycling: Medway WwTW (12.8Ml/d)				

Option and European sites	Dist (km)*	LSE (C)	LSE (O)	Notes
Medway Estuary and Marshes SPA	10.4/DS	U*	U	Construction: Works required close to the River Medway; site features unlikely to utilise habitats affected by option but site may be vulnerable to site-derived pollutants. Significant and/or significant adverse effects almost certainly avoidable with established measures / normal best-practice, although these must necessarily be accounted for at AA (hence 'screened in'). Operation: Option will reduce freshwater inputs to the tidal River Medway as water is extracted from effluent that would otherwise be discharged to the estuary; however, the effect of this on the designated site (~20km downstream) is likely to be limited, particularly in relation to the tidal influx / turnover, within the estuary.
Medway Estuary and Marshes Ramsar	10.4/DS	U*	U	Construction: Works required close to the River Medway; site features unlikely to utilise habitats affected by option but site may be vulnerable to site-derived pollutants. Significant and/or significant adverse effects almost certainly avoidable with established measures / normal best-practice, although these must necessarily be accounted for at AA (hence 'screened in'). Operation: Option will reduce freshwater inputs to the tidal River Medway as water is extracted from effluent that would otherwise be discharged to the estuary; however, the effect of this on the designated site (~20km downstream) is likely to be limited, particularly in relation to the tidal influx / turnover, within the estuary.
SWS_KTZ_HI-DES_ALL_ALL_tha10_p2: Desalination: East Thanet coast & transfer (10Ml/d) Phase 2				
Thanet Coast and Sandwich Bay SPA	0/DS	U*	Y	Construction: The intake / outfall for this option will have already been constructed as part of Option SW005 and so construction would be limited to the existing desalination plant location. Mobile features may be vulnerable to disturbance etc. if using non-designated areas of functional land. Significant and/or significant adverse effects almost certainly avoidable with established measures / normal best-practice, although these must necessarily be accounted for at AA (hence 'screened in'). Operation: Operation will discharge hypersaline brine offshore from this site; potential to affect supporting habitats.

Option and European sites	Dist (km)*	LSE (C)	LSE (O)	Notes
Outer Thames Estuary SPA	0/DS	U*	Y	Construction: The intake / outfall for this option will have already been constructed as part of Option SW005 and so construction would be limited to the existing desalination plant location (inland); mobile features will not be exposed to disturbance etc. Significant and/or significant adverse effects almost certainly avoidable with established measures / normal best-practice, although these must necessarily be accounted for at AA (hence 'screened in'). Operation: Operation will discharge hypersaline brine into this site; potential to affect supporting habitats for the interest features, although exposure and sensitivity may be low given the feature characteristics / preferences.
Thanet Coast and Sandwich Bay Ramsar	0/DS	U*	Y	Construction: The intake / outfall for this option will have already been constructed as part of Option SW005 and so construction would be limited to the existing desalination plant location. Mobile features may be vulnerable to disturbance etc. if using non-designated areas of functional land. Significant and/or significant adverse effects almost certainly avoidable with established measures / normal best-practice, although these must necessarily be accounted for at AA (hence 'screened in'). Operation: Operation will discharge hypersaline brine offshore from this site; potential to affect supporting habitats.
Thanet Coast SAC	0.3/DS	U*	Y	Construction: The intake / outfall for this option will have already been constructed as part of Option SW005 and so construction would be limited to the existing desalination plant location. Few pathways for effects; Significant and/or significant adverse effects almost certainly avoidable with established measures / normal best-practice, although these must necessarily be accounted for at AA (hence 'screened in'). Operation: Operation will discharge hypersaline brine close to this site; potential to affect the typical species of the Reefs feature.

Option and European sites	Dist (km)*	LSE (C)	LSE (O)	Notes
Margate and Long Sands SAC	1.3	0	Y	Construction: The intake / outfall for this option will have already been constructed as part of Option SW005 and so construction would be limited to the existing desalination plant location; this site will not be exposed to environmental changes as a result of construction. Operation: Operation will discharge hypersaline brine close to this site.
Stodmarsh SPA	5.7	U*	U	Construction: No pathways for construction effects on site itself (distance, site up-catchment); mobile features may be functionally linked to wetland habitats close to desal plant (e.g. at Wade Marsh). Significant and/or significant adverse effects almost certainly avoidable with established measures / normal best-practice, although these must necessarily be accounted for at AA (hence 'screened in'). Operation: No pathways for operational effects on site itself (distance; site up-catchment); some mobile features may periodically use habitats of the Thanet Coast and Sandwich Bay SPA / Ramsar that may be exposed to environmental changes associated with operation, although sensitivity and exposure is likely to be low.
SWS_KTZ_HI-DES_ALL_ALL_tha20: Desalination: East Thanet coast & transfer (20Ml/d)				
Thanet Coast and Sandwich Bay SPA	0/DS	Y	Y	Construction: Intake / outfall will cross this site, so direct and indirect effects on site habitats possible depending on construction approach; mobile features will be vulnerable to disturbance etc. Non-designated areas of functional land used by golden plover present near Minnis Bay, may be present elsewhere on pipeline route. Operation: Operation will discharge hypersaline brine offshore from this site; potential to affect supporting habitats.

Option and European sites	Dist (km)*	LSE (C)	LSE (O)	Notes
Outer Thames Estuary SPA	0/DS	Y	Y	Construction: Intake / outfall will be within this site, so direct and indirect effects on site habitats possible depending on construction approach; mobile features will be vulnerable to disturbance etc. although sensitivity may be low. Operation: Operation will discharge hypersaline brine into this site; potential to affect supporting habitats for the interest features, although exposure and sensitivity may be low given the feature characteristics / preferences.
Thanet Coast and Sandwich Bay Ramsar	0/DS	Y	Y	Construction: Intake / outfall will cross this site, so direct and indirect effects on site habitats possible depending on construction approach; mobile features will be vulnerable to disturbance etc. Operation: Operation will discharge hypersaline brine offshore from this site; potential to affect supporting habitats.
Thanet Coast SAC	0.3/DS	Y	Y	Construction: Intake / outfall will be close to site boundary, indirect effects on site habitats possible depending on construction approach although sensitivity of features is likely to be low. Operation: Operation will discharge hypersaline brine close to this site; potential to affect the typical species of the Reefs feature.
Margate and Long Sands SAC	1.3	Y	Y	Construction: Intake / outfall will be close to site boundary, indirect effects on site habitats possible depending on construction approach although sensitivity of features to construction effects is likely to be low. Operation: Operation will discharge hypersaline brine close to this site.

Option and European sites	Dist (km)*	LSE (C)	LSE (O)	Notes
Stodmarsh SPA	5.7	U*	U	Construction: No pathways for construction effects on site itself (distance, site up-catchment); mobile features may be functionally linked to wetland habitats crossed by pipeline (e.g. at Wade Marsh). Significant and/or significant adverse effects almost certainly avoidable with established measures / normal best-practice, although these must necessarily be accounted for at AA (hence 'screened in'). Operation: No pathways for operational effects on site itself (distance; site up-catchment); some mobile features may periodically use habitats of the Thanet Coast and Sandwich Bay SPA / Ramsar that may be exposed to environmental changes associated with operation, although sensitivity and exposure is likely to be low.
SWS_KTZ_HI-DES_ALL_ALL_tha20_p2: Desalination: East Thanet coast & transfer (20Ml/d) Phase 2				
Thanet Coast and Sandwich Bay SPA	0/DS	U*	Y	Construction: The intake / outfall for this option will have already been constructed as part of Option SW005 and so construction would be limited to the existing desalination plant location. Mobile features may be vulnerable to disturbance etc. if using non-designated areas of functional land. Significant and/or significant adverse effects almost certainly avoidable with established measures / normal best-practice, although these must necessarily be accounted for at AA (hence 'screened in'). Operation: Operation will discharge hypersaline brine offshore from this site; potential to affect supporting habitats.
Outer Thames Estuary SPA	0/DS	U*	Y	Construction: The intake / outfall for this option will have already been constructed as part of Option SW005 and so construction would be limited to the existing desalination plant location (inland); mobile features will not be exposed to disturbance etc. Significant and/or significant adverse effects almost certainly avoidable with established measures / normal best-practice, although these must necessarily be accounted for at AA (hence 'screened in'). Operation: Operation will discharge hypersaline brine into this site; potential to affect supporting habitats for the interest features, although exposure and sensitivity may be low given the feature characteristics / preferences.

Option and European sites	Dist (km)*	LSE (C)	LSE (O)	Notes
Thanet Coast and Sandwich Bay Ramsar	0/DS	U*	Y	Construction: The intake / outfall for this option will have already been constructed as part of Option SW005 and so construction would be limited to the existing desalination plant location. Mobile features may be vulnerable to disturbance etc. if using non-designated areas of functional land. Significant and/or significant adverse effects almost certainly avoidable with established measures / normal best-practice, although these must necessarily be accounted for at AA (hence 'screened in'). Operation: Operation will discharge hypersaline brine offshore from this site; potential to affect supporting habitats.
Thanet Coast SAC	0.3/DS	U*	Y	Construction: The intake / outfall for this option will have already been constructed as part of Option SW005 and so construction would be limited to the existing desalination plant location. Few pathways for effects; Significant and/or significant adverse effects almost certainly avoidable with established measures / normal best-practice, although these must necessarily be accounted for at AA (hence 'screened in'). Operation: Operation will discharge hypersaline brine close to this site; potential to affect the typical species of the Reefs feature.
Margate and Long Sands SAC	1.3	0	Y	Construction: The intake / outfall for this option will have already been constructed as part of Option SW005 and so construction would be limited to the existing desalination plant location; this site will not be exposed to environmental changes as a result of construction. Operation: Operation will discharge hypersaline brine close to this site.

Option and European sites	Dist (km)*	LSE (C)	LSE (O)	Notes
Stodmarsh SPA	5.7	U*	U	Construction: No pathways for construction effects on site itself (distance, site up-catchment); mobile features may be functionally linked to wetland habitats close to desal plant (e.g. at Wade Marsh). Significant and/or significant adverse effects almost certainly avoidable with established measures / normal best-practice, although these must necessarily be accounted for at AA (hence 'screened in'). Operation: No pathways for operational effects on site itself (distance; site up-catchment); some mobile features may periodically use habitats of the Thanet Coast and Sandwich Bay SPA / Ramsar that may be exposed to environmental changes associated with operation, although sensitivity and exposure is likely to be low.
SWS_KTZ_HI-TFR_AZ7_ALL_win: Import: SEW Kingston to KTZ Near Canterbury (2Ml/d)				
Stodmarsh Ramsar	0.4/DS	U*	0	Construction: Indicative pipeline route crosses tributaries of this site; site features unlikely to utilise habitats affected by pipeline. Significant and/or significant adverse effects almost certainly avoidable with established measures / normal best-practice, although these must necessarily be accounted for at AA (hence 'screened in'). Operation: No pathways for operational effects (network scheme only).
Stodmarsh SAC	0.4/DS	U*	0	Construction: Indicative pipeline route crosses tributaries of this site; site features unlikely to utilise habitats affected by pipeline. Significant and/or significant adverse effects almost certainly avoidable with established measures / normal best-practice, although these must necessarily be accounted for at AA (hence 'screened in'). Operation: No pathways for operational effects (network scheme only).

Option and European sites	Dist (km)*	LSE (C)	LSE (O)	Notes
Stodmarsh SPA	0.5/DS	U*	0	Construction: Indicative pipeline route crosses tributaries of this site; site features unlikely to utilise habitats affected by pipeline. Significant and/or significant adverse effects almost certainly avoidable with established measures / normal best-practice, although these must necessarily be accounted for at AA (hence 'screened in'). Operation: No pathways for operational effects (network scheme only).
Thanet Coast and Sandwich Bay Ramsar	5.6/DS	U*	0	Construction: Indicative pipeline route crosses tributaries of this site; site features unlikely to utilise habitats affected by pipeline. Significant and/or significant adverse effects almost certainly avoidable with established measures / normal best-practice, although these must necessarily be accounted for at AA (hence 'screened in'). Operation: No pathways for operational effects (network scheme only).
Thanet Coast and Sandwich Bay SPA	5.6/DS	U*	0	Construction: Indicative pipeline route crosses tributaries of this site; site features unlikely to utilise habitats affected by pipeline. Significant and/or significant adverse effects almost certainly avoidable with established measures / normal best-practice, although these must necessarily be accounted for at AA (hence 'screened in'). Operation: No pathways for operational effects (network scheme only).
SWS_KTZ_HI-TFR_RZ8_ALL_canterb-wingha p 20: Canterbury (Broad Oak) to Near Canterbury GW				
Stodmarsh Ramsar	0.4/DS	U*	0	Construction: Indicative pipeline route crosses tributaries of this site; site features unlikely to utilise habitats affected by pipeline. Significant and/or significant adverse effects almost certainly avoidable with established measures / normal best-practice, although these must necessarily be accounted for at AA (hence 'screened in'). Operation: No pathways for operational effects (network scheme only).

Option and European sites	Dist (km)*	LSE (C)	LSE (O)	Notes
Stodmarsh SAC	0.4/DS	U*	0	Construction: Indicative pipeline route crosses tributaries of this site; site features unlikely to utilise habitats affected by pipeline. Significant and/or significant adverse effects almost certainly avoidable with established measures / normal best-practice, although these must necessarily be accounted for at AA (hence 'screened in'). Operation: No pathways for operational effects (network scheme only).
Stodmarsh SPA	0.5/DS	U*	0	Construction: Indicative pipeline route crosses tributaries of this site; site features unlikely to utilise habitats affected by pipeline. Significant and/or significant adverse effects almost certainly avoidable with established measures / normal best-practice, although these must necessarily be accounted for at AA (hence 'screened in'). Operation: No pathways for operational effects (network scheme only).
Thanet Coast and Sandwich Bay Ramsar	5.6/DS	U*	0	Construction: Indicative pipeline route crosses tributaries of this site; site features unlikely to utilise habitats affected by pipeline. Significant and/or significant adverse effects almost certainly avoidable with established measures / normal best-practice, although these must necessarily be accounted for at AA (hence 'screened in'). Operation: No pathways for operational effects (network scheme only).
Thanet Coast and Sandwich Bay SPA	5.6/DS	U*	0	Construction: Indicative pipeline route crosses tributaries of this site; site features unlikely to utilise habitats affected by pipeline. Significant and/or significant adverse effects almost certainly avoidable with established measures / normal best-practice, although these must necessarily be accounted for at AA (hence 'screened in'). Operation: No pathways for operational effects (network scheme only).
SWS_KTZ_HI-TFR_RZ8_ALL_win: Import: SEW Kingston to KTZ Near Canterbury (2Ml/d)				

Option and European sites	Dist (km)*	LSE (C)	LSE (O)	Notes
Thanet Coast and Sandwich Bay Ramsar	7.6/DS	U*	0	Construction: Indicative pipeline route crosses tributaries of this site; site features unlikely to utilise habitats affected by pipeline. Significant and/or significant adverse effects almost certainly avoidable with established measures / normal best-practice, although these must necessarily be accounted for at AA (hence 'screened in'). Operation: No pathways for operational effects (network scheme only).
Thanet Coast and Sandwich Bay SPA	9.9/DS	U*	0	Construction: Indicative pipeline route crosses tributaries of this site; site features unlikely to utilise habitats affected by pipeline. Significant and/or significant adverse effects almost certainly avoidable with established measures / normal best-practice, although these must necessarily be accounted for at AA (hence 'screened in'). Operation: No pathways for operational effects (network scheme only).
SWS_PRT_HI-TFR_HSE_ALL_otterbo-gaters p: Otterbourne to Gaters Mill: 45Ml/d				
River Itchen SAC	0/DS	Y	0	Construction: Indicative pipeline route crosses this site or nearby tributaries at several points. Operation: No pathways for operational effects (water not sourced from Itchen catchment; pipeline operation would not result in other environmental changes (e.g. noise, lighting) likely to affect the features of the site).
Solent and Dorset Coast SPA	1.6/DS	U*	0	Construction: Indicative pipeline route crosses tributaries of this site; site features unlikely to use habitats affected by pipeline however. Significant and/or significant adverse effects almost certainly avoidable with established measures / normal best-practice, although these must necessarily be accounted for at AA (hence 'screened in'). Operation: No pathways for operational effects (network scheme only).

Option and European sites	Dist (km)*	LSE (C)	LSE (O)	Notes
Solent and Southampton Water SPA	3.1/DS	U*	0	Construction: Indicative pipeline route crosses tributaries of this site; site features may also utilise functional habitats outside the site boundary. Significant and/or significant adverse effects almost certainly avoidable with established measures / normal best-practice, although these must necessarily be accounted for at AA (hence 'screened in'). Operation: No pathways for operational effects (network scheme only).
Solent and Southampton Water Ramsar	3.1/DS	U*	0	Construction: Indicative pipeline route crosses tributaries of this site; site features may also utilise functional habitats outside the site boundary. Significant and/or significant adverse effects almost certainly avoidable with established measures / normal best-practice, although these must necessarily be accounted for at AA (hence 'screened in'). Operation: No pathways for operational effects (network scheme only).
Solent Maritime SAC	5.2/DS	U*	0	Construction: Indicative pipeline route crosses tributaries of this site, although effects likely to be negligible based on distance downstream and likely attenuation. Significant and/or significant adverse effects almost certainly avoidable with established measures / normal best-practice, although these must necessarily be accounted for at AA (hence 'screened in'). Operation: No pathways for operational effects (network scheme only).
SWS_PWE_HI-REU_RE1_ALL_60toht v0.1: Recycling: Recharge of Havant Thicket reservoir from Portsmouth Harbour WTW and new WRP (60Ml/d)				
River Itchen SAC	0/DS	Y	0	Construction: Indicative pipeline route crosses this site or nearby tributaries at several points. Operation: No pathways for operational effects (water not sourced from Itchen catchment; pipeline operation would not result in other environmental changes (e.g. noise, lighting) likely to affect the features of the site).

Option and European sites	Dist (km)*	LSE (C)	LSE (O)	Notes
Solent and Dorset Coast SPA	3.6/DS	Y	Y	Construction: Indicative pipeline route crosses this site or nearby tributaries at several points. Operation: Water sourced from Portsmouth Harbour WTW that would otherwise discharge near this site.
Solent Maritime SAC	0.7/DS	Y	Y	Construction: Indicative pipeline route crosses this site or nearby tributaries at several points. Operation: Water sourced from Portsmouth Harbour WTW that would otherwise discharge near this site.
Chichester and Langstone Harbours Ramsar	0.7/DS	Y	Y	Construction: Indicative pipeline route crosses this site or nearby tributaries at several points. Operation: Water sourced from Portsmouth Harbour WTW that would otherwise discharge near this site.
Chichester and Langstone Harbours SPA	0.7/DS	Y	Y	Construction: Indicative pipeline route crosses this site or nearby tributaries at several points. Operation: Water sourced from Portsmouth Harbour WTW that would otherwise discharge near this site.
Portsmouth Harbour Ramsar	4.1/DS	Y	Y	Construction: Indicative pipeline route crosses this site or nearby tributaries at several points. Operation: No pathways for operational effects.
Solent and Southampton Water Ramsar	5/DS	Y	0	Construction: Indicative pipeline route crosses this site or nearby tributaries at several points. Operation: No pathways for operational effects.

Option and European sites	Dist (km)*	LSE (C)	LSE (O)	Notes
Solent and Southampton Water SPA	5/DS	Y	0	Construction: Indicative pipeline route crosses this site or nearby tributaries at several points. Operation: No pathways for operational effects.
Solent and Isle of Wight Lagoons SAC	2.9	Y	0	Construction: Indicative pipeline route crosses this site or nearby tributaries at several points. Operation: No pathways for operational effects.
Portsmouth Harbour SPA	5.3/DS	Y	0	Construction: Indicative pipeline route crosses this site or nearby tributaries at several points. Operation: No pathways for operational effects.
SWS_SHZ_HI-GRW_ALL_ALL_ass_br_bre_eastn: Groundwater: Rye Wells reconfiguration (1.5Ml/d))				
Dungeness, Romney Marsh and Rye Bay SPA	7.2/DS	U*	0	Construction: Works required at Rye WSW upstream of the site. Significant and/or significant adverse effects almost certainly avoidable with established measures / normal best-practice, although these must necessarily be accounted for at AA (hence 'screened in'). Operation: This option will operate within the existing licence and recently abstracted volumes; it is intended to provide additional resilience and so will not result in additional impacts on this site over baseline.

Option and European sites	Dist (km)*	LSE (C)	LSE (O)	Notes
Dungeness, Romney Marsh and Rye Bay Ramsar	7.2/DS	U*	0	Construction: Works required at Rye WSW upstream of the site. Significant and/or significant adverse effects almost certainly avoidable with established measures / normal best-practice, although these must necessarily be accounted for at AA (hence 'screened in'). Operation: This option will operate within the existing licence and recently abstracted volumes; it is intended to provide additional resilience and so will not result in additional impacts on this site over baseline.
SWS_SHZ_HI-REU_RE1_ALL_dar10: Recycling: Hastings WTW to augment storage in Darwell reservoir (9.5Ml/d)				
Dungeness, Romney Marsh and Rye Bay SPA	1.4/DS	U*	0	Construction: Indicative pipeline route crosses tributaries of this site; upgrades at Rye WSW also required. Significant and/or significant adverse effects almost certainly avoidable with established measures / normal best-practice, although these must necessarily be accounted for at AA (hence 'screened in'). Operation: No pathways for operational effects (distance; water sourced from effluent otherwise discharged to sea). All residual discharges will be in accordance with the permit for the WwTW, and so the quality of discharges at Pebsham Gap would not decrease.
Pevensey Levels SAC	4.7/DS	U*	0	Construction: Indicative pipeline route runs along the catchment boundary for tributaries of this site, although surface watercourses are limited. Significant and/or significant adverse effects almost certainly avoidable with established measures / normal best-practice, although these must necessarily be accounted for at AA (hence 'screened in'). Operation: No pathways for operational effects (distance; water sourced from effluent otherwise discharged to sea).

Option and European sites	Dist (km)*	LSE (C)	LSE (O)	Notes
Pevensey Levels Ramsar	4.7/DS	U*	0	Construction: Indicative pipeline route runs along the catchment boundary for tributaries of this site, although surface watercourses are limited. Significant and/or significant adverse effects almost certainly avoidable with established measures / normal best-practice, although these must necessarily be accounted for at AA (hence 'screened in'). Operation: No pathways for operational effects (distance; water sourced from effluent otherwise discharged to sea).
Dungeness, Romney Marsh and Rye Bay Ramsar	12.4/DS	U*	0	Construction: Indicative pipeline route runs along the catchment boundary for tributaries of this site, although surface watercourses are limited. Works may be required at Rye WSW upstream of the site. Significant and/or significant adverse effects almost certainly avoidable with established measures / normal best-practice, although these must necessarily be accounted for at AA (hence 'screened in'). Operation: No pathways for operational effects (distance; water sourced from effluent otherwise discharged to sea).
SWS_SNZ_HI-REU_RE1_ALL_env_cu_chu2_conju: Recycling: Horsham WTW conjunctive use with Arun Reservoir, Pulborough (6.8Ml/d)				
Arun Valley SAC	0.3/DS	U*	U	Construction: Scheme will involve construction within the catchment of this site; site features may also utilise functional habitats outside the site boundary. Significant and/or significant adverse effects almost certainly avoidable with established measures / normal best-practice, although these must necessarily be accounted for at AA (hence 'screened in'). Operation: This option will reduce flows in the River Arun downstream of Horsham, which has the potential to affect this site - although the exposure of the site is likely to be low due to the relationship of the wetlands with the river and management of water levels within the site. However, this requires additional data to confirm acceptability.

Option and European sites	Dist (km)*	LSE (C)	LSE (O)	Notes
Arun Valley Ramsar	0.3/DS	U*	U	Construction: Scheme will involve construction within the catchment of this site; site features may also utilise functional habitats outside the site boundary. Significant and/or significant adverse effects almost certainly avoidable with established measures / normal best-practice, although these must necessarily be accounted for at AA (hence 'screened in'). Operation: This option will reduce flows in the River Arun downstream of Horsham, which has the potential to affect this site - although the exposure of the site is likely to be low due to the relationship of the wetlands with the river and management of water levels within the site. However, this requires additional data to confirm acceptability.
Arun Valley SPA	0.3/DS	U*	U	Construction: Scheme will involve construction within the catchment of this site, although site features will have a very low exposure to site-derived pollutants due to their location within the site (associated with ditches). Significant and/or significant adverse effects almost certainly avoidable with established measures / normal best-practice, although these must necessarily be accounted for at AA (hence 'screened in'). Operation: This option will reduce flows in the River Arun downstream of Horsham, which has the potential to affect this site - although the exposure of the site is likely to be low due to the relationship of the wetlands with the river and management of water levels within the site. However, this requires additional data to confirm acceptability.
The Mens SAC	3.7	U*	0	Construction: Site not exposed to construction effects (distance, no pollutant pathways, up-catchment); pipeline close to Core Sustenance Zone (CSZ; see Appendix B) defined for the mobile interest features of the site, and effects on supporting habitats cannot be excluded at the plan level (although the risk of significant effects would be low based on the nature of the works). Significant and/or significant adverse effects almost certainly avoidable with established measures / normal best-practice, although these must necessarily be accounted for at AA (hence 'screened in'). Operation: No pathways for operational effects (separate catchment).

Option and European sites	Dist (km)*	LSE (C)	LSE (O)	Notes
SWS_SNZ_HI-REU_RE1_ALL_for20: Recycling: Ford WwTW (15Ml/d)				
Arun Valley Ramsar	1/DS	U*	0	Construction: Scheme will involve construction within the catchment of this site; site features may also utilise functional habitats outside the site boundary. Significant and/or significant adverse effects almost certainly avoidable with established measures / normal best-practice, although these must necessarily be accounted for at AA (hence 'screened in'). Operation: The discharge will be treated to tertiary standards for ammonia, phosphate and BOD, potentially generating an improvement for the phosphate status (currently moderate). Therefore, there will be negligible risk of impacting the physico-chemical quality elements of this water body. The proposed treatment will also include a process (either UV AOP or reverse osmosis) to remove the majority organic chemical contaminants. Therefore, there will be a low risk of organic chemicals such as endocrine disruptors causing deterioration to fish status. The discharge will also need to be permitted through the Environment Agency discharge permit controls. Therefore the risk of changes to water quality which could impact the qualifying features (or their food source) are considered to be negligible
Arun Valley SPA	1.1/DS	U*	0	Construction: Scheme will involve construction within the catchment of this site; site features may also utilise functional habitats outside the site boundary. Significant and/or significant adverse effects almost certainly avoidable with established measures / normal best-practice, although these must necessarily be accounted for at AA (hence 'screened in'). Operation: The discharge will be treated to tertiary standards for ammonia, phosphate and BOD, potentially generating an improvement for the phosphate status (currently moderate). Therefore, there will be negligible risk of impacting the physico-chemical quality elements of this water body. The proposed treatment will also include a process (either UV AOP or reverse osmosis) to remove the majority organic chemical contaminants. Therefore, there will be a low risk of organic chemicals such as endocrine disruptors causing deterioration to fish status. The discharge will also need to be permitted through the Environment Agency discharge permit controls. Therefore the risk of changes to water quality which could impact the qualifying features (or their food source) are considered to be negligible

Option and European sites	Dist (km)*	LSE (C)	LSE (O)	Notes
Arun Valley SAC	1.2/DS	U*	0	Construction: Scheme will involve construction within the catchment of this site, although site features will have a very low exposure to site-derived pollutants due to their location within the site (associated with ditches). Significant and/or significant adverse effects almost certainly avoidable with established measures / normal best-practice, although these must necessarily be accounted for at AA (hence 'screened in'). Operation: The discharge will be treated to tertiary standards for ammonia, phosphate and BOD, potentially generating an improvement for the phosphate status (currently moderate). Therefore, there will be negligible risk of impacting the physico-chemical quality elements of this water body. The proposed treatment will also include a process (either UV AOP or reverse osmosis) to remove the majority organic chemical contaminants. Therefore, there will be a low risk of organic chemicals such as endocrine disruptors causing deterioration to fish status. The discharge will also need to be permitted through the Environment Agency discharge permit controls. Therefore the risk of changes to water quality which could impact the Ramshorn snail are considered to be negligible.
The Mens SAC	3.6	U*	0	Construction: Site not exposed to construction effects (distance, no pollutant pathways, up-catchment); pipeline partly within Core Sustenance Zone (CSZ; see Appendix B) defined for the mobile interest features of the site, and effects on supporting habitats cannot be excluded at the plan level (although the risk of significant effects would be low based on the nature of the works). Significant and/or significant adverse effects almost certainly avoidable with established measures / normal best-practice, although these must necessarily be accounted for at AA (hence 'screened in'). Operation: No pathways for operational effects (up-catchment site; not water resource dependent).

Option and European sites	Dist (km)*	LSE (C)	LSE (O)	Notes
Ebernoe Common SAC	7.7	U*	0	Construction: Site not exposed to construction effects (distance, no pollutant pathways, up-catchment); pipeline outside Core Sustenance Zone (CSZ; see Appendix B) defined for the mobile interest features of the site but effects on supporting habitats cannot be excluded at the plan level (although the risk of significant effects would be low based on the nature of the works). Significant and/or significant adverse effects almost certainly avoidable with established measures / normal best-practice, although these must necessarily be accounted for at AA (hence 'screened in'). Operation: No pathways for operational effects (up-catchment site; not water resource dependent).
SWS_SNZ_HI-ROC_RE1_ALL_hsb-rcm: Groundwater: Petworth WSW return to service with a new borehole (4.0Ml/d)				
The Mens SAC	2.3	U*	0	Construction: Site not exposed to construction effects (distance, no pollutant pathways, up-catchment); pipeline within Core Sustenance Zone (CSZ; see Appendix B) defined for the mobile interest features of the site, and effects on supporting habitats cannot be excluded at the plan level (although the risk of significant effects would be low based on the nature of the works). Significant and/or significant adverse effects almost certainly avoidable with established measures / normal best-practice, although these must necessarily be accounted for at AA (hence 'screened in'). Operation: No pathways for operational effects (site not groundwater dependent).
Arun Valley Ramsar	4.4/DS	U*	U	Construction: Indicative pipeline route crosses tributaries of this site; site features may also utilise functional habitats outside the site boundary. Significant and/or significant adverse effects almost certainly avoidable with established measures / normal best-practice, although these must necessarily be accounted for at AA (hence 'screened in'). Operation: Sensitivity of the site habitats is likely to be relatively low due to the active management of water levels in the ditch network; in addition, direct effects from drawdown are unlikely. However, this would require additional characterisation, including details of likely effects on flows in the Rother.

Option and European sites	Dist (km)*	LSE (C)	LSE (O)	Notes
Arun Valley SPA	4.4/DS	U*	U	Construction: Indicative pipeline route crosses tributaries of this site; site features may also utilise functional habitats outside the site boundary. Significant and/or significant adverse effects almost certainly avoidable with established measures / normal best-practice, although these must necessarily be accounted for at AA (hence 'screened in'). Operation: Sensitivity of the site habitats is likely to be relatively low due to the active management of water levels in the ditch network; in addition, direct effects from drawdown are unlikely. However, this would require additional characterisation, including details of likely effects on flows in the Rother.
Arun Valley SAC	4.9/DS	U*	U	Construction: Indicative pipeline route crosses tributaries of this site but site features will have a low exposure to potential effects due to their location within the site. Significant and/or significant adverse effects almost certainly avoidable with established measures / normal best-practice, although these must necessarily be accounted for at AA (hence 'screened in'). Operation: Sensitivity of the site habitats is likely to be relatively low due to the active management of water levels in the ditch network; in addition, direct effects from drawdown are unlikely. However, this would require additional characterisation, including details of likely effects on flows in the Rother.
Ebernoe Common SAC	5.7	U*	0	Construction: Site not exposed to construction effects (distance, no pollutant pathways, up-catchment); pipeline outside Core Sustenance Zone (CSZ; see Appendix B) defined for the mobile interest features of the site, but effects on supporting habitats cannot be excluded at the plan level (although the risk of significant effects would be low based on the nature of the works). Significant and/or significant adverse effects almost certainly avoidable with established measures / normal best-practice, although these must necessarily be accounted for at AA (hence 'screened in'). Operation: No pathways for operational effects (site not groundwater dependent).
SWS_SNZ_HI-TFR_PWE_ALL_havant -hardha r 50: Havant Thicket To Pulborough WTW: 50Ml/d				

Option and European sites	Dist (km)*	LSE (C)	LSE (O)	Notes
Duncton to Bignor Escarpment SAC	0	U*	0	Construction: Indicative pipeline route is within 50m of this site (note, 0km distance is rounding artefact); significant and/or significant adverse effects almost certainly avoidable with established measures / normal best-practice, although these must necessarily be accounted for at AA (hence 'screened in'). Operation: No pathways for operational effects (distance, network scheme only).
Kingley Vale SAC	0.1	U*	0	Construction: Indicative pipeline route is within 150m of this site; significant and/or significant adverse effects almost certainly avoidable with established measures / normal best-practice, although these must necessarily be accounted for at AA (hence 'screened in'). Operation: No pathways for operational effects (distance, network scheme only).
Arun Valley Ramsar	1.1/DS	U*	0	Construction: Indicative pipeline route crosses tributaries of this site, plus works required at Pulborough. Site features unlikely to utilise habitats affected by pipeline construction. Significant and/or significant adverse effects almost certainly avoidable with established measures / normal best-practice, although these must necessarily be accounted for at AA (hence 'screened in'). Operation: No pathways for operational effects (network scheme only).
Arun Valley SPA	1.1/DS	U*	0	Construction: Indicative pipeline route crosses tributaries of this site, plus works required at Pulborough. Site features unlikely to utilise habitats affected by pipeline construction. Significant and/or significant adverse effects almost certainly avoidable with established measures / normal best-practice, although these must necessarily be accounted for at AA (hence 'screened in'). Operation: No pathways for operational effects (network scheme only).

Option and European sites	Dist (km)*	LSE (C)	LSE (O)	Notes
Arun Valley SAC	1.3/DS	U*	0	Construction: Indicative pipeline route crosses tributaries of this site, plus works required at Pulborough. Site features will have a low exposure due to location in site. Significant and/or significant adverse effects almost certainly avoidable with established measures / normal best-practice, although these must necessarily be accounted for at AA (hence 'screened in'). Operation: No pathways for operational effects (network scheme only).
Solent Maritime SAC	3.3/DS	U*	0	Construction: Indicative pipeline route crosses tributaries of this site; site features unlikely to utilise habitats affected by pipeline construction. Significant and/or significant adverse effects almost certainly avoidable with established measures / normal best-practice, although these must necessarily be accounted for at AA (hence 'screened in'). Operation: No pathways for operational effects (network scheme only).
Chichester and Langstone Harbours Ramsar	3.3/DS	U*	0	Construction: Indicative pipeline route crosses tributaries of this site; site features unlikely to utilise habitats affected by pipeline construction. Significant and/or significant adverse effects almost certainly avoidable with established measures / normal best-practice, although these must necessarily be accounted for at AA (hence 'screened in'). Operation: No pathways for operational effects (network scheme only).
Chichester and Langstone Harbours SPA	3.3/DS	U*	0	Construction: Indicative pipeline route crosses tributaries of this site; site features unlikely to utilise habitats affected by pipeline construction. Significant and/or significant adverse effects almost certainly avoidable with established measures / normal best-practice, although these must necessarily be accounted for at AA (hence 'screened in'). Operation: No pathways for operational effects (network scheme only).

Option and European sites	Dist (km)*	LSE (C)	LSE (O)	Notes
The Mens SAC	3.9	U*	0	Construction: Site not exposed to construction effects (distance, no pollutant pathways, up-catchment); pipeline partly within Core Sustenance Zone (CSZ; see Appendix B) defined for the mobile interest features of the site, and effects on supporting habitats cannot be excluded at the plan level (although the risk of significant effects would be low based on the nature of the works). Significant and/or significant adverse effects almost certainly avoidable with established measures / normal best-practice, although these must necessarily be accounted for at AA (hence 'screened in'). Operation: No pathways for operational effects (up-catchment site; not water resource dependent).
Singleton and Cocking Tunnels SAC	4.5	U*	0	Construction: Site not exposed to construction effects (distance, no pollutant pathways, up-catchment); pipeline partly within or close to the Core Sustenance Zone (CSZ; see Appendix B) defined for the mobile interest features of the site, and effects on supporting habitats cannot be excluded at the plan level (although the risk of significant effects would be low based on the nature of the works). Significant and/or significant adverse effects almost certainly avoidable with established measures / normal best-practice, although these must necessarily be accounted for at AA (hence 'screened in'). Operation: No pathways for operational effects (up-catchment site; not water resource dependent).
Solent and Dorset Coast SPA	7.9/DS	U*	0	Construction: Indicative pipeline route crosses tributaries of this site; site features unlikely to utilise habitats affected by pipeline construction. Significant and/or significant adverse effects almost certainly avoidable with established measures / normal best-practice, although these must necessarily be accounted for at AA (hence 'screened in'). Operation: No pathways for operational effects (network scheme only).
SWS_SNZ_HI-TFR_RZ5_ALL_tilmore-hardha p 10: Tilmore to Pulborough: 10Ml/d				

Option and European sites	Dist (km)*	LSE (C)	LSE (O)	Notes
Arun Valley Ramsar	1.6/DS	U*	0	Construction: Indicative pipeline route crosses tributaries of this site; site features may also utilise functional habitats outside the site boundary. Significant and/or significant adverse effects almost certainly avoidable with established measures / normal best-practice, although these must necessarily be accounted for at AA (hence 'screened in'). Operation: No pathways for operational effects (network scheme only).
Arun Valley SAC	1.7/DS	U*	0	Construction: Indicative pipeline route crosses tributaries of this site; site features unlikely to utilise functional habitats outside the site boundary however. Significant and/or significant adverse effects almost certainly avoidable with established measures / normal best-practice, although these must necessarily be accounted for at AA (hence 'screened in'). Operation: No pathways for operational effects (network scheme only).
Arun Valley SPA	1.7/DS	U*	0	Construction: Indicative pipeline route crosses tributaries of this site; site features may also utilise functional habitats outside the site boundary. Significant and/or significant adverse effects almost certainly avoidable with established measures / normal best-practice, although these must necessarily be accounted for at AA (hence 'screened in'). Operation: No pathways for operational effects (network scheme only).

Option and European sites	Dist (km)*	LSE (C)	LSE (O)	Notes
The Mens SAC	3.6	U*	0	Construction: Site not exposed to construction effects (distance, no pollutant pathways, up-catchment); pipeline partly within Core Sustenance Zone (CSZ; see Appendix B) defined for the mobile interest features of the site, and effects on supporting habitats cannot be excluded at the plan level (although the risk of significant effects would be low based on the nature of the works). Significant and/or significant adverse effects almost certainly avoidable with established measures / normal best-practice, although these must necessarily be accounted for at AA (hence 'screened in'). Operation: No pathways for operational effects (up-catchment site; not water resource dependent; network scheme).
Ebernoe Common SAC	5.1	U*	0	Construction: Site not exposed to construction effects (distance, no pollutant pathways, up-catchment); pipeline partly within Core Sustenance Zone (CSZ; see Appendix B) defined for the mobile interest features of the site, and effects on supporting habitats cannot be excluded at the plan level (although the risk of significant effects would be low based on the nature of the works). Significant and/or significant adverse effects almost certainly avoidable with established measures / normal best-practice, although these must necessarily be accounted for at AA (hence 'screened in'). Operation: No pathways for operational effects (up-catchment site; not water resource dependent; network scheme).
Singleton and Cocking Tunnels SAC	5.6	U*	0	Construction: Site not exposed to construction effects (distance, no pollutant pathways, up-catchment); pipeline partly within Core Sustenance Zone (CSZ; see Appendix B) defined for the mobile interest features of the site, and effects on supporting habitats cannot be excluded at the plan level (although the risk of significant effects would be low based on the nature of the works). Significant and/or significant adverse effects almost certainly avoidable with established measures / normal best-practice, although these must necessarily be accounted for at AA (hence 'screened in'). Operation: No pathways for operational effects (up-catchment site; not water resource dependent; network scheme).
SWS_SWZ_HI-DES_ALL_ALL_aru10: Desalination: Tidal River Arun (10Ml/d)				

Option and European sites	Dist (km)*	LSE (C)	LSE (O)	Notes
Arun Valley SPA	4.6	U*	0	Construction: There will be no effects on the site itself (upstream from construction areas); pipeline construction will affect grazing marshes alongside the Arun estuary which may be periodically utilised by assemblage species from the site (although there are no suggestions of significant functional linkages in the supplementary advice); effects can be avoided with established measures. Operation: The site itself will not be affected by operation (upstream). The environmental changes associated with operation of the scheme will be limited to the estuary itself, and will not affect adjacent grazing marsh, and so interest features from this site will have a very low exposure to the effects due to their habitat preferences (the relatively narrow, embanked Arun estuary will not be a preferred habitat for the interest features of the site).
Arun Valley Ramsar	4.6	U*	0	Construction: There will be no effects on the site itself (upstream from construction areas); pipeline construction will affect grazing marshes alongside the Arun estuary which may be periodically utilised by assemblage species from the site (although there are no suggestions of significant functional linkages in the supplementary advice); effects can be be avoided with established measures. Operation: The site itself will not be affected by operation (upstream). The environmental changes associated with operation of the scheme will be limited to the estuary itself, and will not affect adjacent grazing marsh, and so interest features from this site will have a very low exposure to the effects due to their habitat preferences (the relatively narrow, embanked Arun estuary will not be a preferred habitat for the interest features of the site).
SWS_SWZ_HI-TFR_SNZ_ALL_hardham-tenant p 30: Pulborough to Worthing: 30Ml/d				

Option and European sites	Dist (km)*	LSE (C)	LSE (O)	Notes
Arun Valley SPA	0.2/DS	U*	0	Construction: Indicative pipeline route crosses tributaries of this site; site features may also utilise functional habitats outside the site boundary. Significant and/or significant adverse effects almost certainly avoidable with established measures / normal best-practice, although these must necessarily be accounted for at AA (hence 'screened in'). Operation: No pathways for operational effects (network scheme only).
Arun Valley SAC	0.2/DS	U*	0	Construction: Indicative pipeline route crosses tributaries of this site; significant and/or significant adverse effects almost certainly avoidable with established measures / normal best-practice, although these must necessarily be accounted for at AA (hence 'screened in'). Operation: No pathways for operational effects (network scheme only).
Arun Valley Ramsar	0.2/DS	U*	0	Construction: Indicative pipeline route crosses tributaries of this site; site features may also utilise functional habitats outside the site boundary. Significant and/or significant adverse effects almost certainly avoidable with established measures / normal best-practice, although these must necessarily be accounted for at AA (hence 'screened in'). Operation: No pathways for operational effects (network scheme only).
The Mens SAC	4.3	U*	0	Construction: Site not exposed to construction effects (distance, no pollutant pathways, up-catchment site); pipeline partially within the Core Sustenance Zone (CSZ; see Appendix B) defined for the mobile interest feature of the site (Barbastelle bat), and effects on supporting habitats cannot be excluded at the plan level (although the risk of significant effects would be low based on the nature of the works). Significant and/or significant adverse effects almost certainly avoidable with established measures / normal best-practice, although these must necessarily be accounted for at AA (hence 'screened in'). Operation: No pathways for operational effects (network scheme only).

Inter-option ‘in combination’ screening assessment

The inter-option in combination screening assessment is summarised in **Appendix D**. This identifies all those European sites that could potentially be affected by two or more options and then determines whether ‘in combination’ likely significant effects can be excluded based on the nature and timing of the potential effect (for example, schemes with ‘construction only’ effects are unlikely to have in combination effects if required in different plan periods.

Screening Conclusions

The screening has concluded that significant effects are either likely or uncertain for the following sites and options (note, this includes options that may rely on mitigation measures to prevent significant effects occurring); these are therefore taken forward to an appropriate assessment stage.

Table 0.3 Sites and options screened in for appropriate assessment

Site and Option Ref.	Option Name	Screening Summary
Arun Valley Ramsar		SITE
SWS_SWZ_HI-TFR_SNZ_ALL_hardham-tenant p 30	Pulborough to Worthing: 30Ml/d	Low risk construction only
SWS_SNZ_HI-REU_RE1_ALL_env_cu_chu2_conju	Recycling: Horsham WTW conjunctive use with Arun Reservoir, Pulborough (6.8Ml/d)	Construction / Operation
SWS_SWZ_HI-DES_ALL_ALL_aru10	Desalination: Tidal River Arun (10Ml/d)	Low risk construction only
SWS_SNZ_HI-ROC_RE1_ALL_hsb-rcm	Groundwater: Petworth WSW return to service with a new borehole (4.0Ml/d)	Construction / Operation
SWS_SNZ_HI-REU_RE1_ALL_for20	Recycling: Littlehampton WwTW (15Ml/d)	Low risk construction only
SWS_SNZ_HI-TFR_PWE_ALL_havant -hardha r 50	Havant Thicket To Pulborough WTW: 50Ml/d	Low risk construction only
SWS_SNZ_HI-TFR_RZ5_ALL_tilmore-hardha p 10	Tilmore to Pulborough: 10Ml/d	Low risk construction only
Arun Valley SAC		SITE
SWS_SWZ_HI-TFR_SNZ_ALL_hardham-tenant p 30	Pulborough to Worthing: 30Ml/d	Low risk construction only
SWS_SNZ_HI-REU_RE1_ALL_env_cu_chu2_conju	Recycling: Horsham WTW conjunctive use with Arun Reservoir, Pulborough (6.8Ml/d)	Construction / Operation
SWS_SNZ_HI-ROC_RE1_ALL_hsb-rcm	Groundwater: Petworth WSW return to service with a new borehole (4.0Ml/d)	Construction / Operation
SWS_SNZ_HI-REU_RE1_ALL_for20	Recycling: Littlehampton WwTW (15Ml/d)	Low risk construction only
SWS_SNZ_HI-TFR_PWE_ALL_havant -hardha r 50	Havant Thicket To Pulborough WTW: 50Ml/d	Low risk construction only
SWS_SNZ_HI-TFR_RZ5_ALL_tilmore-hardha p 10	Tilmore to Pulborough: 10Ml/d	Low risk construction only
Arun Valley SPA		SITE
SWS_SWZ_HI-TFR_SNZ_ALL_hardham-tenant p 30	Pulborough to Worthing: 30Ml/d	Low risk construction only
SWS_SNZ_HI-REU_RE1_ALL_env_cu_chu2_conju	Recycling: Horsham WTW conjunctive use with Arun Reservoir, Pulborough (6.8Ml/d)	Construction / Operation
SWS_SWZ_HI-DES_ALL_ALL_aru10	Desalination: Tidal River Arun (10Ml/d)	Low risk construction only
SWS_SNZ_HI-ROC_RE1_ALL_hsb-rcm	Groundwater: Petworth WSW return to service with a new borehole (4.0Ml/d)	Construction / Operation
SWS_SNZ_HI-REU_RE1_ALL_for20	Recycling: Littlehampton WwTW (15Ml/d)	Low risk construction only
SWS_SNZ_HI-TFR_PWE_ALL_havant -hardha r 50	Havant Thicket To Pulborough WTW: 50Ml/d	Low risk construction only
SWS_SNZ_HI-TFR_RZ5_ALL_tilmore-hardha p 10	Tilmore to Pulborough: 10Ml/d	Low risk construction only

Site and Option Ref.	Option Name	Screening Summary
Benfleet and Southend Marshes Ramsar		SITE
SWS_KME_HI-DES_ALL_ALL_ios10	Desalination: Isle of Sheppey (10Ml/d)	Low risk construction only
SWS_KME_HI-DES_ALL_ALL_ios20	Desalination: Isle of Sheppey (20Ml/d)	Low risk construction only
SWS_KME_HI-DES_ALL_ALL_ios10	Desalination: Isle of Sheppey (10Ml/d)	Low risk construction only
Benfleet and Southend Marshes SPA		SITE
SWS_KME_HI-DES_ALL_ALL_ios10	Desalination: Isle of Sheppey (10Ml/d)	Low risk construction only
SWS_KME_HI-DES_ALL_ALL_ios20	Desalination: Isle of Sheppey (20Ml/d)	Low risk construction only
SWS_KME_HI-DES_ALL_ALL_ios10	Desalination: Isle of Sheppey (10Ml/d)	Low risk construction only
Briddlesford Copses SAC		SITE
SWS_IOW_HI-REU_RE1_ALL_sey9	Recycling: Sandown WwTW (8.1Ml/d)	Low risk construction only
Chichester and Langstone Harbours Ramsar		SITE
SWS_PWE_HI-REU_RE1_ALL_60toht v0.1	Recycling: Recharge of Havant Thicket reservoir from Portsmouth Harbour WTW and new WRP (60Ml/d)	Construction / Operation
SWS_SNZ_HI-TFR_PWE_ALL_havant -hardha r 50	Havant Thicket To Pulborough WTW: 50Ml/d	Low risk construction only
Chichester and Langstone Harbours SPA		SITE
SWS_PWE_HI-REU_RE1_ALL_60toht v0.1	Recycling: Recharge of Havant Thicket reservoir from Portsmouth Harbour WTW and new WRP (60Ml/d)	Construction / Operation
SWS_SNZ_HI-TFR_PWE_ALL_havant -hardha r 50	Havant Thicket To Pulborough WTW: 50Ml/d	Low risk construction only
Duncton to Bignor Escarpment SAC		SITE
SWS_SNZ_HI-TFR_PWE_ALL_havant -hardha r 50	Havant Thicket To Pulborough WTW: 50Ml/d	Low risk construction only
Dungeness, Romney Marsh and Rye Bay Ramsar		SITE
SWS_SHZ_HI-REU_RE1_ALL_dar10	Recycling: Hastings WTW to augment storage in Darwell reservoir (9.5Ml/d)	Low risk construction only
SWS_SHZ_HI-GRW_ALL_ALL_ass_br_bre_eastn	Groundwater: Rye Wells reconfiguration (1.5Ml/d))	Low risk construction only
Dungeness, Romney Marsh and Rye Bay SPA		SITE
SWS_SHZ_HI-REU_RE1_ALL_dar10	Recycling: Hastings WTW to augment storage in Darwell reservoir (9.5Ml/d)	Low risk construction only
SWS_SHZ_HI-GRW_ALL_ALL_ass_br_bre_eastn	Groundwater: Rye Wells reconfiguration (1.5Ml/d))	Low risk construction only

Site and Option Ref.	Option Name	Screening Summary
Ebernoe Common SAC		SITE
SWS_SNZ_HI-ROC_RE1_ALL_hsb-rcm	Groundwater: Petworth WSW return to service with a new borehole (4.0Ml/d)	Low risk construction only
SWS_SNZ_HI-REU_RE1_ALL_for20	Recycling: Littlehampton WwTW (15Ml/d)	Low risk construction only
SWS_SNZ_HI-TFR_RZ5_ALL_tilmore-hardha p 10	Tilmore to Pulborough: 10Ml/d	Low risk construction only
Essex Estuaries SAC		SITE
SWS_KME_HI-DES_ALL_ALL_ios10	Desalination: Isle of Sheppey (10Ml/d)	Low risk construction only
SWS_KME_HI-DES_ALL_ALL_ios20	Desalination: Isle of Sheppey (20Ml/d)	Low risk construction only
SWS_KME_HI-DES_ALL_ALL_ios10	Desalination: Isle of Sheppey (10Ml/d)	Low risk construction only
Foulness (Mid-Essex Coast Phase 5) Ramsar		SITE
SWS_KME_HI-DES_ALL_ALL_ios10	Desalination: Isle of Sheppey (10Ml/d)	Low risk construction only
SWS_KME_HI-DES_ALL_ALL_ios20	Desalination: Isle of Sheppey (20Ml/d)	Low risk construction only
SWS_KME_HI-DES_ALL_ALL_ios10	Desalination: Isle of Sheppey (10Ml/d)	Low risk construction only
Foulness (Mid-Essex Coast Phase 5) SPA		SITE
SWS_KME_HI-DES_ALL_ALL_ios10	Desalination: Isle of Sheppey (10Ml/d)	Low risk construction only
SWS_KME_HI-DES_ALL_ALL_ios20	Desalination: Isle of Sheppey (20Ml/d)	Low risk construction only
SWS_KME_HI-DES_ALL_ALL_ios10	Desalination: Isle of Sheppey (10Ml/d)	Low risk construction only
Kingley Vale SAC		SITE
SWS_SNZ_HI-TFR_PWE_ALL_havant -hardha r 50	Havant Thicket To Pulborough WTW: 50Ml/d	Low risk construction only
Margate and Long Sands SAC		SITE
SWS_KTZ_HI-DES_ALL_ALL_tha10_p2	Desalination: East Thanet coast & transfer (10Ml/d) Phase 2	Construction / Operation
SWS_KTZ_HI-DES_ALL_ALL_tha20	Desalination: East Thanet coast & transfer (20Ml/d)	Construction / Operation
SWS_KTZ_HI-DES_ALL_ALL_tha20_p2	Desalination: East Thanet coast & transfer (20Ml/d) Phase 2	Construction / Operation
Medway Estuary and Marshes Ramsar		SITE
SWS_KME_HI-DES_ALL_ALL_ios10	Desalination: Isle of Sheppey (10Ml/d)	Construction / Operation

Site and Option Ref.	Option Name	Screening Summary
SWS_KME_HI-DES_ALL_ALL_ios20	Desalination: Isle of Sheppey (20Ml/d)	Construction / Operation
SWS_KME_HI-DES_ALL_ALL_ios10	Desalination: Isle of Sheppey (10Ml/d)	Construction / Operation
SWS_KMW_HI-REU_RE1_ALL_ecc18	Recycling: Medway WwTW (12.8Ml/d)	Construction / Operation
SWS_KME_HI-REU_RE1_ALL_sit8	Recycling: Sittingbourne industrial reuse (7.5Mld)	Low risk construction only
Medway Estuary and Marshes SPA		SITE
SWS_KME_HI-DES_ALL_ALL_ios10	Desalination: Isle of Sheppey (10Ml/d)	Construction / Operation
SWS_KME_HI-DES_ALL_ALL_ios20	Desalination: Isle of Sheppey (20Ml/d)	Construction / Operation
SWS_KME_HI-DES_ALL_ALL_ios10	Desalination: Isle of Sheppey (10Ml/d)	Construction / Operation
SWS_KMW_HI-REU_RE1_ALL_ecc18	Recycling: Medway WwTW (12.8Ml/d)	Construction / Operation
SWS_KME_HI-REU_RE1_ALL_sit8	Recycling: Sittingbourne industrial reuse (7.5Mld)	Low risk construction only
Mottisfont Bats SAC		SITE
SWS_HRZ_HI-GRW_ALL_ALL_nw_gwa_tim_westi	Groundwater: Romsey - new BHs (4.8Ml/d)	Low risk construction only
Outer Thames Estuary SPA		SITE
SWS_KTZ_HI-DES_ALL_ALL_tha10_p2	Desalination: East Thanet coast & transfer (10Ml/d) Phase 2	Construction / Operation
SWS_KTZ_HI-DES_ALL_ALL_tha20	Desalination: East Thanet coast & transfer (20Ml/d)	Construction / Operation
SWS_KTZ_HI-DES_ALL_ALL_tha20_p2	Desalination: East Thanet coast & transfer (20Ml/d) Phase 2	Construction / Operation
SWS_KME_HI-DES_ALL_ALL_ios10	Desalination: Isle of Sheppey (10Ml/d)	Construction / Operation
SWS_KME_HI-DES_ALL_ALL_ios20	Desalination: Isle of Sheppey (20Ml/d)	Construction / Operation
SWS_KME_HI-DES_ALL_ALL_ios10	Desalination: Isle of Sheppey (10Ml/d)	Construction / Operation
Pevensey Levels Ramsar		SITE
SWS_SHZ_HI-REU_RE1_ALL_dar10	Recycling: Hastings WTW to augment storage in Darwell reservoir (9.5Ml/d)	Low risk construction only
Pevensey Levels SAC		SITE
SWS_SHZ_HI-REU_RE1_ALL_dar10	Recycling: Hastings WTW to augment storage in Darwell reservoir (9.5Ml/d)	Low risk construction only
Portsmouth Harbour Ramsar		SITE

Site and Option Ref.	Option Name	Screening Summary
SWS_PWE_HI-REU_RE1_ALL_60toht v0.1	Recycling: Recharge of Havant Thicket reservoir from Portsmouth Harbour WTW and new WRP (60Ml/d)	Construction / Operation
Portsmouth Harbour SPA		SITE
SWS_PWE_HI-REU_RE1_ALL_60toht v0.1	Recycling: Recharge of Havant Thicket reservoir from Portsmouth Harbour WTW and new WRP (60Ml/d)	Construction / Operation
River Itchen SAC		SITE
SWS_HSE_HI-TFR_PRT_ALL_pwc2	Import from Portsmouth Water (21Ml/d)	Construction / Operation
SWS_HAZ_HI-TFR_HWZ_ALL_oan2	Transfer: Hampshire grid (reversible link HW-HA) (30Ml/d)	Low risk construction only
SWS_HKZ_HI-TFR_HAZ_ALL_oan3	Transfer: Hampshire grid (reversible link HA-HK) (10Ml/d)	Low risk construction only
SWS_HSE_EF-TFR_REP_ALL_pwc1	Import from Portsmouth Water (9Ml/d)	Construction / Operation
SWS_HWZ_HI-TFR_HSE_CNO_oan1	Transfer: Hampshire grid (reversible link HSE-HW) (30Ml/d)	Low risk construction only
SWS_HSE_HI-REU_RE1_ALL_wol8	Recycling: Woolston WwTW (7.1Ml/d)	Construction / Operation
SWS_HSE_HI-ROC_WT1_ALL_cpy_ott_30	Treatment capacity: Upgrade Otterbourne WSW (30Ml/d)	Low risk construction only
SWS_PWE_HI-REU_RE1_ALL_60toht v0.1	Recycling: Recharge of Havant Thicket reservoir from Portsmouth Harbour WTW and new WRP (60Ml/d)	Construction / Operation
SWS_PRT_HI-TFR_HSE_ALL_otterbo-gaters p	Otterbourne to Gaters Mill: 45Ml/d	Construction / Operation
River Lambourn SAC		SITE
Singleton and Cocking Tunnels SAC		SITE
SWS_SNZ_HI-TFR_PWE_ALL_havant -hardha r 50	Havant Thicket To Pulborough WTW: 50Ml/d	Low risk construction only
SWS_SNZ_HI-TFR_RZ5_ALL_tilmore-hardha p 10	Tilmore to Pulborough: 10Ml/d	Low risk construction only
Solent and Dorset Coast SPA		SITE
SWS_HSE_HI-TFR_PRT_ALL_pwc2	Import from Portsmouth Water (21Ml/d)	Low risk construction only
SWS_HAZ_HI-TFR_HWZ_ALL_oan2	Transfer: Hampshire grid (reversible link HW-HA) (30Ml/d)	Low risk construction only
SWS_IOW_HI-REU_RE1_ALL_sey9	Recycling: Sandown WwTW (8.1Ml/d)	Low risk construction only
SWS_HKZ_HI-TFR_HAZ_ALL_oan3	Transfer: Hampshire grid (reversible link HA-HK) (10Ml/d)	Low risk construction only
SWS_HSE_EF-TFR_REP_ALL_pwc1	Import from Portsmouth Water (9Ml/d)	Low risk construction only
SWS_HWZ_HI-TFR_HSE_CNO_oan1	Transfer: Hampshire grid (reversible link HSE-HW) (30Ml/d)	Low risk construction only

Site and Option Ref.	Option Name	Screening Summary
SWS_HRZ_HI-TFR_HSW_ALL_bro	Transfer: Romsey Town & Broadlands valve (HSW to HRZ)	Low risk construction only
SWS_HSE_HI-REU_RE1_ALL_wol8	Recycling: Woolston WwTW (7.1Ml/d)	Construction / Operation
SWS_HRZ_HI-GRW_ALL_ALL_nw_gwa_tim_westi	Groundwater: Romsey - new BHs (4.8Ml/d)	Construction / Operation
SWS_HSE_HI-ROC_WT1_ALL_cpy_ott_30	Treatment capacity: Upgrade Otterbourne WSW (30Ml/d)	Low risk construction only
SWS_HSW_HI-GRW_RE1_ALL_str_asr_tes_westi	Groundwater: Test MAR (5.5Ml/d)	Low risk construction only
SWS_HRZ_HI-IMP_HSW_ALL_rob1	Transfer: Romsey Town & Broadlands valve (HSW-HRZ) (3.1Ml//d)	Low risk construction only
SWS_PWE_HI-REU_RE1_ALL_60toht v0.1	Recycling: Recharge of Havant Thicket reservoir from Portsmouth Harbour WTW and new WRP (60Ml/d)	Construction / Operation
SWS_HSW_HI-ROC_WT1_ALL_cpy_tst_60	Treatment capacity: Upgrade Test surface water WSW (60Ml/d)	Low risk construction only
SWS_SNZ_HI-TFR_PWE_ALL_havant -hardha r 50	Havant Thicket To Pulborough WTW: 50Ml/d	Low risk construction only
SWS_PRT_HI-TFR_HSE_ALL_otterbo-gaters p	Otterbourne to Gaters Mill: 45Ml/d	Low risk construction only
Solent and Isle of Wight Lagoons SAC		SITE
SWS_IOW_HI-REU_RE1_ALL_sey9	Recycling: Sandown WwTW (8.1Ml/d)	Low risk construction only
SWS_PWE_HI-REU_RE1_ALL_60toht v0.1	Recycling: Recharge of Havant Thicket reservoir from Portsmouth Harbour WTW and new WRP (60Ml/d)	Construction / Operation
Solent and Southampton Water Ramsar		SITE
SWS_HSE_HI-TFR_PRT_ALL_pwc2	Import from Portsmouth Water (21Ml/d)	Low risk construction only
SWS_HAZ_HI-TFR_HWZ_ALL_oan2	Transfer: Hampshire grid (reversible link HW-HA) (30Ml/d)	Low risk construction only
SWS_IOW_HI-REU_RE1_ALL_sey9	Recycling: Sandown WwTW (8.1Ml/d)	Low risk construction only
SWS_HKZ_HI-TFR_HAZ_ALL_oan3	Transfer: Hampshire grid (reversible link HA-HK) (10Ml/d)	Low risk construction only
SWS_HSE_EF-TFR_REP_ALL_pwc1	Import from Portsmouth Water (9Ml/d)	Low risk construction only
SWS_HWZ_HI-TFR_HSE_CNO_oan1	Transfer: Hampshire grid (reversible link HSE-HW) (30Ml/d)	Low risk construction only
SWS_HRZ_HI-TFR_HSW_ALL_bro	Transfer: Romsey Town & Broadlands valve (HSW to HRZ)	Low risk construction only
SWS_HSE_HI-REU_RE1_ALL_wol8	Recycling: Woolston WwTW (7.1Ml/d)	Construction / Operation
SWS_HRZ_HI-GRW_ALL_ALL_nw_gwa_tim_westi	Groundwater: Romsey - new BHs (4.8Ml/d)	Construction / Operation
SWS_HSE_HI-ROC_WT1_ALL_cpy_ott_30	Treatment capacity: Upgrade Otterbourne WSW (30Ml/d)	Low risk construction only

Site and Option Ref.	Option Name	Screening Summary
SWS_HSW_HI-GRW_RE1_ALL_str_asr_tes_westi	Groundwater: Test MAR (5.5Ml/d)	Low risk construction only
SWS_HRZ_HI-IMP_HSW_ALL_rob1	Transfer: Romsey Town & Broadlands valve (HSW-HRZ) (3.1Ml//d)	Low risk construction only
SWS_PWE_HI-REU_RE1_ALL_60toht v0.1	Recycling: Recharge of Havant Thicket reservoir from Portsmouth Harbour WTW and new WRP (60Ml/d)	Construction / Operation
SWS_HSW_HI-ROC_WT1_ALL_cpy_tst_60	Treatment capacity: Upgrade Test surface water WSW (60Ml/d)	Low risk construction only
SWS_IOW_HI-GRW_ALL_ALL_nw_gwa_kni_westi	Groundwater: Newchurch LGS	Construction / Operation
SWS_PRT_HI-TFR_HSE_ALL_otterbo-gaters p	Otterbourne to Gaters Mill: 45Ml/d	Low risk construction only
Solent and Southampton Water SPA		SITE
SWS_HSE_HI-TFR_PRT_ALL_pwc2	Import from Portsmouth Water (21Ml/d)	Low risk construction only
SWS_HAZ_HI-TFR_HWZ_ALL_oan2	Transfer: Hampshire grid (reversible link HW-HA) (30Ml/d)	Low risk construction only
SWS_IOW_HI-REU_RE1_ALL_sey9	Recycling: Sandown WwTW (8.1Ml/d)	Low risk construction only
SWS_HKZ_HI-TFR_HAZ_ALL_oan3	Transfer: Hampshire grid (reversible link HA-HK) (10Ml/d)	Low risk construction only
SWS_HSE_EF-TFR_REP_ALL_pwc1	Import from Portsmouth Water (9Ml/d)	Low risk construction only
SWS_HWZ_HI-TFR_HSE_CNO_oan1	Transfer: Hampshire grid (reversible link HSE-HW) (30Ml/d)	Low risk construction only
SWS_HRZ_HI-TFR_HSW_ALL_bro	Transfer: Romsey Town & Broadlands valve (HSW to HRZ)	Low risk construction only
SWS_HSE_HI-REU_RE1_ALL_wol8	Recycling: Woolston WwTW (7.1Ml/d)	Construction / Operation
SWS_HRZ_HI-GRW_ALL_ALL_nw_gwa_tim_westi	Groundwater: Romsey - new BHs (4.8Ml/d)	Construction / Operation
SWS_HSE_HI-ROC_WT1_ALL_cpy_ott_30	Treatment capacity: Upgrade Otterbourne WSW (30Ml/d)	Low risk construction only
SWS_HSW_HI-GRW_RE1_ALL_str_asr_tes_westi	Groundwater: Test MAR (5.5Ml/d)	Low risk construction only
SWS_HRZ_HI-IMP_HSW_ALL_rob1	Transfer: Romsey Town & Broadlands valve (HSW-HRZ) (3.1Ml//d)	Low risk construction only
SWS_PWE_HI-REU_RE1_ALL_60toht v0.1	Recycling: Recharge of Havant Thicket reservoir from Portsmouth Harbour WTW and new WRP (60Ml/d)	Construction / Operation
SWS_HSW_HI-ROC_WT1_ALL_cpy_tst_60	Treatment capacity: Upgrade Test surface water WSW (60Ml/d)	Low risk construction only
SWS_IOW_HI-GRW_ALL_ALL_nw_gwa_kni_westi	Groundwater: Newchurch LGS	Construction / Operation
SWS_PRT_HI-TFR_HSE_ALL_otterbo-gaters p	Otterbourne to Gaters Mill: 45Ml/d	Low risk construction only
Solent Maritime SAC		SITE

Site and Option Ref.	Option Name	Screening Summary
SWS_HSE_HI-TFR_PRT_ALL_pwc2	Import from Portsmouth Water (21Ml/d)	Low risk construction only
SWS_HSE_EF-TFR_REP_ALL_pwc1	Import from Portsmouth Water (9Ml/d)	Low risk construction only
SWS_HRZ_HI-TFR_HSW_ALL_bro	Transfer: Romsey Town & Broadlands valve (HSW to HRZ)	Low risk construction only
SWS_HRZ_HI-GRW_ALL_ALL_nw_gwa_tim_westi	Groundwater: Romsey - new BHs (4.8Ml/d)	Construction / Operation
SWS_HSW_HI-GRW_RE1_ALL_str_asr_tes_westi	Groundwater: Test MAR (5.5Ml/d)	Low risk construction only
SWS_HRZ_HI-IMP_HSW_ALL_rob1	Transfer: Romsey Town & Broadlands valve (HSW-HRZ) (3.1Ml//d)	Low risk construction only
SWS_PWE_HI-REU_RE1_ALL_60toht v0.1	Recycling: Recharge of Havant Thicket reservoir from Portsmouth Harbour WTW and new WRP (60Ml/d)	Construction / Operation
SWS_HSW_HI-ROC_WT1_ALL_cpy_tst_60	Treatment capacity: Upgrade Test surface water WSW (60Ml/d)	Low risk construction only
SWS_SNZ_HI-TFR_PWE_ALL_havant -hardha r 50	Havant Thicket To Pulborough WTW: 50Ml/d	Low risk construction only
SWS_PRT_HI-TFR_HSE_ALL_otterbo-gaters p	Otterbourne to Gaters Mill: 45Ml/d	Low risk construction only
Stodmarsh Ramsar		SITE
SWS_KTZ_HI-TFR_RZ8_ALL_canterb-wingha p 20	Canterbury (Broad Oak) to Near Canterbury GW	Low risk construction only
SWS_KTZ_HI-TFR_AZ7_ALL_win	Import: SEW Kingston to KTZ Near Canterbury (2Ml/d)	Low risk construction only
Stodmarsh SAC		SITE
SWS_KTZ_HI-TFR_RZ8_ALL_canterb-wingha p 20	Canterbury (Broad Oak) to Near Canterbury GW	Low risk construction only
SWS_KTZ_HI-TFR_AZ7_ALL_win	Import: SEW Kingston to KTZ Near Canterbury (2Ml/d)	Low risk construction only
Stodmarsh SPA		SITE
SWS_KTZ_HI-DES_ALL_ALL_tha10_p2	Desalination: East Thanet coast & transfer (10Ml/d) Phase 2	Construction / Operation
SWS_KTZ_HI-DES_ALL_ALL_tha20	Desalination: East Thanet coast & transfer (20Ml/d)	Construction / Operation
SWS_KTZ_HI-DES_ALL_ALL_tha20_p2	Desalination: East Thanet coast & transfer (20Ml/d) Phase 2	Construction / Operation
SWS_KTZ_HI-TFR_RZ8_ALL_canterb-wingha p 20	Canterbury (Broad Oak) to Near Canterbury GW	Low risk construction only
SWS_KTZ_HI-TFR_AZ7_ALL_win	Import: SEW Kingston to KTZ Near Canterbury (2Ml/d)	Low risk construction only
Thames Estuary and Marshes Ramsar		SITE
SWS_KME_HI-DES_ALL_ALL_ios10	Desalination: Isle of Sheppey (10Ml/d)	Construction / Operation

Site and Option Ref.	Option Name	Screening Summary
SWS_KME_HI-DES_ALL_ALL_ios20	Desalination: Isle of Sheppey (20Ml/d)	Construction / Operation
SWS_KME_HI-DES_ALL_ALL_ios10	Desalination: Isle of Sheppey (10Ml/d)	Construction / Operation
SWS_KMW_HI-DES_ALL_ALL_swa10	Desalination: River Thames estuary (10Ml/d)	Construction / Operation
SWS_KMW_HI-DES_ALL_ALL_swa10_p2	Desalination: River Thames estuary (10Ml/d) Phase 2	Construction / Operation
SWS_KMW_HI-DES_ALL_ALL_swa20	Desalination: River Thames estuary (20Ml/d)	Construction / Operation
SWS_KMW_HI-DES_ALL_ALL_swa20_p2	Desalination: River Thames estuary (20Ml/d) Phase 2	Construction / Operation
Thames Estuary and Marshes SPA		SITE
SWS_KME_HI-DES_ALL_ALL_ios10	Desalination: Isle of Sheppey (10Ml/d)	Construction / Operation
SWS_KME_HI-DES_ALL_ALL_ios20	Desalination: Isle of Sheppey (20Ml/d)	Construction / Operation
SWS_KME_HI-DES_ALL_ALL_ios10	Desalination: Isle of Sheppey (10Ml/d)	Construction / Operation
SWS_KMW_HI-DES_ALL_ALL_swa10	Desalination: River Thames estuary (10Ml/d)	Construction / Operation
SWS_KMW_HI-DES_ALL_ALL_swa10_p2	Desalination: River Thames estuary (10Ml/d) Phase 2	Construction / Operation
SWS_KMW_HI-DES_ALL_ALL_swa20	Desalination: River Thames estuary (20Ml/d)	Construction / Operation
SWS_KMW_HI-DES_ALL_ALL_swa20_p2	Desalination: River Thames estuary (20Ml/d) Phase 2	Construction / Operation
Thanet Coast and Sandwich Bay Ramsar		SITE
SWS_KTZ_HI-DES_ALL_ALL_tha10_p2	Desalination: East Thanet coast & transfer (10Ml/d) Phase 2	Construction / Operation
SWS_KTZ_HI-DES_ALL_ALL_tha20	Desalination: East Thanet coast & transfer (20Ml/d)	Construction / Operation
SWS_KTZ_HI-DES_ALL_ALL_tha20_p2	Desalination: East Thanet coast & transfer (20Ml/d) Phase 2	Construction / Operation
SWS_KTZ_HI-TFR_RZ8_ALL_win	Import: SEW Kingston to KTZ Near Canterbury (2Ml/d)	Low risk construction only
SWS_KTZ_HI-TFR_RZ8_ALL_canterb-wingha p 20	Canterbury (Broad Oak) to Near Canterbury GW	Low risk construction only
SWS_KTZ_HI-TFR_AZ7_ALL_win	Import: SEW Kingston to KTZ Near Canterbury (2Ml/d)	Low risk construction only
Thanet Coast and Sandwich Bay SPA		SITE
SWS_KTZ_HI-DES_ALL_ALL_tha10_p2	Desalination: East Thanet coast & transfer (10Ml/d) Phase 2	Construction / Operation
SWS_KTZ_HI-DES_ALL_ALL_tha20	Desalination: East Thanet coast & transfer (20Ml/d)	Construction / Operation

Site and Option Ref.	Option Name	Screening Summary
SWS_KTZ_HI-DES_ALL_ALL_tha20_p2	Desalination: East Thanet coast & transfer (20Ml/d) Phase 2	Construction / Operation
SWS_KTZ_HI-TFR_RZ8_ALL_win	Import: SEW Kingston to KTZ Near Canterbury (2Ml/d)	Low risk construction only
SWS_KTZ_HI-TFR_RZ8_ALL_canterb-wingha p 20	Canterbury (Broad Oak) to Near Canterbury GW	Low risk construction only
SWS_KTZ_HI-TFR_AZ7_ALL_win	Import: SEW Kingston to KTZ Near Canterbury (2Ml/d)	Low risk construction only
Thanet Coast SAC		SITE
SWS_KTZ_HI-DES_ALL_ALL_tha10_p2	Desalination: East Thanet coast & transfer (10Ml/d) Phase 2	Construction / Operation
SWS_KTZ_HI-DES_ALL_ALL_tha20	Desalination: East Thanet coast & transfer (20Ml/d)	Construction / Operation
SWS_KTZ_HI-DES_ALL_ALL_tha20_p2	Desalination: East Thanet coast & transfer (20Ml/d) Phase 2	Construction / Operation
The Mens SAC		SITE
SWS_SWZ_HI-TFR_SNZ_ALL_hardham-tenant p 30	Pulborough to Worthing: 30Ml/d	Low risk construction only
SWS_SNZ_HI-REU_RE1_ALL_env_cu_chu2_conju	Recycling: Horsham WTW conjunctive use with Arun Reservoir, Pulborough (6.8Ml/d)	Low risk construction only
SWS_SNZ_HI-ROC_RE1_ALL_hsb-rcm	Groundwater: Petworth WSW return to service with a new borehole (4.0Ml/d)	Low risk construction only
SWS_SNZ_HI-REU_RE1_ALL_for20	Recycling: Littlehampton WwTW (15Ml/d)	Low risk construction only
SWS_SNZ_HI-TFR_PWE_ALL_havant -hardha r 50	Havant Thicket To Pulborough WTW: 50Ml/d	Low risk construction only
SWS_SNZ_HI-TFR_RZ5_ALL_tilmore-hardha p 10	Tilmore to Pulborough: 10Ml/d	Low risk construction only
The Swale Ramsar		SITE
SWS_KME_HI-DES_ALL_ALL_ios10	Desalination: Isle of Sheppey (10Ml/d)	Construction / Operation
SWS_KME_HI-DES_ALL_ALL_ios20	Desalination: Isle of Sheppey (20Ml/d)	Construction / Operation
SWS_KME_HI-DES_ALL_ALL_ios10	Desalination: Isle of Sheppey (10Ml/d)	Construction / Operation
SWS_KME_HI-REU_RE1_ALL_sit8	Recycling: Sittingbourne industrial reuse (7.5Mld)	Construction / Operation
The Swale SPA		SITE
SWS_KME_HI-DES_ALL_ALL_ios10	Desalination: Isle of Sheppey (10Ml/d)	Construction / Operation
SWS_KME_HI-DES_ALL_ALL_ios20	Desalination: Isle of Sheppey (20Ml/d)	Construction / Operation
SWS_KME_HI-DES_ALL_ALL_ios10	Desalination: Isle of Sheppey (10Ml/d)	Construction / Operation

Site and Option Ref.	Option Name	Screening Summary
SWS_KME_HI-REU_RE1_ALL_sit8	Recycling: Sittingbourne industrial reuse (7.5Mld)	Construction / Operation

Appropriate Assessment Summary

Demand-side Options

The demand side options are set out in **Table 2.2** (**Section 2**). In summary, the options are either

- 'water efficiency support' measures that are designed to reduce water use without the need for significant physical intervention in the network or other development; or
- leakage reduction measures that may require construction works.

Of these, the 'water efficiency support' options cannot have significant effects due to the nature of the option (based on established guidance for similar policies and proposals in other strategic planning documents.

With regard to the leakage options, these will have no negative operational effects on European sites as they will reduce treated water use. The only realistic mechanism for a negative effect would be through any construction required (for example, the leakage reduction programme may require repair of a pipe in or near an SAC), but this cannot be meaningfully assessed at the strategic level since information on the location of specific intervention requirements (e.g. leaks) is not available without specific investigations, which would form part of the option package (e.g. the precise location and severity of most leakages is not known ahead of detection), and there is consequently no information on the scale (etc.) of any construction required. Therefore, from an HRA perspective, the options are 'screened in' (as an effect pathway is conceivable) but as a meaningful appropriate assessment is not possible, the assessment is necessarily deferred to the project level.

However, it is clear that the anticipated works associated with these options are not of a scale that would suggest that effects are potentially unavoidable at the project stage, and the WRMP requires that the standard avoidance measures in **Appendix C** be employed (which includes a requirement for the potential for European sites to be affected to be considered at the planning stage). The WRMP does not imply any approval for schemes that come forward under these options or remove the need for project-level assessments, although the measures noted in **Appendix C** will ensure that potential adverse effects can be identified and avoided at the project stage. **The leakage-reduction options are therefore excluded from further assessment.**

Supply-side Options

SWS has identified 66 supply-side options (excluding options from the Drought Plan that are included in the long-term modelling for the WRMP). Of these:

- 17 have been 'screened out' since they will have 'no effect' (and hence no possibility of 'in combination' effects).
- 19 only have pathways that can be reliably avoided with established measures; these have been appropriately assessed with the inclusion of mitigation measures, in accordance with People over Wind (Appendix E15).

- 21 have potentially more involved pathways that have been examined through more detailed assessments (Appendices E1 – E14).

'No effect options'

17 options are expected (if progressed as projects) to have 'no effect' on any European sites (i.e. there are no reasonable pathways by which environmental changes associated with the option could affect the site or its interest features); as these options will have 'no effects' they cannot have 'in combination' effects, and have been screened out and are not considered further.

'Simple' Assessment Options

19 options only have effect pathways associated with them that can clearly be prevented with avoidance or mitigation measures that are commonly used and known to be available, achievable and effective (see **Appendix C**); typically these are low-probability and/or low magnitude pathways (for example, construction required across a minor up-catchment tributary of a European site) that would have historically been 'screened out with mitigation' prior to 'People over Wind'.

The assessment of these options is included in **Appendix E15**, which is 'appropriate' to the nature of the WRMP as a strategic plan, the option under consideration, and the scale and likelihood of any effects.

In summary, for all of the options in **Table 5.1**:

- there will be no operational effects (all essentially modifications to the network or existing assets that do not require the development of new water resources or alterations to abstraction licences);
- all potential construction effects are of a scale and type that can be reliably prevented with established measures (see Appendix C), such that effects 'alone' would be nil or negligible and 'in combination' effects would not be expected.

For these options, therefore, there will be 'no adverse effects, alone or in combination' on any of the European sites noted in Appendix A.

Table 0.1 Options that only have potential effects that can be reliably avoided with established measures

Option	Name
SWS_SHZ_HI-REU_RE1_ALL_dar10	Recycling: Hastings WTW to augment storage in Darwell reservoir (9.5Ml/d)
SWS_SWZ_HI-TFR_SNZ_ALL_hardham-tenant p 30	Pulborough to Worthing: 30Ml/d
SWS_HAZ_HI-TFR_HWZ_ALL_oan2	Transfer: Hampshire grid (reversible link HW-HA) (30Ml/d)
SWS_IOW_HI-REU_RE1_ALL_sey9	Recycling: Sandown WwTW (8.1Ml/d)
SWS_HKZ_HI-TFR_HAZ_ALL_oan3	Transfer: Hampshire grid (reversible link HA-HK) (10Ml/d)
SWS_HWZ_HI-TFR_HSE_CNO_oan1	Transfer: Hampshire grid (reversible link HSE-HW) (30Ml/d)

Option	Name
SWS_HRZ_HI-TFR_HSW_ALL_bro	Transfer: Romsey Town & Broadlands valve (HSW to HRZ)
SWS_HSE_HI-ROC_WT1_ALL_cpy_ott_30	Treatment capacity: Upgrade Otterbourne WSW (30Ml/d)
SWS_HSW_HI-GRW_RE1_ALL_str_asr_tes_westi	Groundwater: Test MAR (5.5Ml/d)
SWS_HRZ_HI-IMP_HSW_ALL_rob1	Transfer: Romsey Town & Broadlands valve (HSW-HRZ) (3.1Ml//d)
SWS_SHZ_HI-GRW_ALL_ALL_ass_br_bre_eastn	Groundwater: Rye Wells reconfiguration (1.5Ml/d))
SWS_HSW_HI-ROC_WT1_ALL_cpy_tst_60	Treatment capacity: Upgrade Test surface water WSW (60Ml/d)
SWS_SWZ_HI-DES_ALL_ALL_aru10	Desalination: Tidal River Arun (10Ml/d)
SWS_KTZ_HI-TFR_RZ8_ALL_win	Import: SEW Kingston to KTZ Near Canterbury (2Ml/d)
SWS_SNZ_HI-REU_RE1_ALL_for20	Recycling: Littlehampton WwTW (15Ml/d)
SWS_KTZ_HI-TFR_RZ8_ALL_canterb-wingha p 20	Canterbury (Broad Oak) to Near Canterbury GW
SWS_SNZ_HI-TFR_PWE_ALL_havant -hardha r 50	Havant Thicket To Pulborough WTW: 50Ml/d
SWS_KTZ_HI-TFR_AZ7_ALL_win	Import: SEW Kingston to KTZ Near Canterbury (2Ml/d)
SWS_SNZ_HI-TFR_RZ5_ALL_tilmore-hardha p 10	Tilmore to Pulborough: 10Ml/d

Other Option Assessments

More detailed appropriate assessments (**Appendices E1 – E14**) have been completed for those options with construction or operational effects on a site that are potentially more difficult to avoid (i.e. direct or close-proximity construction effects, or environmental changes that are inherent to the operation of the scheme).

Options are grouped together in Appendices E1 – E14 if they are modular or phased in some way (i.e. fundamentally the same scheme or type of scheme at the same location), as follows.

Table 0.2 Options subject to more detailed assessments

Options / Option groups	Option Names	Appx.
SWS_HSE_EF-TFR_REP_ALL_pwc1	Import from Portsmouth Water (9Ml/d)	E1
SWS_HSE_HI-TFR_PRT_ALL_pwc2	Import from Portsmouth Water (21Ml/d)	
SWS_HSE_HI-REU_RE1_ALL_wol8	Recycling: Woolston WwTW (7.1Ml/d)	E2
SWS_HRZ_HI-GRW_ALL_ALL_nw_gwa_tim_westi	Groundwater: Romsey - new BHs (4.8Ml/d)	E3
SWS_SNZ_HI-REU_RE1_ALL_env_cu_chu2_conju	Recycling: Horsham WTW conjunctive use with Arun Reservoir, Pulborough (6.8Ml/d)	E4

Options / Option groups	Option Names	Appx.
SWS_IOW_HI-GRW_ALL_ALL_nw_gwa_kni_westi	Groundwater: Newchurch LGS (1.9Ml/d)	E5
SWS_SNZ_HI-ROC_RE1_ALL_hsb-rcm	Groundwater: Petworth WSW return to service with a new borehole (4.0Ml/d)	E6
SWS_PRT_HI-TFR_HSE_ALL_otterbo-gaters p	Otterbourne to Gaters Mill: 45Ml/d	E7
SWS_KTZ_HI-DES_ALL_ALL_tha10_p2	Desalination: East Thanet coast & transfer (10Ml/d) Phase 2	E8
SWS_KTZ_HI-DES_ALL_ALL_tha20	Desalination: East Thanet coast & transfer (20Ml/d)	
SWS_KTZ_HI-DES_ALL_ALL_tha20_p2	Desalination: East Thanet coast & transfer (20Ml/d) Phase 2	
SWS_KME_HI-DES_ALL_ALL_ios10	Desalination: Isle of Sheppey (10Ml/d)	E9
SWS_KME_HI-DES_ALL_ALL_ios10	Desalination: Isle of Sheppey (20Ml/d) Phase 2	
SWS_KME_HI-DES_ALL_ALL_ios20	Desalination: Isle of Sheppey (20Ml/d)	
SWS_KMW_HI-DES_ALL_ALL_swa10	Desalination: River Thames estuary (10Ml/d)	E10
SWS_KMW_HI-DES_ALL_ALL_swa10_p2	Desalination: River Thames estuary (10Ml/d) Phase 2	
SWS_KMW_HI-DES_ALL_ALL_swa20	Desalination: River Thames estuary (20Ml/d)	
SWS_KMW_HI-DES_ALL_ALL_swa20_p2	Desalination: River Thames estuary (20Ml/d) Phase 2	
SWS_KMW_HI-REU_RE1_ALL_ecc18	Recycling: Medway WwTW (12.8Ml/d)	E11
SWS_KME_HI-REU_RE1_ALL_sit8	Recycling: Sittingbourne industrial reuse (7.5Mld)	E12
SWS_HSE_HI-TFR_T2S_CNO_spar to ott 120 pot	HWZ to Otterbourne (120) Potable - Construction	E13
SWS_HSE_HI-TFR_T2S_CNO_spar to ott 50 pot	HWZ to Otterbourne (50) Potable - Construction	
SWS_T2S_HI-ROC_WT1_CNO_culham120pot	Culham (120) - potable - Construction	
SWS_T2S_HI-ROC_WT1_CNO_culham50pot	Culham (50) - potable - Construction	
SWS_PWE_HI-REU_RE1_ALL_60toht v0.1	Recycling: Recharge of Havant Thicket reservoir from Portsmouth Harbour WTW and new WRP (60Ml/d)	E14

The results of these assessments are summarised in **Table 5.3**.

Table 0.3 Options subject to more detailed assessments

Option Group	European sites screened-in	Appropriate Assessment Summary and Key Uncertainties
Import from Portsmouth Water (9Ml/d) **Import from Portsmouth Water (21Ml/d)**	River Itchen SAC Solent and Dorset Coast SPA Solent and Southampton Water SPA Solent and Southampton Water Ramsar Solent Maritime SAC.	**Summary** No adverse effects **Construction:** • Indirect construction effects on these sites or their interest features can be reliably avoided or mitigated with measures that are currently available, achievable and effective. • The indicative route of the pipeline crosses the River Itchen SAC at locations where directional drill may be challenging given the space available, although these potential effects could be avoided at the project-design stage with re-routing. **Operation:** • No operational effects on sites (transfer scheme only).
Recycling: Woolston WwTW (7.1Ml/d)	Solent and Dorset Coast SPA River Itchen SAC Solent and Southampton Water SPA Solent and Southampton Water Ramsar	**Summary** Adverse effects avoidable; some residual uncertainties that may require additional data to resolve although sufficient time is available to collect these data prior to option deployment. **Construction:** • Indirect construction effects on these sites or their interest features can be reliably avoided or mitigated with measures that are currently available, achievable and effective. • The indicative route of the pipeline crosses the River Itchen SAC at locations where directional drill may be challenging given the space available, although these potential effects could be avoided at the project-design stage with re-routing. **Operation:** • Operation of the Woolston WwTW Indirect Potable Reuse option will change abstractions and discharges in the **River Itchen SAC** resulting in changes to flow and water quality; however ▸ To ensure that impacts on water quality are mitigated, the treated effluent will comply with rCSMG standards and will be of better quality when compared to the

Option Group	European sites screened-in	Appropriate Assessment Summary and Key Uncertainties
		existing water quality within the River Itchen. Although this water discharged will not be "chalky" in nature, it is recognised that the treated effluent will be discharged at the tidal limit and will have limited impact on the river water quality and will not impact on the Annex 1 habitat. ▸ The abstraction would effectively operate as a 'put and take' and there would be no net loss of water from the freshwater section of the River Itchen. Therefore there would be no change in compliance with CSMG requirements. • A redirection of discharge from the Woolston WwTW outfall would reduce non-saline inputs to the **Solent and Southampton Water SPA/Ramsar** and **Solent and Dorset Coast SPA** at Weston Point; this may result in minor changes in benthic communities at this location, although the sensitivity of these communities to the expected magnitude of change will be low particularly given the dominance of tidal influences. Evidence from previous studies suggests that the relationship of SPA/Ramsar birds with intertidal flows is not related to flow volume, and the location of the WwTW is a heavily modified location. Adverse effects would not therefore be expected from the minor reduction in non-saline inputs at this location.

Option Group	European sites screened-in	Appropriate Assessment Summary and Key Uncertainties
Groundwater: Romsey - new BHs (4.8Ml/d)	Solent and Southampton Water Ramsar Solent and Southampton Water SPA Solent Maritime SAC Solent and Dorset Coast SPA Mottisfont Bats SAC	**Summary** No adverse effects **Construction:** • Indirect construction effects on these sites or their interest features can be reliably avoided or mitigated with measures that are currently available, achievable and effective. **Operation:** • Romsey is part of Southern Water's 'no deterioration' investigations – specifically considering the risk of Recent Actual to Fully Licensed abstraction increases on the River Test. The freshwater flow conditions for the River Test SSSI are tighter than what would be reasonable for the transitional Southampton Water, and so adverse effects on the sites associated with Southampton Water are not expected. • Groundwater modelling has indicated that the wetland communities of the Lower Test Valley SSSI (and hence the Solent and Southampton Water SPA/Ramsar in this location) are largely disconnected from adjacent watercourses, and hence the Romsey abstraction would not affect the site at this location. • The impacts of the abstraction increase on non-saline inputs to the estuary is negligible, particularly in relation to the dominance of the tidal influx; the supporting habitats for the SPA/Ramsar interest features, or the qualifying features of the Solent Maritime SAC will not be exposed to changes of sufficient magnitude to adversely affect integrity.

Option Group	European sites screened-in	Appropriate Assessment Summary and Key Uncertainties
Recycling: Horsham WTW conjunctive use with Arun Reservoir, Pulborough (6.8Ml/d)	Arun Valley SAC Arun Valley SPA Arun Valley Ramsar The Mens SAC	**Summary** No adverse effects **Construction:** • Indirect construction effects on the **Arun valley sites** or their interest features can be reliably avoided, mitigated with measures that are currently available, achievable and effective, or so minor (**The Mens**) that effects would not be adverse. **Operation:** • This option will reduce flows in the Arun downstream of Horsham. Potential operational effects comprise change in water level in the **Arun valley sites**. This relates to change in flows and levels in the River Arun. However it was concluded that the River Arun is only functionally linked to the sites during flood flows and the potential reduction in flows at high flows has a less than 1% impact, it is concluded that there will be no adverse effects on the site integrity. • No operational effects on the **The Mens SAC**.
Groundwater: Newchurch LGS (1.9Ml/d)	Solent and Southampton Water Ramsar Solent and Southampton Water SPA	**Summary** No adverse effects **Construction:** • No construction effects on these sites due to the minor nature of the works required. **Operation:** • Potential operation effects on the site comprise change in water level and flow to the estuary for both. It is expected that level changes in the estuarine environment will be negligible. In respect of volume discharging to the estuary, the abstraction volume is negligible relative to the estuary volume and therefore no level change would be expected. Furthermore EA abstraction licensing will require a robust detailed assessment. Therefore it can be concluded at this stage that there will be no adverse effect.

Option Group	European sites screened-in	Appropriate Assessment Summary and Key Uncertainties
Groundwater: Petworth WSW return to service with a new borehole (4.0Ml/d)	The Mens SAC Arun Valley SAC Arun Valley SPA Arun Valley Ramsar Ebernoe Common SAC	**Summary** No adverse effects **Construction:** • Indirect construction effects on the **Arun valley sites** or their interest features can be reliably avoided, mitigated with measures that are currently available, achievable and effective, or so minor (**The Mens and Ebernoe Common**) that effects would not be adverse. • This option will result in change in river flows. Potential operational effects comprise change in water level in the **Arun valley** sites. This relates to change in flows and levels in the River Rother. However it was concluded that as the River Rother is only functionally linked to the SAC during flood flows and the potential reduction in flows at high flows has a less than 1% impact, and that effects would be ameliorated by direct hydrological support from the Arun, it is concluded that there will be no adverse effects on the site integrity. • No operational effects on the **The Mens SAC** or **Ebernoe Common SAC**.
Otterbourne to Gaters Mill: 45Ml/d	River Itchen SAC Solent and Dorset Coast SPA Solent and Southampton Water SPA Solent and Southampton Water Ramsar Solent Maritime SAC.	**Summary** No adverse effects **Construction:** • Indirect construction effects on these sites or their interest features can be reliably avoided or mitigated with measures that are currently available, achievable and effective. • The indicative route of the pipeline crosses the River Itchen SAC at locations where directional drill may be challenging given the space available, although these potential effects could be avoided at the project-design stage with re-routing. **Operation:** • No operational effects on sites (transfer scheme only).

Option Group	European sites screened-in	Appropriate Assessment Summary and Key Uncertainties
Desalination: East Thanet coast & transfer (10Ml/d) Phase 2 **Desalination: East Thanet coast & transfer (20Ml/d)** **Desalination: East Thanet coast & transfer (20Ml/d) Phase 2**	Thanet Coast and Sandwich Bay SPA Outer Thames Estuary SPA Thanet Coast and Sandwich Bay Ramsar Thanet Coast SAC Margate and Long Sands SAC Stodmarsh SPA	**Summary** Adverse effects avoidable; some residual uncertainties that may require additional data to resolve although sufficient time is available to collect these data prior to option deployment. **Construction:** • Indirect construction effects on these sites or their interest features can be reliably avoided or mitigated with measures that are currently available, achievable and effective. • Direct effects on small areas of **Thanet Coast and Sandwich Bay SPA/Ramsar and Margate and Long Sands SAC** are possible from intake / outfall construction, potentially resulting in permanent changes to qualifying or supporting habitats. Direct effects on Thanet Coast and Sandwich Bay SPA/Ramsar can be avoided with specific construction techniques (i.e. directional drill); a 2km outfall on the current orientation would likely impinge on the Margate and Long Sands SAC although the area affected will be small and effects are unlikely to be adverse given the dynamic characteristics of the habitat. **Operation:** • No effects on **Stodmarsh SPA** • Adverse effects on the interest features or supporting habitats of **Thanet Coast and Sandwich Bay SPA/Ramsar, Outer Thames Estuary SPA, Thanet Coast SAC** are not expected based on feature characteristics and sensitivities; experience of brine (etc.) dispersal from other sites (typically return to ambient salinity in tens of metres; water quality parameters technically achievable); and the likelihood that adverse effects can be avoided through design / operational practices. • Adverse effects on the qualifying features of **Margate and Long Sands SAC** are possible if outfall is located in this site, although the exposure and sensitivity of the features is relatively low; outfall may affect sediment movements if within site, but likely to be very localised and not adverse given the dynamic nature of the qualifying feature.

Option Group	European sites screened-in	Appropriate Assessment Summary and Key Uncertainties
Desalination: Isle of Sheppey (10Ml/d) **Desalination: Isle of Sheppey (20Ml/d) Phase 2** **Desalination: Isle of Sheppey (20Ml/d)**	The Swale SPA The Swale Ramsar Medway Estuary and Marshes SPA Medway Estuary and Marshes Ramsar Thames Estuary and Marshes Ramsar Thames Estuary and Marshes SPA Outer Thames Estuary SPA	**Summary** Adverse effects avoidable; some residual uncertainties that may require additional data to resolve although sufficient time is available to collect these data prior to option deployment. **Construction:** • Indirect construction effects on these sites or their interest features can be reliably avoided or mitigated with measures that are currently available, achievable and effective. No direct construction effects anticipated. **Operation:** • Adverse effects on the habitats of **The Swale SPA / The Swale Ramsar** are not expected based on the site location relative to outfall and limited exposure of the site itself (features may be exposed when using the other sites, although effects on these are not expected to be adverse, see below). • Adverse effects on the interest features or supporting habitats of **Medway Estuary and Marshes SPA/Ramsar, Thames Estuary and Marshes SPA/Ramsar** and **Outer Thames Estuary SPA** are not expected based on feature characteristics and sensitivities; experience of brine (etc.) dispersal from other sites (typically return to ambient salinity in tens of metres; water quality parameters technically achievable); and the likelihood that adverse effects can be avoided through design / operational practices. • The proximity of the **Medway Estuary and Marshes SPA/Ramsar** and **Thames Estuary and Marshes SPA/Ramsar** may drive designed-avoidance, including locating the outfall off the northern coast of Sheppey and hence into the Thames estuary rather than the relatively more constrained Medway (hence providing greater stand-off distance from the intertidal habitats of the SPA/Ramsar sites.

Option Group	European sites screened-in	Appropriate Assessment Summary and Key Uncertainties
Desalination: River Thames estuary (10Ml/d) **Desalination: River Thames estuary (10Ml/d) Phase 2** **Desalination: River Thames estuary (20Ml/d)** **Desalination: River Thames estuary (20Ml/d) Phase 2**	Thames Estuary and Marshes SPA Thames Estuary and Marshes SPA	**Summary** Adverse effects avoidable; some residual uncertainties that may require additional data to resolve although sufficient time is available to collect these data prior to option deployment. **Construction:** • Indirect construction effects on these sites or their interest features can be reliably avoided or mitigated with measures that are currently available, achievable and effective. **Operation:** • Adverse effects on the interest features or supporting habitats of the **Thames Estuary Marshes SPA/Ramsar** are not expected based on the distance to the sites from the likely outfall location; feature characteristics and sensitivities; experience of brine (etc.) dispersal from other sites (typically return to ambient salinity in tens of metres; water quality parameters technically achievable); and the likelihood that potential adverse effects can be avoided through design / operational practices.

Option Group	European sites screened-in	Appropriate Assessment Summary and Key Uncertainties
Recycling: Medway WwTW (12.8Ml/d)	Medway Estuary and Marshes SPA Medway Estuary and Marshes Ramsar	**Summary** No adverse effects **Construction:** • Indirect construction effects on these sites or their interest features can be reliably avoided or mitigated with measures that are currently available, achievable and effective. **Operation:** • Operation will not directly reduce water quality in the Medway (assumed that effluent discharges from the recovery process will be within existing or new permit limits set by the EA (technologically feasible) or disposed of through alternative arrangements (e.g. to landfill). • Operation will reduce non-saline inputs to the Medway estuary which may marginally increase saline intrusion upstream but these effects will be very small (esp. relative to tidal influence and the residual flows within the Medway) and within normal variation, and so not adverse.

Option Group	European sites screened-in	Appropriate Assessment Summary and Key Uncertainties
Recycling: Sittingbourne industrial reuse (7.5Mld)	The Swale SPA The Swale Ramsar	**Summary** No adverse effects **Construction:** • Indirect construction effects on these sites or their interest features can be reliably avoided or mitigated with measures that are currently available, achievable and effective. **Operation:** • Operation will not directly reduce water quality in the Swale (assumed that effluent discharges from the recovery process will be within existing or new permit limits set by the EA (technologically feasible) or disposed of through alternative arrangements (e.g. to landfill). • Operation will reduce non-saline inputs to the Milton Creek although this is not part of the SPA/Ramsar and will not see substantial use by the SPA/Ramsar qualifying features due to its characteristics (narrow, poor sight-lines, relatively high-disturbance). • The small reduction in non-saline inputs to the Swale from the WwTW will not adversely affect the sites associated with this channel, which is dominated by tidal influx and hence saline conditions; the reduction would not substantially alter 'freshwater flows' to the Swale and evidence from previous studies undertaken at this site suggests that the relationship of birds with intertidal flows is not related to flow volume.

Option Group	European sites screened-in	Appropriate Assessment Summary and Key Uncertainties
HWZ to Otterbourne (120) Potable - Construction **HWZ to Otterbourne (50) Potable - Construction** **Culham (120) - potable - Construction** **Culham (50) - potable - Construction**		**Summary** No adverse effects **Construction:** • Indirect construction effects on these sites or their interest features can be reliably avoided or mitigated with measures that are currently available, achievable and effective. **Operation:** • No operational effects on sites immediately associated with this transfer are expected (transfer scheme only). • Effects on distant site that are part of the 'water supply' for this option (i.e. sites exposed to the Severn Thames Transfer SRO or the North West Transfer SRO) are considered through Gate 2 submissions and within the WRMPs for the relevant water companies.
Recycling: Recharge of Havant Thicket reservoir from Portsmouth Harbour WTW and new WRP (60Ml/d)	River Itchen SAC Solent and Dorset Coast SPA Solent Maritime SAC Chichester and Langstone Harbours Ramsar Chichester and Langstone Harbours SPA Portsmouth Harbour Ramsar Solent and Southampton Water Ramsar Solent and Southampton Water SPA Solent and Isle of Wight Lagoons SAC Portsmouth Harbour SPA	**Summary** No adverse effects **Construction:** • Indirect construction effects on these sites or their interest features are possible but can be reliably avoided or mitigated with measures that are currently available, achievable and effective. **Operation:** • No operational effects on sites expected (discharge of waste products from recovery process will take place via the existing LSO; the WFD Compliance Assessment shows the effect of the water recycling is to reduce the extent of impact in relation to subtidal water quality changes overall, compared with the existing discharges and therefore no AEoI is predicted as a result of operation).

Strategic In Combination Assessment

Between-option 'in combination' effects

The effects of the WRMP options operating 'in combination' have been explored through the screening and appropriate assessment phases (see **Sections 4 – 5 and Appendices D – E15**). These assessments have concluded that adverse 'in combination' effects are not likely to occur for any European sites or features based on the currently available information, although this will require review as options are bought forward for delivery.

'In combination' effects with other SWS Plans

Drought Plan

The WRMP is developed with reference to the current and emerging Drought Plans; the requirements of the Drought Plan are accounted for within the WRMP calculations and the HRA of this plan, and so there cannot be additional 'in combination' effects in respect of water resources between the WRMP and the Drought Plan.

Furthermore, the scope for in-combination operational effects between the WRMP and the Drought Plan measures is limited as in most cases the drought management measures will come into operation once the operation of the WRMP schemes have ceased due to abstraction licence conditions.

Drainage and Wastewater Management Plan (DWMP)

SWS's draft DWMP is a company-wide plan for drainage and wastewater management covering the whole of the SWS operating region. It pulls together the investment planning for 381 wastewater systems and sets out SWS will ensure drainage and wastewater systems provide a resilient water future over the next 25 years.

In common with other DWMPs the options proposed for the wastewater systems are largely generic that do not identify specific locations for interventions. The DWMP HRA concludes that there is insufficient information available in the DWMP to enable potential effects on European sites within, near or downstream of TPUs to be meaningfully assessed, and so assessment is necessarily deferred 'down the line'. However:

- The options will involve minor and/or unexceptional construction works, and construction effects can clearly be avoided with normal best-practice measures.
- Implementation of the options must be consistent with the DWMP objectives and these include meeting all permitting requirements (now, or in the future) and protecting, restoring or improving the environment by reducing spills from storm overflows and delivering WINEP-driven schemes. Operational effects on water quality would therefore be neutral or positive both collectively and for individual schemes. Other operational effects are conceivable (for example, new pumping stations may introduce noise and vibration effects), but these will be scheme-specific, not systematically driven by the options in the DWMP, and avoidable with best-practice design measures.

Consequently, the interaction of the WRMP options with specific schemes derived from the DWMP can only be assessed at the project level (although there is nothing to suggest that

adverse effects will be unavoidable); and overall water quality within the receiving waterbodies (including European sites potentially affected by the WRMP) will be positive as a result of the DWMP (so adverse in combination effects would not occur).

Between-company 'in combination' effects

WRMPs

Other water company plans are currently in preparation, and so an 'in combination' assessment cannot be completed at this stage; however, the options selected for the SWS plan have been driven in part by assessments undertaken for WRSE, which have included HRA, and so in combination effects with other WRMPs would not be expected.

Drought Plans

The drought options within other water company Drought Plans will will not affect any European sites that are likely to also be exposed to effects associated with the WRMP options, and so in combination effects with other WRMPs would not be expected.

In combination effects with other plans and programmes

Effects with other strategic plans and water resource demand

The WRMP explicitly accounts for growth forecasts when calculating future water demand (and hence areas with potential deficits). This means that 'in combination' water-resource effects with growth promoted by other plans or projects are considered and accounted for during the WRMP development process and its deficit calculations.

Potential 'in combination' effects in respect of water-resource demands due to other plans or projects are therefore unlikely since these demands are explicitly modelled when determining deficit zones and hence developing Feasible Options. As a result (in respect of water resources) the WRMP is not likely to make non-significant effects in other plans significant (indeed, other plans are arguably the 'source' of any potential effects in respect of water demand, with the WRMP having to manage potential effects that are not generated by the WRMP itself).

Obviously local plans are not all consistent with regard to planned growth and this arguably introduces some uncertainty. However, with regard to water resources and planning uncertainty it is important to note the following:

- The WRMP safeguards against uncertainty in option yield and timing through 'Target Headroom'; this is an allowance provided in the planning process (i.e. designed-in spare capacity) that ensures that any supply-demand deficit will still be met if there is an underperforming demand management measure or growth exceeds predicted levels. It is therefore extremely unlikely that additional demand or a poorly-performing option would 'suddenly' result in a deficit that might affect a European site; and (in any case);
- The WRMP is revised on a five-yearly cycle, which allows any changes in demand forecasts (e.g. as new plans come forward) to be accounted for, and for timely intervention should a measure not be performing as expected. Delivery is also formally reviewed on an annual basis.

It is therefore considered that the WRMP options will not have significant 'in combination' effects with local plans in respect of water resources.

Effects with major projects

Known major projects that are likely to increase demand have been taken into account during the development of SWS's WRMP and determination of future deficits.

With regard to individual projects interacting with specific options to affect particular sites, this is addressed in **Appendices E1 – E15**.

In summary, reference has been made to the Planning Inspectorates National Infrastructure Projects database[35] which includes major projects, subject to the requirements of the Planning Act 2008. It includes projects:

- where the developer has advised the Planning Inspectorate in writing that they intend to submit an application in the future;
- where an application has already been made to the Planning Inspectorate and is undergoing the development consent process;
- where a Development Consent Order (DCO) application has been determined.

This exercise identified several major projects that might affect sites that are also exposed to the outcomes of the WRMP options (particularly in the North Kent area); however, adverse in combination effects between these projects are not expected, partly as there is unlikely to be notable temporal or spatial overlap in the delivery of these options, or in the longer-term operational effects. However, this can only be fully assessed at the project level when details of the developments are known and the baseline can be fixed.

Minor projects

It has not been possible to produce a definitive list of existing (minor) planning applications near each option's zone of influence and, generating a list at this stage would be of little value. It is possible that there will be 'in combination' project-specific construction effects associated with future planning applications, although this can only be assessed at the time of any application. This is consistent with the ACWG guidance on cumulative/in combination assessments.

Effects with strategic development pressure

Regional and local plans have been reviewed at a high level to determine whether there are any likely significant 'in combination' effects, with allocation sites identified where possible. This review has not indicated any potential or likely 'in combination' effects that could occur as a result of cumulative development pressure, and in reality, the timescales involved in the implementation of the options and the absence of detail on allocation proposals makes any 'in combination' assessment difficult and potentially meaningless. However, the construction works required for the options are temporary and not of a scale or type that would make 'in combination' effects likely.

[35] https://infrastructure.planninginspectorate.gov.uk/projects/

HRA Conclusions

Overview

The Water Act 2003 requires that all water companies in England and Wales prepare and maintain Water Resources Management Plans (WRMPs). These plans set out how public water supply (PWS) will be maintained over a minimum of 25 years in a way that is economically, socially and environmentally sustainable.

In accordance with water resource planning guidance[36], SWS has developed a supply-demand balance to identify those water resource zones (WRZs) in deficit over the lifetime of the plan (and so where additional water resources are required). The WRMP presents options for the resolution of the WRZ deficit.

All of SWS's WRZs are in deficit over the planning period. SWS has identified 66 supply-side options (excluding options from the Drought Plan) and 7 demand-side options to maintain supplies to customers.

Water company WRMPs are subject to the provisions of the *Conservation of Habitats and Species Regulations 2017*. SWS has a statutory duty to prepare a WRMP and is therefore the Competent Authority for the HRA of that plan. This draft HRA report accompanies the draft WRMP24 that has been published for consultation, and summarises the current assessment of SWS's preferred portfolio of options against the requirements of the Habitats Regulations. It also documents the iterative HRA process that has been applied through the development of the draft WRMP24.

This report provides a strategic, plan-level assessment to support the WRMP and is not an application-specific ("project" level) assessment. A more detailed, application-specific HRA (with Stage 2 Appropriate Assessment where required) will be needed to support any actual planning application and environmental permits/consents. At this stage, the HRA will need to be revisited to take account of any changes to scheme design, construction and operational arrangements, site specific survey and modelling work, as well as the package of mitigation measures proposed at that stage. Cumulative, in-combination effects will also need to be re-assessed to take account of prevailing, updated information on other projects, programmes and plans, including those highlighted in the section of this HRA report that describes the potential in-combination effects of this plan with other plans and projects.

For each option (or group of options, as appropriate), the assessment comprises:

- a 'screening' of European sites within the study area to identify those sites and features where there will self-evidently be 'no effect', 'no likely significant effects', or positive

[36] UK Government (2022) *Water Resource Planning Guideline [online]*. Available at: https://www.gov.uk/government/publications/waterresources-planning-guideline/water-resources-planning-guideline
Section 4.4. of the WRPG defines a water resource zone as "an area within which the sources of water and distribution of water to meet demand, is largely self-contained (with the exception of agreed bulk transfers)".

effects due to the option[37], and those where significant effects are likely or uncertain; and

- an 'appropriate assessment' of any European sites where significant effects cannot be excluded (this may include 'down-the-line' deferral of some options in accordance with established HRA practice, where appropriate).

The conservation objectives are taken into account at the screening and appropriate assessment stages as necessary.

Screening

17 options are expected (if progressed as projects) to have 'no effect' on any European sites (i.e. there are no reasonable pathways by which environmental changes associated with the option could affect the site or its interest features); as these options will have 'no effects' they cannot have 'in combination' effects, and have been screened out and are not considered further. These options are as follows:

Table 0.1 Options screened out with 'no effects'

Option	Name
SWS_SBZ_HI-DES_ALL_ALL_shom10	Desalination: Sussex Coast (Modular 0-10Ml/d) (10Ml/d)
SWS_SBZ_HI-DES_ALL_ALL_shom20	Desalination: Sussex Coast (Modular 10-20Ml/d) (10Ml/d)
SWS_SBZ_HI-DES_ALL_ALL_shom40	Desalination: Sussex Coast (Modular 10-20Ml/d) (40Ml/d)
SWS_KMW_HI-RSR_RE1_ALL_rab1	Storage: Raising Bewl by 0.4m (3Ml/d)
SWS_SNZ_HI-RSR_RE1_ALL_bla	Storage: River Adur offline reservoir (19.5Ml/d)
SWS_HSE_RE-DRO_ALL_ALL_si_can2	Drought option: Candover Drought Permit/Order (2027-2029 only) (15.4Ml/d)
SWS_SWZ_HI-LRE_ALL_ALL_har1	Transfer: Winter transfer stage 1 - Provision of a permanent sludge treatment facility at Pulborough WSW (2Ml/d)
SWS_KME_HI-GRW_ALL_ALL_nw_gwa_win_eastn	Groundwater: Recommission Gravesend source (2.7Ml/d)
SWS_KTZ_HI-TFR_KME_ALL_sfl	Transfer: KTZ-KME (14Ml/d)
SWS_SNZ_RE-DRO_ALL_ALL_si_har_2	Drought option: Pulborough surface (Phases 1 to 3) Drought Permit/Order (2025 onwards)
SWS_HKZ_HI-ROC_ALL_ALL_ewo	Groundwater: Newbury WSW (1.3Ml/d)
SWS_IOW_HI-GRW_ALL_ALL_br_less	Groundwater: Eatern Yar3 replacement BH (1.5Ml/d)
SWS_SHZ_HI-REU_RE1_ALL_env_cu_bew1_conju	Recycling: Tunbridge Wells WTW conjunctive use with Bewl reservoir (3.6Ml/d)

[37] Note, for options with 'no effects' or positive effects there is no possibility of 'in combination' effects.

Option	Name
SWS_SBZ_EF-TFR_REP_ALL_har2 res	Transfer: Winter transfer stage 2 - New main between Shoreham /North Shoreham and Brighton A (4Ml/d)
SWS_KTZ_HI-TFR_KME_ALL_sel3	Transfer: Utilise full existing KME-KTZ transfer capacity (9Ml/d)
SWS_SNZ_HI-TFR_PWE_ALL_havant - hardha r 20	Havant Thicket To Pulborough WTW: 20Ml/d
SWS_SNZ_HI-TFR_SES_ALL_outwood-turner p 10	Outwood To Turners Hill: 10Ml/d

The screening concluded that significant effects are either likely or uncertain for the following supply-side options (note, this includes options that may rely on mitigation measures to prevent significant effects occurring); these have therefore been taken forward to an appropriate assessment stage.

Table 0.2 Options considered through appropriate assessment

Option	Name
SWS_HSE_HI-TFR_PRT_ALL_pwc2	Import from Portsmouth Water (21Ml/d)
SWS_SHZ_HI-REU_RE1_ALL_dar10	Recycling: Hastings WTW to augment storage in Darwell reservoir (9.5Ml/d)
SWS_KTZ_HI-DES_ALL_ALL_tha10_p2	Desalination: East Thanet coast & transfer (10Ml/d) Phase 2
SWS_KTZ_HI-DES_ALL_ALL_tha20	Desalination: East Thanet coast & transfer (20Ml/d)
SWS_KTZ_HI-DES_ALL_ALL_tha20_p2	Desalination: East Thanet coast & transfer (20Ml/d) Phase 2
SWS_SWZ_HI-TFR_SNZ_ALL_hardham-tenant p 30	Pulborough to Worthing: 30Ml/d
SWS_HAZ_HI-TFR_HWZ_ALL_oan2	Transfer: Hampshire grid (reversible link HW-HA) (30Ml/d)
SWS_IOW_HI-REU_RE1_ALL_sey9	Recycling: Sandown WwTW (8.1Ml/d)
SWS_HKZ_HI-TFR_HAZ_ALL_oan3	Transfer: Hampshire grid (reversible link HA-HK) (10Ml/d)
SWS_HSE_EF-TFR_REP_ALL_pwc1	Import from Portsmouth Water (9Ml/d)
SWS_HWZ_HI-TFR_HSE_CNO_oan1	Transfer: Hampshire grid (reversible link HSE-HW) (30Ml/d)
SWS_HRZ_HI-TFR_HSW_ALL_bro	Transfer: Romsey Town & Broadlands valve (HSW to HRZ)
SWS_KME_HI-DES_ALL_ALL_ios10	Desalination: Isle of Sheppey (10Ml/d)
SWS_KME_HI-DES_ALL_ALL_ios20	Desalination: Isle of Sheppey (20Ml/d)
SWS_KME_HI-DES_ALL_ALL_ios10	Desalination: Isle of Sheppey (20Ml/d) Phase 2
SWS_HSE_HI-REU_RE1_ALL_wol8	Recycling: Woolston WwTW (7.1Ml/d)
SWS_HRZ_HI-GRW_ALL_ALL_nw_gwa_tim_westi	Groundwater: Romsey - new BHs (4.8Ml/d)

Option	Name
SWS_HSE_HI-ROC_WT1_ALL_cpy_ott_30	Treatment capacity: Upgrade Otterbourne WSW (30Ml/d)
SWS_HSW_HI-GRW_RE1_ALL_str_asr_tes_westi	Groundwater: Test MAR (5.5Ml/d)
SWS_HRZ_HI-IMP_HSW_ALL_rob1	Transfer: Romsey Town & Broadlands valve (HSW-HRZ) (3.1Ml//d)
SWS_PWE_HI-REU_RE1_ALL_60tohtv0.1	Recycling: Recharge of Havant Thicket reservoir from Portsmouth Harbour WTW and new WRP (60Ml/d)
SWS_SHZ_HI-GRW_ALL_ALL_ass_br_bre_eastn	Groundwater: Rye Wells reconfiguration (1.5Ml/d))
SWS_SNZ_HI-REU_RE1_ALL_env_cu_chu2_conju	Recycling: Horsham WTW conjunctive use with Arun Reservoir, Pulborough (6.8Ml/d)
SWS_KMW_HI-DES_ALL_ALL_swa10	Desalination: River Thames estuary (10Ml/d)
SWS_KMW_HI-DES_ALL_ALL_swa10_p2	Desalination: River Thames estuary (10Ml/d) Phase 2
SWS_KMW_HI-DES_ALL_ALL_swa20	Desalination: River Thames estuary (20Ml/d)
SWS_KMW_HI-DES_ALL_ALL_swa20_p2	Desalination: River Thames estuary (20Ml/d) Phase 2
SWS_HSW_HI-ROC_WT1_ALL_cpy_tst_60	Treatment capacity: Upgrade Test surface water WSW (60Ml/d)
SWS_IOW_HI-GRW_ALL_ALL_nw_gwa_kni_westi	Groundwater: Newchurch LGS (1.9Ml/d)
SWS_SWZ_HI-DES_ALL_ALL_aru10	Desalination: Tidal River Arun (10Ml/d)
SWS_SNZ_HI-ROC_RE1_ALL_hsb-rcm	Groundwater: Petworth WSW return to service with a new borehole (4.0Ml/d)
SWS_KTZ_HI-TFR_RZ8_ALL_win	Import: SEW Kingston to KTZ Near Canterbury (2Ml/d)
SWS_KMW_HI-REU_RE1_ALL_ecc18	Recycling: Medway WwTW (12.8Ml/d)
SWS_SNZ_HI-REU_RE1_ALL_for20	Recycling: Littlehampton WwTW (15Ml/d)
SWS_KME_HI-REU_RE1_ALL_sit8	Recycling: Sittingbourne industrial reuse (7.5Mld)
SWS_KTZ_HI-TFR_RZ8_ALL_canterb-wingha p 20	Canterbury (Broad Oak) to Near Canterbury GW
SWS_SNZ_HI-TFR_PWE_ALL_havant - hardha r 50	Havant Thicket To Pulborough WTW: 50Ml/d
SWS_KTZ_HI-TFR_AZ7_ALL_win	Import: SEW Kingston to KTZ Near Canterbury (2Ml/d)
SWS_PRT_HI-TFR_HSE_ALL_otterbo-gaters p	Otterbourne to Gaters Mill: 45Ml/d

Option	Name
SWS_SNZ_HI-TFR_RZ5_ALL_tilmore-hardha p 10	Tilmore to Pulborough: 10Ml/d

With regard to **demand-side options**, all of the options are essentially 'water efficiency support' measures that are designed to reduce water use without the need for significant physical intervention in the network or other development. They have no locational component below the level of the WRMP. Based on established guidance for similar policies and proposals in other strategic planning documents (i.e. not locationally specific; which do not promote development or similar changes; and which are designed to reduce water use) **these options would all be categorised as having 'no significant effect, alone or in combination**. Therefore, the demand-side options are 'screened out' and not considered further.

Appropriate Assessments

Appropriate assessments were undertaken for those European sites that may be significantly affected by WRMP options (or where there was uncertainty at the screening stage), alone or in combination.

In summary, for all of the options in **Table 7.3**:

- there will be no operational effects (all essentially modifications to the network or existing assets that do not require the development of new water resources or alterations to abstraction licences);
- all potential construction effects are of a scale and type that can be reliably prevented with established measures (see Appendix C), such that effects 'alone' would be nil or negligible and 'in combination' effects would not be expected.
- For these options, therefore, there will be 'no adverse effects, alone or in combination' on any of the European sites noted in Appendix A.

Table 0.3 Options that only have potential effects that can be reliably avoided with established measures

Option	Name
SWS_SHZ_HI-REU_RE1_ALL_dar10	Recycling: Hastings WTW to augment storage in Darwell reservoir (9.5Ml/d)
SWS_SWZ_HI-TFR_SNZ_ALL_hardham-tenant p 30	Pulborough to Worthing: 30Ml/d
SWS_HAZ_HI-TFR_HWZ_ALL_oan2	Transfer: Hampshire grid (reversible link HW-HA) (30Ml/d)
SWS_IOW_HI-REU_RE1_ALL_sey9	Recycling: Sandown WwTW (8.1Ml/d)
SWS_HKZ_HI-TFR_HAZ_ALL_oan3	Transfer: Hampshire grid (reversible link HA-HK) (10Ml/d)
SWS_HWZ_HI-TFR_HSE_CNO_oan1	Transfer: Hampshire grid (reversible link HSE-HW) (30Ml/d)
SWS_HRZ_HI-TFR_HSW_ALL_bro	Transfer: Romsey Town & Broadlands valve (HSW to HRZ)

Option	Name
SWS_HSE_HI-ROC_WT1_ALL_cpy_ott_30	Treatment capacity: Upgrade Otterbourne WSW (30Ml/d)
SWS_HSW_HI-GRW_RE1_ALL_str_asr_tes_westi	Groundwater: Test MAR (5.5Ml/d)
SWS_HRZ_HI-IMP_HSW_ALL_rob1	Transfer: Romsey Town & Broadlands valve (HSW-HRZ) (3.1Ml//d)
SWS_SHZ_HI-GRW_ALL_ALL_ass_br_bre_eastn	Groundwater: Rye Wells reconfiguration (1.5Ml/d))
SWS_HSW_HI-ROC_WT1_ALL_cpy_tst_60	Treatment capacity: Upgrade Test surface water WSW (60Ml/d)
SWS_SWZ_HI-DES_ALL_ALL_aru10	Desalination: Tidal River Arun (10Ml/d)
SWS_KTZ_HI-TFR_RZ8_ALL_win	Import: SEW Kingston to KTZ Near Canterbury (2Ml/d)
SWS_SNZ_HI-REU_RE1_ALL_for20	Recycling: Littlehampton WwTW (15Ml/d)
SWS_KTZ_HI-TFR_RZ8_ALL_canterb-wingha p 20	Canterbury (Broad Oak) to Near Canterbury G
SWS_SNZ_HI-TFR_PWE_ALL_havant -hardha r 50	Havant Thicket To Pulborough WTW: 50Ml/d
SWS_KTZ_HI-TFR_AZ7_ALL_win	Import: SEW Kingston to KTZ Near Canterbury (2Ml/d)
SWS_SNZ_HI-TFR_RZ5_ALL_tilmore-hardha p 10	Tilmore to Pulborough: 10Ml/d

More detailed appropriate assessments (**Appendices E1 – E14**) have been completed for those options with construction or operational effects on a site that are potentially more difficult to avoid (i.e. direct or close-proximity construction effects, or environmental changes that are inherent to the operation of the scheme). Options are grouped together in Appendices E1 – E14 if they are modular or phased in some way (i.e. fundamentally the same scheme or type of scheme at the same location), as follows.

In summary:

- 19 options will have 'no adverse effects, alone or in combination' if implemented, principally because potential effects can be clearly avoided through scheme design and delivery, or because the predicted effects are too small to adversely affect site or feature integrity. These options are:
  - Import from Portsmouth Water (9Ml/d)
  - Import from Portsmouth Water (21Ml/d)
  - Groundwater: Romsey - new BHs (4.8Ml/d)
  - Recycling: Horsham WTW conjunctive use with Arun Reservoir, Pulborough (6.8Ml/d)
  - Groundwater: Newchurch LGS (1.9Ml/d)
  - Groundwater: Petworth WSW return to service with a new borehole (4.0Ml/d)
  - Otterbourne to Gaters Mill: 45Ml/d

- Recycling: Medway WwTW (12.8Ml/d)
- Recycling: Sittingbourne industrial reuse (7.5Mld)
- HWZ to Otterbourne (120) Potable - Construction
- HWZ to Otterbourne (50) Potable - Construction
- Culham (120) - potable - Construction
- Culham (50) - potable - Construction
- Recycling: Recharge of Havant Thicket reservoir from Portsmouth Harbour WTW and new WRP (60Ml/d)
- Recycling: Woolston WwTW (7.1Ml/d)
- Desalination: River Thames estuary (10Ml/d)
- Desalination: River Thames estuary (10Ml/d) Phase 2
- Desalination: River Thames estuary (20Ml/d)
- Desalination: River Thames estuary (20Ml/d) Phase 2

- Six options associated with two desalination schemes have potential adverse effects that are avoidable, based on available data and case-examples from elsewhere, but which have residual uncertainties at the WRMP level that can nevertheless be resolved prior to deployment; these may require the identification of no adverse effect alternatives if included within the final, adopted WRMP:
  - Desalination: East Thanet coast & transfer (10Ml/d) Phase 2
  - Desalination: East Thanet coast & transfer (20Ml/d)
  - Desalination: East Thanet coast & transfer (20Ml/d) Phase 2
  - Desalination: Isle of Sheppey (10Ml/d)
  - Desalination: Isle of Sheppey (20Ml/d) Phase 2
  - Desalination: Isle of Sheppey (20Ml/d)

7.3.5 In summary, the mitigation measures described in the Appropriate Assessments and Appendix C are considered to be necessary to avoid adverse effects on the integrity of any SACs, SPAs and Ramsar sites, alone or in combination. These will have to be secured as part of the consenting processes for those options, in order for the consents to be lawfully granted. As a consequence, it can be reasonably concluded at this Plan stage that with that mitigation secured, the WRMP24 options will not have an adverse effect on the integrity of any SACs, SPAs and Ramsar sites, alone or in combination.

However, it is recognised that there are some residual uncertainties associated with some options due to the absence of detailed design and the long planning horizon for delivery. Further work will be undertaken on the residual uncertainties to seek to resolve them as far as achievable for a strategic plan, before submission of the final WRMP (and hence the final HRA); however, it would be possible for the WRMP to manage these uncertainties by

identifying a specific alternative 'no adverse effects' option that would be employed if options (or subsets of options) prove unachievable due to their impact on European sites.

7.3.6 It should also be noted that the options with residual uncertainties are not required until late in the planning cycle (2040 at the earliest). There is therefore substantial time for these uncertainties to be resolved as part of subsequent WRMP cycles, and subsequent applications for consent, and (if necessary) the option abandoned and replaced in future WRMP cycles. It is also the case that new technologies will emerge over time that could assist in avoiding or reducing some of the effects associated with some of the longer-term options, and this would also be taken into account in subsequent WRMP cycles.

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Appendix A
European sites considered by the HRA process

The table below lists the European sites and their features considered for the assessment of the supply-side options (i.e. sites within 20km of an option, or downstream, or upstream sites supporting fish that may use affected reaches of rivers). Hyperlinks to site documentation are provided to simplify presentation. Note, all European sites within or close to the Southern Water supply area might theoretically be exposed to effects of some demand-side options, but these sites are not listed here for clarity.

Site and Features
Arun Valley Ramsar
- Crit. 2: Crit. 2 - supports vulnerable, endangered, or critically endangered species or threatened eco. communities - Crit. 3: Crit. 3 - supports populations of plant/animal species important for maintaining regional biodiversity - Crit. 5: Crit. 5 - regularly supports 20,000 or more waterbirds
Arun Valley SAC
- S4056: Ramshorn snail Anisus vorticulus
Arun Valley SPA
- A037: Tundra swan Cygnus columbianus bewickii - WATR: Waterbird assemblage
Ashdown Forest SAC
- H4010: Northern Atlantic wet heaths with Erica tetralix - H4030: European dry heaths - S1166: Great crested newt Triturus cristatus
Ashdown Forest SPA
- A224: European nightjar Caprimulgus europaeus - A302: Dartford warbler Sylvia undata
Benfleet and Southend Marshes Ramsar
- Crit. 6: Crit. 6 - regularly supports 1% of the individuals in a population of one species/subspecies of waterbirds - Crit. 5: Crit. 5 - regularly supports 20,000 or more waterbirds
Benfleet and Southend Marshes SPA
- A143: Red knot Calidris canutus - A675: Dark-bellied brent goose Branta bernicla bernicla - A141: Grey plover Pluvialis squatarola - A672: Dunlin Calidris alpina alpina - A137: Ringed plover Charadrius hiaticula - WATR: Waterbird assemblage
Blean Complex SAC
- H9160: Sub-Atlantic and medio-European oak or oak-hornbeam forests of the Carpinion betuli
Briddlesford Copses SAC

Site and Features
- S1323: Bechstein`s bat Myotis bechsteini
Butser Hill SAC
- H6210: Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-Brometalia) (* important orchid sites) - H91J0: Taxus baccata woods of the British Isles
Castle Hill SAC
- H6210: Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-Brometalia) (* important orchid sites) - S1654: Early gentian Gentianella anglica
Chichester and Langstone Harbours Ramsar
- Crit. 1: Crit. 1 - sites containing representative, rare or unique wetland types - Crit. 6: Crit. 6 - regularly supports 1% of the individuals in a population of one species/subspecies of waterbirds - Crit. 5: Crit. 5 - regularly supports 20,000 or more waterbirds
Chichester and Langstone Harbours SPA
- A191: Sandwich tern Sterna sandvicensis - A162: Common redshank Tringa totanus - A169: Ruddy turnstone Arenaria interpres - A193: Common tern Sterna hirundo - A137: Ringed plover Charadrius hiaticula - A050: Eurasian wigeon Anas penelope - A056: Northern shoveler Anas clypeata - A054: Northern pintail Anas acuta - A157: Bar-tailed godwit Limosa lapponica - A052: Eurasian teal Anas crecca - A144: Sanderling Calidris alba - A141: Grey plover Pluvialis squatarola - A069: Red-breasted merganser Mergus serrator - A675: Dark-bellied brent goose Branta bernicla bernicla - A160: Eurasian curlew Numenius arquata - A195: Little tern Sterna albifrons - A672: Dunlin Calidris alpina alpina - A048: Common shelduck Tadorna tadorna - WATR: Waterbird assemblage
Crouch and Roach Estuaries (Mid-Essex Coast Phase 3) Ramsar
- Crit. 6: Crit. 6 - regularly supports 1% of the individuals in a population of one species/subspecies of waterbirds - Crit. 5: Crit. 5 - regularly supports 20,000 or more waterbirds - Crit. 2: Crit. 2 - supports vulnerable, endangered, or critically endangered species or threatened eco. communities
Crouch and Roach Estuaries (Mid-Essex Coast Phase 3) SPA
- A675: Dark-bellied brent goose Branta bernicla bernicla - WATR: Waterbird assemblage
Dover to Kingsdown Cliffs SAC
- H1230: Vegetated sea cliffs of the Atlantic and Baltic Coasts - H6210: Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-Brometalia) (* important orchid sites)
Duncton to Bignor Escarpment SAC
- H9130: Asperulo-Fagetum beech forests

Site and Features
Dungeness SAC
- H1210: Annual vegetation of drift lines - H1220: Perennial vegetation of stony banks - S1166: Great crested newt Triturus cristatus
Dungeness, Romney Marsh and Rye Bay Ramsar
- Crit. 1: Crit. 1 - sites containing representative, rare or unique wetland types - Crit. 2: Crit. 2 - supports vulnerable, endangered, or critically endangered species or threatened eco. communities - Crit. 5: Crit. 5 - regularly supports 20,000 or more waterbirds - Crit. 6: Crit. 6 - regularly supports 1% of the individuals in a population of one species/subspecies of waterbirds
Dungeness, Romney Marsh and Rye Bay SPA
- A056: Northern shoveler Anas clypeata - A082: Hen harrier Circus cyaneus - A151: Ruff Philomachus pugnax - A176: Mediterranean gull Larus melanocephalus - A191: Sandwich tern Sterna sandvicensis - A193: Common tern Sterna hirundo - A195: Little tern Sterna albifrons - A294: Aquatic warbler Acrocephalus paludicola - A037: Tundra swan Cygnus columbianus bewickii - A021: Great bittern Botaurus stellaris - A140: European golden plover Pluvialis apricaria - A081: Eurasian marsh harrier Circus aeruginosus - A132: Pied avocet Recurvirostra avosetta - WATR: Waterbird assemblage
East Hampshire Hangers SAC
- H6210: Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-Brometalia) (* important orchid sites) - H9130: Asperulo-Fagetum beech forests - H9180: Tilio-Acerion forests of slopes, screes and ravines - H91J0: Taxus baccata woods of the British Isles - S1654: Early gentian Gentianella anglica
Ebernoe Common SAC
- H9120: Atlantic acidophilous beech forests with Ilex and sometimes also Taxus in the shrublayer (Quercion robori-petraeae or Ilici-Fagenion) - S1308: Barbastelle Barbastella barbastellus - S1323: Bechstein`s bat Myotis bechsteini
Emer Bog SAC
- H7140: Transition mires and quaking bogs
Essex Estuaries SAC
- H1110: Sandbanks which are slightly covered by sea water all the time - H1130: Estuaries - H1140: Mudflats and sandflats not covered by seawater at low tide - H1310: Salicornia and other annuals colonizing mud and sand - H1320: Spartina swards (Spartinion maritimae) - H1330: Atlantic salt meadows (Glauco-Puccinellietalia maritimae) - H1420: Mediterranean and thermo-Atlantic halophilous scrubs (Sarcocornetea fruticosi)
Folkestone to Etchinghill Escarpment SAC

Site and Features
- H6210: Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-Brometalia) (* important orchid sites)
Foulness (Mid-Essex Coast Phase 5) Ramsar
- Crit. 2: Crit. 2 - supports vulnerable, endangered, or critically endangered species or threatened eco. communities - Crit. 6: Crit. 6 - regularly supports 1% of the individuals in a population of one species/subspecies of waterbirds - Crit. 5: Crit. 5 - regularly supports 20,000 or more waterbirds - Crit. 1: Crit. 1 - sites containing representative, rare or unique wetland types - Crit. 3: Crit. 3 - supports populations of plant/animal species important for maintaining regional biodiversity
Foulness (Mid-Essex Coast Phase 5) SPA
- A130: Eurasian oystercatcher Haematopus ostralegus - A193: Common tern Sterna hirundo - A195: Little tern Sterna albifrons - A162: Common redshank Tringa totanus - A157: Bar-tailed godwit Limosa lapponica - A675: Dark-bellied brent goose Branta bernicla bernicla - A191: Sandwich tern Sterna sandvicensis - A132: Pied avocet Recurvirostra avosetta - A137: Ringed plover Charadrius hiaticula - A143: Red knot Calidris canutus - A141: Grey plover Pluvialis squatarola - A132: Pied avocet Recurvirostra avosetta - A082: Hen harrier Circus cyaneus - WATR: Waterbird assemblage
Hastings Cliffs SAC
- H1230: Vegetated sea cliffs of the Atlantic and Baltic Coasts
Isle of Wight Downs SAC
- H1230: Vegetated sea cliffs of the Atlantic and Baltic Coasts - H4030: European dry heaths - H6210: Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-Brometalia) (* important orchid sites) - S1654: Early gentian Gentianella anglica
Kennet and Lambourn Floodplain SAC
- S1016: Desmoulin`s whorl snail Vertigo moulinsiana
Kennet Valley Alderwoods SAC
- H91E0: Alluvial forests with Alnus glutinosa and Fraxinus excelsior (Alno-Padion, Alnion incanae, Salicion albae)
Kingley Vale SAC
- H6210: Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-Brometalia) (* important orchid sites) - H91J0: Taxus baccata woods of the British Isles
Lewes Downs SAC
- H6210: Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-Brometalia) (* important orchid sites)
Lydden and Temple Ewell Downs SAC
- H6210: Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-Brometalia) (* important orchid sites)

Site and Features
Margate and Long Sands SAC
- H1110: Sandbanks which are slightly covered by sea water all the time
Medway Estuary and Marshes Ramsar
- Crit. 6: Crit. 6 - regularly supports 1% of the individuals in a population of one species/subspecies of waterbirds - Crit. 5: Crit. 5 - regularly supports 20,000 or more waterbirds - Crit. 2: Crit. 2 - supports vulnerable, endangered, or critically endangered species or threatened eco. communities
Medway Estuary and Marshes SPA
- A130: Eurasian oystercatcher Haematopus ostralegus - A056: Northern shoveler Anas clypeata - A052: Eurasian teal Anas crecca - A143: Red knot Calidris canutus - A137: Ringed plover Charadrius hiaticula - A132: Pied avocet Recurvirostra avosetta - A082: Hen harrier Circus cyaneus - A616: Black-tailed godwit Limosa limosa islandica - A001: Red-throated diver Gavia stellata - A169: Ruddy turnstone Arenaria interpres - A054: Northern pintail Anas acuta - A164: Common greenshank Tringa nebularia - A053: Mallard Anas platyrhynchos - A017: Great cormorant Phalacrocorax carbo - A195: Little tern Sterna albifrons - A141: Grey plover Pluvialis squatarola - A050: Eurasian wigeon Anas penelope - A048: Common shelduck Tadorna tadorna - A672: Dunlin Calidris alpina alpina - A162: Common redshank Tringa totanus - A098: Merlin Falco columbarius - A059: Common pochard Aythya ferina - A037: Tundra swan Cygnus columbianus bewickii - A132: Pied avocet Recurvirostra avosetta - A160: Eurasian curlew Numenius arquata - A005: Great crested grebe Podiceps cristatus - A193: Common tern Sterna hirundo - A675: Dark-bellied brent goose Branta bernicla bernicla - WATR: Waterbird assemblage - BBA: Breeding bird assemblage - BBA: Breeding bird assemblage - A162: Common redshank Tringa totanus
Mole Gap to Reigate Escarpment SAC
- H4030: European dry heaths - H5110: Stable xerothermophilous formations with Buxus sempervirens on rock slopes (Berberidion p.p.) - H6210: Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-Brometalia) (* important orchid sites) - H9130: Asperulo-Fagetum beech forests - H91J0: Taxus baccata woods of the British Isles - S1166: Great crested newt Triturus cristatus - S1323: Bechstein`s bat Myotis bechsteini
Mottisfont Bats SAC
- S1308: Barbastelle Barbastella barbastellus

Site and Features
New Forest SPA
- A314: Wood warbler Phylloscopus sibilatrix - A246: Wood lark Lullula arborea - A302: Dartford warbler Sylvia undata - A082: Hen harrier Circus cyaneus - A224: European nightjar Caprimulgus europaeus - A099: Eurasian hobby Falco subbuteo - A072: European honey-buzzard Pernis apivorus
North Downs Woodlands SAC
- H6210: Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-Brometalia) (* important orchid sites) - H9130: Asperulo-Fagetum beech forests - H91J0: Taxus baccata woods of the British Isles
Outer Thames Estuary SPA
- A195: Little tern Sterna albifrons - A193: Common tern Sterna hirundo - A001: Red-throated diver Gavia stellata
Pagham Harbour Ramsar
- Crit. 6: Crit. 6 - regularly supports 1% of the individuals in a population of one species/subspecies of waterbirds
Pagham Harbour SPA
- A151: Ruff Philomachus pugnax - A675: Dark-bellied brent goose Branta bernicla bernicla - A195: Little tern Sterna albifrons - A193: Common tern Sterna hirundo
Parkgate Down SAC
- H6210: Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-Brometalia) (* important orchid sites)
Peter`s Pit SAC
- S1166: Great crested newt Triturus cristatus
Pevensey Levels Ramsar
- Crit. 2: Crit. 2 - supports vulnerable, endangered, or critically endangered species or threatened eco. communities - Crit. 3: Crit. 3 - supports populations of plant/animal species important for maintaining regional biodiversity
Pevensey Levels SAC
- S4056: Ramshorn snail Anisus vorticulus
Porton Down SPA
- A133: Stone-curlew Burhinus oedicnemus
Portsmouth Harbour Ramsar
- Crit. 6: Crit. 6 - regularly supports 1% of the individuals in a population of one species/subspecies of waterbirds - Crit. 3: Crit. 3 - supports populations of plant/animal species important for maintaining regional biodiversity
Portsmouth Harbour SPA
- A672: Dunlin Calidris alpina alpina - A616: Black-tailed godwit Limosa limosa islandica - A069: Red-breasted merganser Mergus serrator - A675: Dark-bellied brent goose Branta bernicla bernicla

Site and Features
Queendown Warren SAC
- H6210: Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-Brometalia) (* important orchid sites)
River Avon SAC
- H3260: Water courses of plain to montane levels with the Ranunculion fluitantis and Callitricho-Batrachion vegetation - S1095: Sea lamprey Petromyzon marinus - S1096: Brook lamprey Lampetra planeri - S1106: Atlantic salmon Salmo salar - S1163: Bullhead Cottus gobio - S1016: Desmoulin`s whorl snail Vertigo moulinsiana
River Itchen SAC
- H3260: Water courses of plain to montane levels with the Ranunculion fluitantis and Callitricho-Batrachion vegetation - S1096: Brook lamprey Lampetra planeri - S1106: Atlantic salmon Salmo salar - S1163: Bullhead Cottus gobio - S1044: Southern damselfly Coenagrion mercuriale - S1092: White-clawed (or Atlantic stream) crayfish Austropotamobius pallipes - S1355: Otter Lutra lutra
River Lambourn SAC
- H3260: Water courses of plain to montane levels with the Ranunculion fluitantis and Callitricho-Batrachion vegetation - S1096: Brook lamprey Lampetra planeri - S1163: Bullhead Cottus gobio
Rook Clift SAC
- H9180: Tilio-Acerion forests of slopes, screes and ravines
Salisbury Plain SAC
- H5130: Juniperus communis formations on heaths or calcareous grasslands - H6210: Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-Brometalia) (* important orchid sites) - S1065: Marsh fritillary butterfly Euphydryas (Eurodryas, Hypodryas) aurinia
Salisbury Plain SPA
- A133: Stone-curlew Burhinus oedicnemus - A099: Eurasian hobby Falco subbuteo - A113: Common quail Coturnix coturnix - A082: Hen harrier Circus cyaneus
Sandwich Bay SAC
- H2110: Embryonic shifting dunes - H2120: Shifting dunes along the shoreline with Ammophila arenaria ("white dunes") - H2130: Fixed coastal dunes with herbaceous vegetation ("grey dunes") - H2170: Dunes with Salix repens ssp. argentea (Salicion arenariae) - H2190: Humid dune slacks
Shortheath Common SAC
- H4030: European dry heaths - H7140: Transition mires and quaking bogs - H91D0: Bog woodland

Site and Features
Singleton and Cocking Tunnels SAC
- S1323: Bechstein`s bat Myotis bechsteini - S1308: Barbastelle Barbastella barbastellus
Solent and Dorset Coast SPA
- A191: Sandwich tern Sterna sandvicensis - A193: Common tern Sterna hirundo - A195: Little tern Sterna albifrons
Solent and Isle of Wight Lagoons SAC
- H1150: Coastal lagoons
Solent and Southampton Water Ramsar
- Crit. 6: Crit. 6 - regularly supports 1% of the individuals in a population of one species/subspecies of waterbirds - Crit. 1: Crit. 1 - sites containing representative, rare or unique wetland types - Crit. 2: Crit. 2 - supports vulnerable, endangered, or critically endangered species or threatened eco. communities - Crit. 5: Crit. 5 - regularly supports 20,000 or more waterbirds
Solent and Southampton Water SPA
- A137: Ringed plover Charadrius hiaticula - A176: Mediterranean gull Larus melanocephalus - A616: Black-tailed godwit Limosa limosa islandica - A195: Little tern Sterna albifrons - A192: Roseate tern Sterna dougallii - A675: Dark-bellied brent goose Branta bernicla bernicla - A191: Sandwich tern Sterna sandvicensis - A052: Eurasian teal Anas crecca - A193: Common tern Sterna hirundo - WATR: Waterbird assemblage
Solent Maritime SAC
- H1110: Sandbanks which are slightly covered by sea water all the time - H1130: Estuaries - H1140: Mudflats and sandflats not covered by seawater at low tide - H1150: Coastal lagoons - H1210: Annual vegetation of drift lines - H1220: Perennial vegetation of stony banks - H1310: Salicornia and other annuals colonizing mud and sand - H1320: Spartina swards (Spartinion maritimae) - H1330: Atlantic salt meadows (Glauco-Puccinellietalia maritimae) - H2120: Shifting dunes along the shoreline with Ammophila arenaria ("white dunes") - S1016: Desmoulin`s whorl snail Vertigo moulinsiana
South Wight Maritime SAC
- H1170: Reefs - H1230: Vegetated sea cliffs of the Atlantic and Baltic Coasts - H8330: Submerged or partially submerged sea caves
Southern North Sea SAC
- S1351: Harbour porpoise Phocoena phocoena
Stodmarsh Ramsar
- Crit. 2: Crit. 2 - supports vulnerable, endangered, or critically endangered species or threatened eco. communities
Stodmarsh SAC

Site and Features
- S1016: Desmoulin`s whorl snail Vertigo moulinsiana
Stodmarsh SPA
- A050: Eurasian wigeon Anas penelope - A056: Northern shoveler Anas clypeata - A394: Greater white-fronted goose Anser albifrons albifrons - A153: Common snipe Gallinago gallinago - A142: Northern lapwing Vanellus vanellus - A082: Hen harrier Circus cyaneus - A021: Great bittern Botaurus stellaris - A051: Gadwall Anas strepera - A059: Common pochard Aythya ferina - A053: Mallard Anas platyrhynchos - A051: Gadwall Anas strepera - A118: Water rail Rallus aquaticus - A061: Tufted duck Aythya fuligula - BBA: Breeding bird assemblage - A048: Common shelduck Tadorna tadorna
Tankerton Slopes and Swalecliffe SAC
- S4035: Fisher's estuarine moth Gortyna borelii lunata
Thames Estuary and Marshes Ramsar
- Crit. 2: Crit. 2 - supports vulnerable, endangered, or critically endangered species or threatened eco. communities - Crit. 6: Crit. 6 - regularly supports 1% of the individuals in a population of one species/subspecies of waterbirds - Crit. 5: Crit. 5 - regularly supports 20,000 or more waterbirds
Thames Estuary and Marshes SPA
- A672: Dunlin Calidris alpina alpina - A143: Red knot Calidris canutus - A082: Hen harrier Circus cyaneus - A616: Black-tailed godwit Limosa limosa islandica - A141: Grey plover Pluvialis squatarola - A132: Pied avocet Recurvirostra avosetta - A137: Ringed plover Charadrius hiaticula - A162: Common redshank Tringa totanus - WATR: Waterbird assemblage
Thanet Coast and Sandwich Bay Ramsar
- Crit. 6: Crit. 6 - regularly supports 1% of the individuals in a population of one species/subspecies of waterbirds - Crit. 2: Crit. 2 - supports vulnerable, endangered, or critically endangered species or threatened eco. communities
Thanet Coast and Sandwich Bay SPA
- A169: Ruddy turnstone Arenaria interpres - A140: European golden plover Pluvialis apricaria - A195: Little tern Sterna albifrons
Thanet Coast SAC
- H1170: Reefs - H8330: Submerged or partially submerged sea caves
The Mens SAC
- H9120: Atlantic acidophilous beech forests with Ilex and sometimes also Taxus in the shrublayer (Quercion robori-petraeae or Ilici-Fagenion) - S1308: Barbastelle Barbastella barbastellus

Site and Features
The New Forest Ramsar
- Crit. 1: Crit. 1 - sites containing representative, rare or unique wetland types - Crit. 3: Crit. 3 - supports populations of plant/animal species important for maintaining regional biodiversity - Crit. 2: Crit. 2 - supports vulnerable, endangered, or critically endangered species or threatened eco. communities
The New Forest SAC
- H3110: Oligotrophic waters containing very few minerals of sandy plains (Littorelletalia uniflorae) - H3130: Oligotrophic to mesotrophic standing waters with vegetation of the Littorelletea uniflorae and/or of the Isoëto-Nanojuncetea - H4010: Northern Atlantic wet heaths with Erica tetralix - H4030: European dry heaths - H6410: Molinia meadows on calcareous, peaty or clayey-silt-laden soils (Molinion caeruleae) - H7140: Transition mires and quaking bogs - H7150: Depressions on peat substrates of the Rhynchosporion - H7230: Alkaline fens - H9120: Atlantic acidophilous beech forests with Ilex and sometimes also Taxus in the shrublayer (Quercion robori-petraeae or Ilici-Fagenion) - H9130: Asperulo-Fagetum beech forests - H9190: Old acidophilous oak woods with Quercus robur on sandy plains - H91D0: Bog woodland - H91E0: Alluvial forests with Alnus glutinosa and Fraxinus excelsior (Alno-Padion, Alnion incanae, Salicion albae) - S1166: Great crested newt Triturus cristatus - S1044: Southern damselfly Coenagrion mercuriale - S1083: Stag beetle Lucanus cervus
The Swale Ramsar
- Crit. 5: Crit. 5 - regularly supports 20,000 or more waterbirds - Crit. 2: Crit. 2 - supports vulnerable, endangered, or critically endangered species or threatened eco. communities - Crit. 6: Crit. 6 - regularly supports 1% of the individuals in a population of one species/subspecies of waterbirds
The Swale SPA
- A137: Ringed plover Charadrius hiaticula - A130: Eurasian oystercatcher Haematopus ostralegus - A052: Eurasian teal Anas crecca - A672: Dunlin Calidris alpina alpina - A160: Eurasian curlew Numenius arquata - A051: Gadwall Anas strepera - A141: Grey plover Pluvialis squatarola - A162: Common redshank Tringa totanus - A675: Dark-bellied brent goose Branta bernicla bernicla - WATR: Waterbird assemblage - BBA: Breeding bird assemblage - A616: Black-tailed godwit Limosa limosa islandica
Thursley and Ockley Bog Ramsar
- Crit. 3: Crit. 3 - supports populations of plant/animal species important for maintaining regional biodiversity - Crit. 2: Crit. 2 - supports vulnerable, endangered, or critically endangered species or threatened eco. communities
Thursley, Ash, Pirbright and Chobham SAC
- H4010: Northern Atlantic wet heaths with Erica tetralix - H4030: European dry heaths - H7150: Depressions on peat substrates of the Rhynchosporion
Thursley, Hankley and Frensham Commons (Wealden Heaths Phase 1) SPA

Site and Features
- A302: Dartford warbler Sylvia undata - A224: European nightjar Caprimulgus europaeus - A246: Wood lark Lullula arborea
Wealden Heaths Phase 2 SPA
- A302: Dartford warbler Sylvia undata - A224: European nightjar Caprimulgus europaeus - A246: Wood lark Lullula arborea
Woolmer Forest SAC
- H3160: Natural dystrophic lakes and ponds - H4010: Northern Atlantic wet heaths with Erica tetralix - H4030: European dry heaths - H7140: Transition mires and quaking bogs - H7150: Depressions on peat substrates of the Rhynchosporion
Wye and Crundale Downs SAC
- H6210: Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-Brometalia) (* important orchid sites)

Appendix B
Effect Pathway Assumptions

Table B1 (from UKWIR 2021) and the following paragraphs outline some of the general assumptions that are typically (and reliably) applied to plan-level assessments where effect pathways are imaginable but not quantifiable at the plan level. These are applied cautiously, recognising that there is always a risk of atypical scenarios, but have been proved to be generally robust across a wide range of scenarios.

Table B1 Potential Impacts of Plan Options (from UKWIR 2021)

Broad categories of potential impacts on European sites, with examples	**Examples of operations responsible for impacts (distance assumptions in italics)**
Physical loss: • Removal (including offsite effects, e.g. foraging habitat, and removal of supporting habitat within boundary of a SPA) • Smothering	Development of infrastructure associated with scheme, e.g. new or temporary pipelines, transport infrastructure, temporary weirs. Indirect effects from a reduction in flows e.g. drying out marginal habitat. Physical loss is most likely to be significant where the boundary of the scheme extends within the boundary of the European site, or within an offsite area of known foraging, roosting, breeding habitat (that supports species for which a European site is designated).
Physical damage: • Sedimentation / silting • Prevention of natural processes including coastal and fluvial bank stabilisation, prevention of long-shore drift etc. • Habitat degradation • Erosion • Fragmentation • Severance/barrier effect • Edge effects	Reduction in river flow leading to permanent and/or temporary loss of available habitat, sedimentation/siltation, fragmentation, etc. Physical damage is likely to be significant where the boundary of the scheme extends within or is directly adjacent to the boundary of the European site, or within/adjacent to an offsite area of known foraging, roosting, breeding habitat (that supports species for which a European site is designated, or where natural processes link the scheme to the site, such as through hydrological connectivity downstream of a scheme, long shore drift along the coast, or the scheme impacts the linking habitat).

Broad categories of potential impacts on European sites, with examples	Examples of operations responsible for impacts (distance assumptions in italics)
Non-physical disturbance: • Noise (incl. underwater) • Visual presence • Human presence • Light pollution • Vibration (incl. underwater).	Noise from temporary construction or temporary pumping activities. Taking into consideration the noise level generated from general building activity (c. 122dB(A)) and considering the lowest noise level identified in appropriate guidance as likely to cause disturbance to bird species, it is concluded that noise impacts could be significant up to 1km from the boundary of the European site[38]. Noise from vehicular traffic during operation of a scheme. Noise from construction traffic is only likely to be significant where the transport route to and from the scheme is within 3-5km of the boundary of the European site. Plant and personnel involved in in operation of the scheme. These effects (noise, visual/human presence) are only likely to be significant where the boundary of the scheme extends within or is directly adjacent to the boundary of the European site, or within/adjacent to an offsite area of known foraging, roosting, breeding habitat (that supports species for which a European site is designated). Schemes which might include artificial lighting, e.g. for security around a temporary pumping station. Effects from light pollution are only likely to be significant where the boundary of the scheme is within 500m of the boundary of the European site. Vibration from temporary construction From a review of Environment Agency internal guidance on HRA and various websites/sources[39,40,41] it is considered that effects of vibration are more likely to be significant if development is within 500m of a European site.

[38] British Standards Institute (BSI) (2009) BS5228 - Noise and Vibration Control on Construction and Open Sites. BSI, London.

[39] Institute of Lighting Professionals (2011) Guidance Notes for the Reduction of Obtrusive Light GN01:2011

[40] Environment Agency (2013 Bird Disturbance from Flood and Coastal Risk Management Construction Activities. Overarching Interpretive Summary Report. Prepared by Cascade Consulting and Institute of Estuarine and Coastal Studies.

[41] Cutts N, Hemingway K and Spencer J (2013) The Waterbird Disturbance Mitigation Toolkit Informing Estuarine Planning and Construction Projects. Produced by the Institute of Estuarine and Coastal Studies (IECS). Version 3.2.

Broad categories of potential impacts on European sites, with examples	Examples of operations responsible for impacts (distance assumptions in italics)
Water table/availability: • Drying • Flooding / stormwater • Changes to surface water levels and flows including both increases and reductions. • Changes in groundwater levels and flows • Changes to coastal water movement	Changes to water levels and flows due to increased water abstraction, reduced storage or reduced flow releases from reservoirs to river systems. These effects are only likely to be significant where the boundary of the scheme extends within the same ground or surface water catchment as the European site. However, these effects are dependent on hydrological continuity between the scheme and the European site, and sometimes, whether the scheme is up or down stream from the European site.
Toxic contamination: • Water pollution • Soil contamination • Air Pollution	Reduced dilution in downstream or receiving waterbodies due to changes in abstraction or reduced compensation flow releases to river systems. These effects are only likely to be significant where the boundary of the scheme extends within the same ground or surface water catchment as the European site. However, these effects are dependent on hydrological continuity between the scheme and the European site, and sometimes, whether the scheme is up or down stream from the European site. Air emissions associated with plant and vehicular traffic during construction and operation of schemes. The effect of dust is only likely to be significant where site is within or in proximity to the boundary of the European site[42,43]. Without mitigation, dust and dirt from the construction site may be transported onto the public road network and then deposited/spread by vehicles on roads up to 500m from large sites, 200m from medium sites, and 50m from small sites as measured from the site exit. Effects of road traffic emissions from the transport route to be taken by the project traffic are only likely to be significant where the protected site falls within 200 metres of the edge of a road affected[44].

[42] Highways Agency (2003) Design Manual for Roads and Bridges (DMRB), Volume 11.

[43] Institute of Air Quality Management (2014) Guidance on the assessment of dust from demolition and construction v1.1.

[44] NE Internal Guidance – Approach to Advising Competent Authorities on Road Traffic Emissions and HRAs V1.4 Final - June 2018

Broad categories of potential impacts on European sites, with examples	Examples of operations responsible for impacts (distance assumptions in italics)
Non-toxic contamination: • Nutrient enrichment (e.g. of soils and water) • Algal blooms • Changes in salinity • Changes in water chemistry (e.g. pH, calcium balance etc) • Changes in thermal regime • Changes in turbidity • Changes in sedimentation/silting	Changes to water salinity, nutrient levels, turbidity, thermal regime due to increased water abstraction, storage, or reduced compensation flow releases to river systems. These effects are only likely to be significant where the boundary of the scheme extends within the same ground or surface water catchment as the European Site. However, these effects are dependent on hydrological continuity between the scheme and the European site, and sometimes, whether the scheme is up or down stream from the European site.
Biological disturbance: • Direct mortality • Changes to habitat availability • Out-competition by non-native species • Selective extraction of species • Introduction of disease • Rapid population fluctuations • Natural succession	Potential for changes to habitat availability, for example reductions in wetted width of rivers leading to desiccation of macrophyte beds due to changes in abstraction or reduced compensation flow releases to river systems. In addition, via removal of vegetation (including hedgerows and trees) used by based as foraging, roosting and hibernation sites and birds as roosting and nesting sites. Creation of new pathway of non-native invasive species. This effect is only likely to be significant where the scheme is situated within the European site or an upstream tributary of the European site (or affects groundwater levels supporting these sites or tributaries) Entrapment during in-river or terrestrial construction works causing injury and/or mortality of mobile species Likely to be a risk of entrapment, injury and/or mortality where the boundary of the option extends within or is directly adjacent to the boundary of a European site or within/adjacent to offsite functionally linked habitat. Mobile species could include fish, bats and European otters for example. Potential for changes to habitat availability via removal of vegetation (including hedgerows and trees) to facilitate construction activities and potential entrapment, injury and/or mortality of breeding birds and roosting/hibernating bats. This effect is dependent on the requirement to remove vegetation (if it cannot be avoided), ecological surveys to determine species presence and timing of removal based on species specific ecological considerations.

In addition:

Water resource sensitive features

The EA has previously published advice on qualifying species and habitats that it considers to be water-resource dependent (National EA guidance: Habitats Directive Stage 2 Review: Water Resources Authorisations – Practical Advice for Agency Water Resources Staff). This is not reproduced here, but as a general rule most species are not considered water resource dependent

with the exception of wildfowl and waders associated with estuarine and wetland sites. Wide-ranging marine / marine dependent species associated with marine sites that are not directly connected to the hydrological zone of influence are not typically considered to be both sensitive and exposed to the effects of the options (except in certain relatively unique circumstances, such as some desalination schemes).

Bat species and functional land

Bat species associated with UK SACs are not considered 'water resource sensitive' and so (in the absence of substantial habitat changes caused by operational aspects (e.g. draining of a wetland or replacement of extensive foraging habitat with a reservoir; or introduction of light etc. sources that may disrupt commuting or seasonal movements), their exposure to the outcomes of the WRMP will be limited to incidental effects from construction. In most instances potential effects will not be specifically identifiable or quantifiable (as the locations of works are not necessarily defined, and field surveys would not typically be undertaken at plan level).

UK bat species do not typically travel substantial distances (i.e. tens of kilometres) when foraging and the Bat Conservation Trust has therefore identified Core Sustenance Zones (CSZs) – defined as "*the area surrounding a communal bat roost within which habitat availability and quality will have a significant influence on the resilience and conservation status of the roost*" – for UK bat species; the CSZs for all UK species have a radius of 4km or less, with the exception of the CSZ for barbastelle (6km). This can be cautiously applied to bat SACs, although it is recognised that many roosts used by SAC bat populations will not be within the boundaries of the SAC. In general, therefore, unavoidable adverse effects would not be expected unless significant permanent land-take within those zones is likely; virtually all other potential effects are avoidable with normal good practice in planning and design, and with established mitigation measures that are known to be effective – although these inevitably cannot be defined above the project level.

Birds and construction noise / visual disturbance

The **exposure** of any birds using the reservoir to **noise** and **visual disturbance** associated with the development will depend on several factors, including:

- the sound power level of the machinery;
- the principal habitats and locations used by the birds species (and hence the distance from the source of any disturbance);
- attenuating factors (such as screening by topography, buildings or vegetation);
- the seasonal timing of the works;
- background noise levels in this area[45].

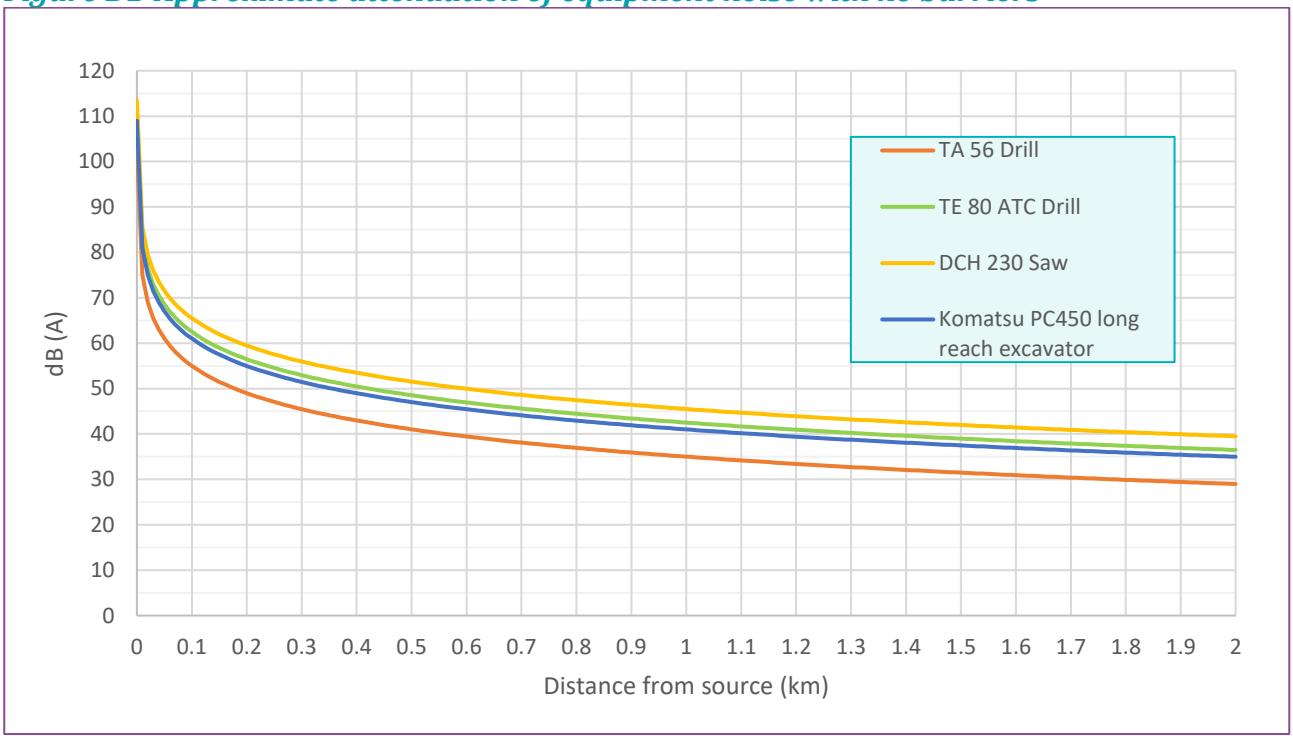
The sensitivity of the interest features will depend on their behavioural characteristics, their general tolerance / habituation to existing or new activities at a site, and the extent to which avoidance

[45] Noise levels do not operate additively, so the dB levels in an area are not the sum of the component sources.

behaviours are achievable. This may also vary during the year (for example, most bird species will be more sensitive when nesting as avoidance behaviours are more constrained).

With regard to noise, a typical long-reach excavator has sound power level of ~109 dB(A); drills and saws have sound power level between 103 dB(A) and 114 dB(A). Without any barriers, the noise level of the loudest equipment used would attenuate to around 55dB(A) within 300m, and to 50 dB(A)[46] within 600m due to distance alone (see Figure B1).

Figure B1 Approximate attenuation of equipment noise with no barriers



With regard to visual disturbance, sensitivity may be broadly correlated with size, with larger species typically having greater 'flush distances' (the distances at which birds typically move when approached by people). Laursen *et al.* (2005) determined that the mean flush distance for shelduck was 225 m; 319 m for brent geese; but only 70 m for dunlin (a much smaller species).

Cutts *et al.* (2009)[47] provide a useful review of available data on bird disturbance. It makes particular reference to noise and disturbance investigations studies undertaken during sea defence works, which included piling works. These studies identified disturbance levels for various activities associated with construction, based on observations of bird responses, which are summarised in **Table B2** below.

[46] As a guide, 60dB(A) is approximately equivalent to a conversation; 50dB(A) is approximately equivalent to the level associated with a quiet suburb or light traffic (which is unlikely to be reached except at night in this area).

[47] Cutts N., Phelps A. & Burdon D. (2009) *Construction and waterfowl: defining sensitivity, response, impacts and guidance*. Report to Humber INCA by the Institute of Estuarine and Coastal Studies, University of Hull

Table B2 Observed disturbance associated with sea wall construction activities (after Cutts et al. 2009) and the need for similar activities at site

Activity	Observed Disturbance Level	Equivalent activity required for substation works
Personnel and plant on mudflat	High	No
Personnel and plant on seaward toe and face	High to Moderate	No
Intermittent plant and personnel on crest	High to Moderate	No
Irregular piling noise (above 70 dB)	High to Moderate	No
Long term plant and personnel on crest	Moderate	No
Regular piling noise (below 70dB)	Moderate	No
Irregular noise (50-70 dB)	Moderate	Yes
Regular noise (50-70dB)	Moderate to low	Yes
Occasional movement of the crane jib and load above sight-line	Moderate to low	No
Noise below 50 dB	Low	Yes
Long-term plant only on crest	Low	No
Activity behind flood bank (inland)	Low	Yes

Key:
High — Maximum response; preparing to fly away and flying away, may leave area altogether
Moderate-high, Moderate, Moderate-low — Head turning, scanning behaviour, reduced feeding, movement to other areas close by (decreasing response)
Low — No effect

The study also records the following observations from other construction schemes on the Humber:

- Piling activity on the landward side of the sea wall at Pyewipe (southern shore), associated with construction of a pumping station, had no disturbance effect on birds in January, February and March; the numbers and distributions of birds were similar during periods with and without piling. Disturbance only occurred when construction was moved to the seaward-side of the sea wall in April.
- Six years of bird monitoring associated with the construction of the Humber International Terminal (HIT) concluded that most disturbance only caused birds to move over a small area, and that the HIT development did not have a significant effect on usage of the area by birds.

In general, therefore, effects from noise and visual disturbance during construction typically have a limited range and duration, are reversible, and do not result in long-term adjustments in bird behaviours (such that they might constitute an adverse effect).

Air Quality Effects from Construction Schemes

A number of pollutants have a negative effect on air quality; however, the most significant and relevant to habitats and species (particularly plant species) are the primary pollutants sulphur dioxide (SO_2, typically from combustion of coal and heavy fuel oils although this has declined substantially), nitrogen oxides (NOx, mainly from vehicles) and ammonia (NH_3, principally from agriculture), which (together with secondary aerosol pollutants[48]) are deposited as wet or dry deposits. These pollutants affect habitats and species mainly through acidification and eutrophication.

Acidification increases the acidity of soils, which can directly affect some organisms and which also promotes leaching of some important base chemicals (e.g. calcium), and mobilisation and uptake by plants of toxins (especially metals such as aluminium).

Air pollution contributes to eutrophication within ecosystems by increasing the amounts of available nitrogen (N)[49]. This is a particular problem in low-nutrient habitats, where available nitrogen is frequently the limiting factor on plant growth, and results in slow-growing low-nutrient species being out-competed by faster growing species that can take advantage of the increased amounts of available N.

Overall in the UK, there has been a significant decline in SOx and NOx emissions in recent years and a consequential decrease in acid deposition. In England, SO_x and NO_x have declined by 97% and 72% respectively since 1970 (Defra, 2018) which is the result of a switch from coal to gas, nuclear and renewables for energy generation, and increased efficiency and emissions standards for cars. These emissions are expected to decline further in future years with the transition to electric vehicles. In contrast, emissions of ammonia have remained largely unchanged; they have declined by 10% in England since 1980 (Defra, 2018), but since 2008 have started to increase slightly.

The effect of SO_x and NO_x decreases on ecosystems has been marked, particularly in respect of acidification; the key contributor to acidification is now thought to be deposited nitrogen, for which the major source (ammonia emissions) has not decreased significantly. Indeed, eutrophication from N-deposition (again, primarily from ammonia) is now considered the most significant air quality issue for many habitats.

In terms of the exposure of designated sites to air quality changes associated with construction, this tends to be considered on a case-by-case basis. However, the Department of Transport's *Transport Analysis Guidance*[50] states that "***beyond 200m, the contribution of vehicle emissions from the roadside to local pollution levels is not significant***" and this distance is typically applied to construction schemes also when considering the potential for European sites to be exposed to any local effects associated with emissions to air. However, it should be noted that concentrations and deposition of traffic-generated pollutants do not decline linearly with distance from the road; typically, air pollution levels fall sharply within the first 20 – 30m before declining

[48] Secondary pollutants are not emitted, but are formed following further reactions in the atmosphere; for example, SO_2 and NO_x are oxidised to form SO_4^{2-} and NO_2^- compounds; ozone is formed by the reaction of other pollutants (e.g. NOx or volatile organic compounds) with UV light; ammonia reacts with SO_4^{2-} and NO_2^- to form ammonium (NH_4^+).

[49] Nitrogen that is in a form that can be absorbed and used by plants.

[50] See http://www.dft.gov.uk/webtag/documents/expert/unit3.3.3.php#013; accessed 15/06/14.

more slowly with increased distance[51]. Concentrations and deposition will also be affected by physical parameters, such as local topography or vegetation structure.

Highways England's *Design Manual for Roads and Bridges* (DMRB) sets out an approach for assessing the effect of emissions from specific road schemes on designated sites; this suggests that a quantitative air quality assessment may be required if a European site is within 200m of an affected road and the predicted change in annual average daily traffic (AADT) is over 1000. It should be noted that this is 'in combination' with other projects (etc.), but this is a relatively large increase which

- would not be met by the vast majority of construction schemes when considering either vehicle access to the site / deliveries, or the equivalent movement / use of construction plant); and
- is assumed to be permanent (which is not the case for most construction).

Although it is not simple to apply 'rule of thumb' estimates to relationships between traffic volumes and N-deposition (as this is influenced by a number of factors), it is worth noting that the DMRB guidance regarding air quality thresholds is based on the assumption that 1,000 extra vehicles is equivalent to ~0.01 kg N/ha/yr (this is obviously a coarse figure and there are other factors that come into play such as the emissions factors used for opening year/ wind direction / number of HGVs / speed etc.). The EA-accepted threshold for 'significant effects' on habitats to be possible is an increase of >1% of the minimum critical load[52].

Air quality modelling and assessment is unlikely to be achievable at the WRMP level due to the absence of information on scheme design and construction approaches; and arguably not proportionate. However, it is clear that in the vast majority of cases emissions associated with construction schemes are of a magnitude that (a) will not exceed the thresholds for significant or significant adverse effects (even if relatively close to a site), and which (b) can be reliably managed or avoided using standard and unexceptional avoidance and mitigation measures, if required.

[51] For example, recent air quality modelling by Wood of a new link road at an MoD establishment in the UK found that an Average Annual Daily Traffic (AADT) increase of ~7,000 increased nitrogen deposition by 0.21 kg N/ha/yr at the worst receptor point (at the immediate kerbside), and that by 25m from the road the increase in N-deposition was zero.

[52] The 1% threshold is used as it is accepted that levels below this are difficult to measure and not typically distinguishable from background fluctuations. An exceedance of 1% of the critical load should be seen as a 'starting point' for assessing the significance of any effects; the Institute of Air Quality Management (IAQM) position statement on air quality effects notes that "*it is the position of the IAQM that the use of a criterion of 1% of an assessment level in the context of habitats should be used only to screen out impacts that will have an insignificant effect. It should not be used as a threshold above which damage is implied and is therefore used to conclude that a significant effect is likely*."

Appendix C
Standard Mitigation and Avoidance Measures

Overview

The 'avoidance measures' that may be applied to the options are detailed below, and are grouped as follows:

- General Measures (established construction best-practice, etc.) which will be applied to all options;
- Option-specific Measures (established and reliable measures identified to avoid specific potential effects on European sites, such as in relation to mobile species from the sites).

These measures will be applied unless project-level HRAs or project-specific environmental studies demonstrate that they are not required (i.e. the anticipated effect will not occur), not appropriate, or that alternative or additional measures are necessary or more appropriate.

Note that these measures are not exhaustive or exclusive and must be reviewed at the project stage, taking into account any changes in best-practice as well as scheme-specific survey information or studies.

General Measures and Principles

Scheme Design and Planning

All options will be subject to project-level environmental assessment as they are brought forward, which will include assessments of their potential to affect European sites during their construction or operation. These assessments will consider or identify (inter alia):

- opportunities for avoiding potential effects on European sites through design (e.g. alternative pipeline routes; micro siting; etc);
- construction measures that need to be incorporated into scheme design and/or planning to avoid or mitigate potential effects - for example, ensuring that sufficient working area is available for pollution prevention measures to be installed, such as sediment traps;
- operational designs required to ensure no adverse effects occur (e.g. screening, additional treatment, etc.) – although note that these measures can only be identified through detailed investigation schemes and agreed through the project-level HRA process.

Pollution Prevention

The habitats of European sites are most likely to be affected indirectly, through site-derived pollutants, rather than through direct encroachment. There is a substantial body of general construction good-practice which is likely to be applicable to all of the proposed options and can be relied on (at this level) to prevent significant or adverse effects on a European site occurring as a result of construction site-derived pollutants (including site run-off and air quality changes). The following guidance documents detail the industry best-practices in construction that are likely to be relevant to the proposed schemes:

- Environment Agency Pollution Prevention Guidance Notes[53], including:
  - PPG1: General guide to the prevention of pollution (May 2001);
  - PPG5: Works and maintenance in or near water (October 2007);
  - PPG6: Pollution prevention guidance for working at construction and demolition sites (April 2010);
  - PPG21: Pollution incident response planning (March 2009);
  - PPG22: Dealing with spillages on highways (June 2002);
- Environment Agency (2001) Preventing pollution from major pipelines [online]. Available at www.environment-agency.gov.uk/static/documents/Business/pipes.pdf. [Accessed 1 March 2011];
- Venables R. et al. (2000) Environmental Handbook for Building and Civil Engineering Projects. 2nd Edition. Construction Industry Research and Information Association (CIRIA), London.

The best-practice procedures and measures detailed in these documents will be followed for all construction works derived from the DWMP as a minimum standard, unless scheme-specific investigations identify additional measures and/or more appropriate non-standard approaches for dealing with potential site-derived pollutants.

General measures for species

The requirements for most species-specific avoidance or mitigation measures can only be determined at the scheme level, following scheme-specific surveys, and 'best-practice' mitigation for a species will vary according to a range of factors that cannot be determined at the strategic level. In addition, some general 'best-practice' measures may not be relevant or appropriate to the interest features of the European sites concerned (for example, clearing vegetation over winter is usually advocated to avoid impacts on nesting birds; however, this is unlikely to be necessary to avoid effects on some SPA species (such as overwintering estuarine birds) and the winter removal of vegetation might actually have a negative effect on these species through disturbance). However, the following general measures will be followed to minimise the potential for impacts on species that are European site interest features unless project level environmental studies or HRA indicate that they are not required or not appropriate, or that alternative or additional measures are more appropriate/necessary:

[53] Note, the Environment Agency Pollution Prevention Guidance Notes have been withdrawn by the Government, although the principles within them are sound and form a reasonable basis for pollution prevention measures.

- Scheme design will aim to minimise the environmental effects by 'designing to avoid' potential habitat features that may be used by species that are European site interest features when outside the site boundary (e.g. linear features such as hedges or stream corridors; large areas of scrub or woodland; mature trees; etc.) through scheme-specific surveys and investigations.
- The works programme and requirements for each option will be determined at the earliest opportunity to allow investigation schemes, surveys and mitigation to be appropriately scheduled and to provide sufficient time for consultations with NE.
- Night-time working, or working around dusk/dawn, should be avoided to reduce the likelihood of negative effects on nocturnal species.
- Any lighting required (either temporary or permanent) will be designed with an ecologist to ensure that potential 'displacement' effects on nocturnal animals, particularly SAC bat species, are avoided.
- All compounds/pipe stores etc. will be sited, fenced or otherwise arranged to prevent vulnerable SAC species (notably otters) from accessing them.
- All materials will be stored away from commuting routes/foraging areas that may be used by species that are European site interest features.
- All excavations will have ramps or battered ends to prevent species becoming trapped.
- Pipe-caps must be installed overnight to prevent species entering and becoming trapped in any laid pipe-work.
- Best practice biosecurity measures, as recommended by the GB Non-Native Species Secretariat (http://www.nonnativespecies.org/index.cfm?sectionid=58) would guard against any potential for spreading invasive species as a result of construction.
- Noise / vibration and visual disturbance can be avoided through timing of works, choice of plant (e.g. vibro-piling rather than percussive), construction management (e.g. soft-start for machinery), using stand-off zones or exclusion areas, using screening, or 'live monitoring' of construction works.
- Works can be programmed to avoid or minimise effects on species during sensitive periods in their annual cycle.
- Clerk of Works supervision can be employed to ensure species are safeguarded and to ensure that potentially adverse effects do not occur (for example, at Hinkley Point C construction works immediately adjacent to an SPA designated for wintering birds has been able to proceed over the winter period with 'live monitoring' of bird activity on the foreshore to prevent disturbance of significant agglomerations of qualifying features)

Appendix D
Preferred Options Screening

Appendix E
Appropriate Assessments

from Southern Water