



Wessex Water

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



Report for

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1. 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).

1.1 Wessex Water's Water Resources Management Plan 2024

- 1.1.1 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.
- 1.1.2 Wessex Water is preparing its WRMP (WRMP24) for the period 2025 – 2050 and previously published a Draft WRMP ('the dWRMP') for consultation between the 28th November 2022 and 20th February 2023. Wessex Water has subsequently selected its preferred plan for WRMP24, taking account of consultation responses from regulators, stakeholders and the public, as well as further engagement and environmental assessment. The preferred plan is set out in the Revised Draft WRMP24 (rdWRMP24) which is being submitted to the Secretary of State for Environment, Food and Rural Affairs for approval.
- 1.1.3 Wessex Water is developing its WRMP24 within the context of the West Country Water Resources (WCWR) Regional Plan¹ for the management of water resources in the south-west of England. It includes all of the operational areas of Bristol Water, South West Water and Wessex Water. The Regional Plan for the period 2025 to 2085 will address long-term regional and inter-regional, multi-sectoral water resources management pressures.

1.2 Habitats Regulations Assessment

- 1.2.1 Water company WRMPs are subject to the provisions of the *Conservation of Habitats and Species Regulations 2017* (as amended) (the 'Habitats Regulations')².
- 1.2.2 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 EA (2020) *Water Resources National Framework*: Appendix 2: Regional planning

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.

- 1.2.3 Regulation 63 states that if a plan or project is “(a) is likely to have a significant effect on a European site³ or a European offshore marine site⁴ (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.
- 1.2.4 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.

1.3 This Report

- 1.3.1 Wessex Water has a statutory duty to prepare a WRMP and is therefore the Competent Authority for the HRA of that plan. Wessex Water has appointed appointed Wood Group UK Limited (Wood) to assist with its assessment of WRMP24 against Regulations 63 and (if required) 64.
- 1.3.2 This report accompanies the revised draft WRMP24 (rdWRMP24) that has been published for consultation and summarises the current assessment of Wessex Water’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 rdWRMP24. The report is structured as follows:
- **Section 2** provides a brief summary of the rdWRMP24 and the preferred options;
 - **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;

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; TAN5 para. 5.1.3) 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’.

- **Sections 5 – 8** provide ‘appropriate assessments’ for those European sites where significant effects could not be excluded, including option-specific ‘in combination’ assessments;
- **Section 9** summarises the plan-level ‘in combination’ assessment; and
- **Section 10** sets out the proposed conclusion of the HRA of Wessex Water’s WRMP24 (assuming that final WRMP reflects the rdWRMP, and subject to any additional data gathering that may be required to resolve residual uncertainties).

- 1.3.3 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 therefore documented separately for clarity.
- 1.3.4 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 (APEM 2022a). This HRA report should therefore be read in conjunction with these reports.
- 1.3.5 In addition, it should be noted that any conclusions are necessarily preliminary (since the HRA is only finalised for 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.

2. Wessex Water's rdWRMP

The WRMP process identifies potential deficits between the water available for supply and the projected demand. Wessex Water has identified 14 'supply-side' options and two 'demand-side' options to resolve predicted deficits in its supply area, and to release water for transfer to other water companies.

2.1 Water Resources Planning

- 2.1.1 The WRMP process establishes supply and demand balances for each Water Resource Zone⁸ (WRZ) operated by a 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.
- 2.1.2 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.
- 2.1.3 Demand forecasts are completed in accordance with the *Water Resources Planning Guideline*⁹) 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;

⁸ 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)”.

⁹ 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].

- 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;
- 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.

2.1.4 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. This staged filtering process allows various assessments, including HRA, to inform the plan development.

2.1.5 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 options¹⁰ 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

¹⁰ ‘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 Options¹¹ involving multiple companies and sources.

2.2 Wessex Water's rdWRMP24

- 2.2.1 Wessex Water supplies water to ~1.3 million customers in Dorset, Somerset and Wiltshire. The supply area is covered by one integrated network that comprises the following key connections:
- The Spine Main and Central Area Link Main (CALM) that allows the transfer of water from major surface reservoir sources in Somerset to demand centres in the centre and north of the region (this can be reversed if required during dry periods).
 - Transfer of groundwater from Malmesbury and the Great Oolite aquifer near Chippenham to north Bath.
 - The East/West link main that transfers water from the Poole region to Dorchester and Weymouth, and from Dorchester to Poole.
 - The Integrated GRID that connects sources in the south of the region (Corfe Mullen area) to Salisbury via Blandford and Shaftesbury, and which reduces abstraction in the upper Hampshire Avon catchment.
- 2.2.2 Supply surpluses were identified in WRMP14 and WRMP19 and no supply-side measures were therefore identified in these plans, although measures to reduce water usage were included. However, for WRMP24, Wessex Water is forecasting a deficit of over 130 MI/d by 2079/80 under the dry year critical period scenario, with significant licence reductions in 2035.
- 2.2.3 The forecast deficit is a result of several drivers, including climate change, a move to 1 in 500 drought resilience, and environmental destination work reducing abstraction from environmentally sensitive sources, particularly in the chalk catchments. The uncertainties reflect the need to complete further AMP cycle investigations to confirm the actual licence reduction requirements. This deficit will require the inclusion of both supply-side and demand management measures in the WRMP.
- 2.2.4 Wessex Water has screened its list of unconstrained options and has identified **a number of feasible options**, comprising **supply side** (resource management) options, **demand-side** (customer, distribution and production) options and **drought options**. The supply side options, include:
- enhancements to network operations and existing transfers;
 - new reservoir storage schemes and increasing storage at existing sites;
 - new transfers;
 - effluent re-use schemes;
 - modifications to existing source abstraction.
- 2.2.5 Wessex Water has developed a number of different plan options and tested these under different future growth and demand scenarios to address the future predicted supply deficits both at a companywide level and also at a sub-zone level. A decision-making tool has been applied to choose the optimum combination of supply and demand options to meet any deficits across the planning horizon. In response to regulator requests,

¹¹ 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).

additional options have been included to consider the effects of drought measures being implemented including restrictions on use (temporary use bans and non-essential use bans), drought orders, and assuming less severe droughts.

2.2.6 **Wessex Water’s rdWRMP24 therefore contains 11 preferred options which are a best value combination of supply and demand options.**

2.2.7 These options are summarised in **Tables 2.1 – 2.3.**

Supply-side options

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

Table 2.1 Preferred portfolio supply-side options

Option ID	Option name	Yield (Ml/d)	Description
22.04	Weymouth Source Improvements	2.5	Network reconfiguration and treatment works improvement in the Weymouth area to increase yield from a local source.
39.01	Under-utilised licence - North Bath Source	5	Increase utilisation of a small reservoir North of Bath to help meet peak demands through a new pre-treatment works, and use of existing infrastructure for ongoing treatment and distribution.
39.02	Under-utilised Licence - North Warminster	2.5	The option involved drilling two new boreholes at an existing site north of Warminster to improve the yield of the source
59.01	Mere Stream Support	5	Option to provide stream support to an upper Dorset Stour tributary to allow current abstraction in the catchment to continue
70.01	Bristol Import and onwards transfer I	4	This option is a combination of the following schemes: 18_26 and 18_09
70.06	Increased Reservoir Capacity and East Transfer	4	This option is a combination of the following schemes: 23_01 and 18_02.

Demand-side options

2.2.9 The demand side options are summarised in **Table 2.2;** note, it is assumed that these will be applied 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 Wessex Water’s network.

Table 2.2 Preferred demand-side options

Option ID	Option	Yield (Ml/d)	Description
57.07	Demand Strategy 7	89	<p>This option will involve:</p> <ul style="list-style-type: none"> • Full urban smart AMI by 2030, rural also by 2035 • Household water efficiency checks to be at the largest feasible scale by 2030 • Non-household water efficiency checks to be at the largest feasible scale by 2030 • Leakage profile will be linear to 2050 (~1 Ml/d)

Drought Options

2.2.10 In addition, the rdWRMP includes drought options that are proposed in the current 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). **Note, the assessment of these options is not included within this HRA but is available in the HRA of the Drought Plan.**

Table 2.3 Preferred drought options

Option ID	Option	Yield (Ml/d)	Description
9.16	Drought Plan benefits (TUBS/WE/Enhanced leakage)	13.11	<p>Temporary usage bans applied to customers, to restrict customer water usage in areas where the water company is experiencing, or may experience, a serious shortage of water for distribution, in addition to level 1 and 2 water efficiency and leakage activities.</p> <p>Scheme combines several demand-side options from the drought plan into a single option, from Wessex Water's drought plan.</p> <p>Leakage savings:</p> <ul style="list-style-type: none"> • Enhance leakage management through maximisation of existing ALC resources, increasing staff overtime and night working, and more same day emergency works. this would lead to greater traffic disruption and increased staff working hours. Further activity would be in recruiting extra staff, and more active pressure management as well as review if the supply pipe policy for repair. • Water Efficiency: high profile water efficiency campaign, building on our baseline activity. increased promotional activity on social media, website and other channels with behavioural messaging and promotion of water efficient appliances. • There would be heightened media campaigns to engage with customers to make them aware of the ban.
9.19	Reduce levels of service from 1 in 200 to 1 in 500 (only until 2049/50)	5	Reduce levels of service from 1 in 200 to 1 in 500 (only until 2049/50)

Option ID	Option	Yield (MI/d)	Description
41.01	Drought Permit - Stour catchment	2.08 MI/d average and 0MI/d peak	Increase annual licence during drought conditions from sources in the Stour and Frome catchments
41.06	Drought Permit - Bride catchment	0.10 MI/d average and 1.10 MI/d peak	Increase peak output from a source in the Bride catchment during drought conditions

* 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 rdWRMP preferred options.

2.3 Relationship with the WCWR Regional Plan and SROs

Regional Plan

- 2.3.1 The Emerging Draft Regional Plan indicates that whilst large scale demand reductions can be reliably achieved, due to the effects of population growth, climate change, increased drought resilience and the need for sustainable reduction in abstractions the region is likely to face a shortfall for water users ranging from 28MI/d to 277MI/d under a number of different scenarios considered. The Emerging Draft Regional Plan outlines the potential strategic¹² supply-side options that are being investigated in the West Country in parallel with demand reduction options. Supply-side options include new reservoirs, enhancements to existing reservoirs and effluent recycling.
- 2.3.2 The Emerging Draft Regional Plan identifies Wessex Water as one of two WRZs where the supply demand balance is particularly constrained under critical dry period conditions (with deficits ranging from 31MI/d to 108MI/d). It identifies potential Strategic Resource Options (SROs) to address this deficit, including the Cheddar Two Reservoir and the Mendip Quarries Reservoir (from Bristol Water) and the Wimbleball Reservoir and Allers WTW (from South West Water) and effluent reuse (Wessex Water and Bournemouth Water). The plan suggests that for Wessex Water, in the long-term the use of groundwater as the primary source of water will reduce (indicatively from over 70% to approximately 40%) as new alternative sources of water come online to replace reduced groundwater abstraction.

¹² Strategic regional solutions are options that generate new water resources and enable the new water resource to be used regionally. They involve more than one water company and will provide a significant yield (typically more than 10 MI/d).

3. 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.

3.1 Key Guidance

- 3.1.1 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.
- 3.1.2 Other relevant guidance and case-practice includes:
- UK Government (2023). *Water resources planning guideline* [online.]. Available at: <https://www.gov.uk/government/publications/water-resources-planning-guideline/water-resources-planning-guideline>. [Accessed May 2023].
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 - PINS Note 05/2018: *Consideration of avoidance and reduction measures in Habitats Regulations Assessment: People over Wind*, Peter Sweetman v Coillte Teoranta. [withdrawn].
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[raisal%20-%20the%20People%20Over%20Wind%20CJEU%20judgement.pdf](#).
[Accessed May 2023].

3.2 Application of HRA to WRMPs

Process Overview

- 3.2.1 European Commission guidance¹³ 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:

¹³ *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 taken into account 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. 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’).

- 3.2.2 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.**
- 3.2.3 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.
- 3.2.4 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 plans¹⁴ 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)¹⁵ case.

3.2.5 Therefore, whilst the principles of HRA have been applied to the emerging WRMP and the feasible options, **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 ‘**risk review**’ of the **supply-side**¹⁶ **feasible options**, to assist Wessex Water’s selection of constrained options (i.e. ‘HRA as a process’). The review of the feasible options applied the normal principles and practices associated with ‘HRA screening’ but also took account of the deliverability of the options including potential mitigation opportunities¹⁷ (for clarity, this review process is not documented in this report but is available from Wessex Water on request).
- 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 (this report).

Key Challenges and Assumptions

3.2.6 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.

3.2.7 In particular, it should be recognised that many of the options (particularly those slated for distant planning horizons) are to some extent conceptual, with limited design information that in most cases will be quite malleable (e.g. pipeline routes are essentially indicative routes, not fixed proposals that cannot be deviated from at the design stage). This also requires an acceptance that not all potential outcomes can be examined at the plan-level, and that the HRA is ultimately (to some extent) attempting to identify those residual effects

¹⁴ 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.

¹⁵ *People Over Wind and Sweetman v Coillte Teoranta (C-323/17)*

¹⁶ 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.

¹⁷ 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 Wessex 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 Wessex Water and to avoid the perception of premature assessment conclusions.

that are essentially unavoidable at the scheme level (e.g. due to the fundamental scale of the proposals).

- 3.2.8 This report therefore 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

- 3.2.9 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.
- 3.2.10 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.
- 3.2.11 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.
- 3.2.12 Case-practice in WRMP HRAs¹⁸ and the WRPG indicates that 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.
- 3.2.13 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 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.

¹⁸ For example, in relation to DCWW's WRMP14.

- 3.2.14 However, it is important to note that some uncertainties will 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

Existing Consents

- 3.2.15 Regulation 9 of the Habitats Regulations requires that “...a competent authority, in exercising any of its functions, must have regard to the requirements of the Directives so far as they may be affected by the exercise of those functions”.
- 3.2.16 For existing abstraction licences and their consideration in WRMPs, the requirements of Reg. 9 are effectively met by the Environment Agency and the water companies through the licence review arrangements and protocols that are implemented at the start of each WRMP cycle, which also take account of the Environment Agency’s requirements through the Water Industry National Environment Programme (WINEP). This review process (and WINEP) is undertaken in conjunction with Natural England, which identifies protected sites (including European sites) to the EA where it believes abstraction-related issues are affecting the achievement of favourable conservation status (these may or may not be subject to current WINEP investigations).
- 3.2.17 This review is important to the development of the supply forecast at the start of the WRMP process and is consequently reflected in Section 5.4 (*‘Developing Your Supply Forecast’*) of the the WRPG (2020 draft and 2023 published versions) which outlines the requirements for sustainable abstraction taking into account existing statutory requirements and environmental destination. Any required licence amendments are factored into the supply-deficit calculations, and the EA will have confirmed those licences that are considered valid for the planning period when the WRMP modelling is undertaken.
- 3.2.18 The supply forecast informs the supply-demand balance calculations for the planning period, which is in effect the ‘predicted future baseline’ for water resources in a supply area. The water company then develops ‘options’¹⁹ for resolving any predicted deficits in the supply-demand balance, which are then tested against various metrics to determine the ‘preferred plan’.
- 3.2.19 Consideration of the existing consenting regime in relation to European sites is noted in the WRPG (2020 draft and 2023 published versions) solely in relation to the development of the supply forecast (Section 5.4), and not in those sections of the guidance that explicitly consider the application of HRA to the WRMP; and whilst the 2023 guidelines refer to “*Your plan, including any options within it...*” in relation to the Habitats Regulations, all references to HRA (as both a process and legislative test) are explicitly and/or implicitly linked to the options identified by the WRMP. Consequently, the WRMP HRA addresses Regulation 63 of the Habitats Regulations and necessarily focuses on the assessment of the additional effects that the WRMP introduces over the predicted future

¹⁹ Note that all references to WRMP ‘options’ in the WRPG are made in the commonly-accepted sense, i.e. explicit interventions proposed by the WRMP to increase water supply or reduce consumption (e.g. WRPG Section 1.1), not a broad ‘catch all’ for ongoing water company operations such as those existing abstractions that will form part of the ‘predicted future baseline’.

baseline (i.e. the supply forecast determined at the start of the WRMP process that takes account of the agreed sustainability reductions and any that are reasonably anticipated).

- 3.2.20 Therefore, the HRA of the WRMP is necessarily a forward looking assessment of the specific options (feasible and preferred) proposed by the WRMP to resolve deficits; it does not (and cannot) re-litigate the existing licences agreed for the planning period (and hence the WRMP supply-demand baseline) since there has to be a starting point / basis for the WRMP (i.e. the modelling / optioneering process cannot start with the assumption that no current consents are reliable; and the HRA of the WRMP does not and cannot determine the licensing baseline from which the supply-demand balance is calculated).
- 3.2.21 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.

Regional Growth

- 3.2.22 The WRMP supply-demand balance 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, and in accordance with methods set out in the WRPG. Likewise, the modelling accounts for climate change. ‘In combination’ effects with population growth and water use that may be related to land-use plans 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 not a solution) and this can be relied on by the HRA; the HRA may consider the potential for ‘in combination’ effects with specific proposals within Local Plans (and similar), such as major site allocations, but does not (and cannot) attempt to define and model an alternative ‘population growth’ scenario to somehow test against specific options.

In combination effects with SROs

- 3.2.23 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 Wessex Water, 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.
- 3.2.24 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/s²⁰. 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.
- 3.2.25 The West Country Water Resources Group is developing three strategic resource options (SROs) which may benefit Wessex Water in the future. SROs are large regional or inter-

²⁰ 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.

regional schemes which have the potential to provide benefits to multiple water companies. Three SROs (Mendip Quarries, Poole Effluent Recycling and Cheddar Two Reservoir) are all progressing through RAPID's gated process for SRO development.

3.2.26 The status of these schemes within Wessex Water's rdWRMP is as follows:

- Mendip Quarries: This option is not selected in the preferred plan but is selected under alternative higher need adaptive pathways.
- Poole Effluent Recycling: This option is not selected in the preferred plan but is selected under alternative pathways.
- Cheddar Two reservoir: This option does not appear in the feasible options list following discussion with South West Water and Bristol Water.

3.2.27 The environmental compliance assessments, and the supporting investigations, are ongoing with the outcomes available to inform the RAPID Gate 3 submission in 2024. In consequence, the findings have not been available in time for the rdWRMP24 (and its assessment), although existing data and assessments are referred to as appropriate. Note that any in combination effects with SROs will be addressed by the forthcoming SRO Gate 3 investigations and in future WRMP cycles and so there is no risk of 'in combination' effects being overlooked.

3.3 HRA of the Preferred Options

Geographical Scope

3.3.1 '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.

3.3.2 Professional experience and case-practice relating to typical water industry schemes demonstrates that environmental changes associated with construction in terrestrial environments are 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 20km 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.
- 3.3.3 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 sites²¹; however, unless otherwise noted, sites over 20km 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 at the site will be effectively nil, and so there will be 'no effects' on sites beyond this distance (and so no possibility of 'in combination' effects).
- 3.3.4 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

- 3.3.5 The screening and appropriate assessment stages take account of the baseline condition of the European sites and their interest features²², 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;
 - 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).
- 3.3.6 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;

²¹ 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.

²² 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).

- Supplementary Advice to the conservation objectives (SACO) where available²³;
- 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.

3.3.7 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.

3.3.8 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**'.

3.3.9 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:

- 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.

3.3.10 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.

3.3.11 '**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.);

²³ 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.

- 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. Note, this is not intended as a speculative catch-all covering any habitat that might be occasionally used by or be theoretically suitable for a particular species)).

3.3.12 **Conservation Objectives** benchmark Favourable Conservation Status (FCS) for each feature. Guidance²⁴ 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*”.

3.3.13 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):

3.3.14 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 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.*

3.3.15 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;*

²⁴ 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].

- ▶ *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.*

- 3.3.16 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.
- 3.3.17 In Wales, the Regulation 37 advice and Core Management Plans for the SACs and SPAs set out conservation objectives that benchmark Favourable Conservation Status (FCS) for each feature. For the Welsh European sites the conservation objectives comprise a ‘vision’ for the the feature (the key component of the objective) and (where relevant) performance indicators by which the objectives may be measured. These are used and referred to as necessary within the assessment but are not generally reproduced in this report. Note, the Welsh European sites potentially exposed to the outcomes of the plan are likely to be restricted to those associated with the Severn estuary.
- 3.3.18 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.
- 3.3.19 **The conservation objectives and supplementary advice are considered at both screening and appropriate assessment stages but are not explicitly reproduced in this report** as (a) they are freely available online and (b) the narrative nature of much of the supplementary advice can be challenging to co-opt in a clear and concise manner, particularly given the number of preferred options and the high-level nature of the available option design information. The assessments therefore focus on the key conservation objectives that might be undermined by an option, rather than attempting to exhaustively document the assessment of an option against all conservation objectives / supplementary advice measures for all features. Information on the sensitivities of the interest features also informs the assessment.

Water resources baseline data

- 3.3.20 Information on the water resources baseline in the region is drawn from other assessment reports (e.g. the WFD), Wessex Water (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).
- 3.3.21 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

- 3.3.22 Information on the preferred options is provided by Wessex Water. 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.

- 3.3.23 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), although it should 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

- 3.3.24 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 option²⁵, 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).
- 3.3.25 The conservation objectives and supplementary advice have been taken into account throughout the screening and appropriate assessment stages; as noted, however, these metrics are not explicitly reproduced in this report and the assessments do not attempt to exhaustively document the assessment of an option against all conservation objectives / supplementary advice measures for all features.

General Assumptions

- 3.3.26 Most environmental changes associated with construction and operation will have an inherent range over which they naturally attenuate²⁶, 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 or arguments that can be robustly applied to the assessments of the individual options or interest features are set out in **Appendix B**.
- 3.3.27 In addition:

²⁵ Note, for options with 'no effects' or positive effects there is no possibility of 'in combination' effects.

²⁶ 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.

- 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 (GWDTs) 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 Wessex Water or the EA as licences requiring investigation, and where CAMS indicates water is available for use.

Screening

3.3.28 The screening 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
- 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 affected²⁷).

3.3.29 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).

3.3.30 The ‘low-bar’ principle is used for the screening of the preferred options²⁸; 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’

²⁷ 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.

²⁸ 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?

effects is not excluded and these are taken forward to ‘appropriate assessment’). This approach simplifies the overall assessment and ensures procedural clarity.

- 3.3.31 The ‘low bar’ approach is consistent with the ‘People Over Wind’²⁹ 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.
- 3.3.32 In this instance, therefore, mitigation measures (including the established best-practice avoidance and mitigation measures noted in **Appendix C**) are not taken into account at screening but are instead introduced at the ‘appropriate assessment’ stage (if required).

Appropriate Assessments

- 3.3.33 The ‘appropriate assessments’ are an extension of the assessment processes undertaken at the screening stage, with significant effects (or areas of uncertainty) examined to determine whether there will be any adverse effects on the integrity of any European sites taking into account the conservation objectives.
- 3.3.34 The presentation of the assessments depends on the nature of the options and European sites that might be exposed to effects. In this case the assessments are ‘European site led’ (i.e. each assessment section relates to a specific European site or group of co-incident sites and features), rather than being ‘option by option’; this tends to simplify the ‘in combination’ assessment and minimises repetition of information relating to the interest features / sensitivities (etc.) of the sites).
- 3.3.35 Shared evidence applicable to multiple sites or features (for example, in relation to birds and construction noise) are provided in appendices to reduce repetition.
- 3.3.36 The appropriate 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; for example, exhaustive examination of feature sensitivities and possible effect pathways is not undertaken for options that would have previously been ‘screened out with mitigation’ if there is a high degree of confidence in the mitigation measures. The assessments include inter-option ‘in combination’ assessments.
- 3.3.37 In addition, 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 appropriate assessments to identify those adverse 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 avoided if necessary. In practice such unavoidable adverse effects are more likely for scheme operation rather than construction.

²⁹ Case C 323/17 Court of Justice of the European Union: People Over Wind

3.4 Plan-Level In Combination Assessments

- 3.4.1 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.
- 3.4.2 Broadly, it is considered that the Wessex Water 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.
- 3.4.3 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.
- 3.4.4 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 WWSL rdWRMP 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 where sufficient information is available for a meaningful assessment (typically, this would require that environmental assessment documentation (and ideally an HRA) be available online). However, it should be noted that NSIPs registered with The Planning Inspectorate often have little information associated with them (including delivery timescales) unless they are in the later stages of the permitting process; and the timescales over which the WRMP operates means that there are substantial uncertainties over the nature or potential for in combination effects. The in combination assessment of this aspect therefore focuses on other projects and options that are likely to be delivered in the next AMP (i.e. prior to WRMP29) and speculative assessment of long-horizon schemes is not pursued.

- 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.

4. Preferred Options Screening

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.

4.1 Demand-side options

4.1.1 There is one demand-side option: Option 57.07 (Demand Strategy 7). This option will involve:

- Full urban smart AMI by 2030, rural also by 2035
- Household water efficiency checks to be at the largest feasible scale by 2030
- Non-household water efficiency checks to be at the largest feasible scale by 2030
- Leakage profile will be linear to 2050 (~1 MI/d)

4.1.2 Some of these may require some form of physical intervention or amendment to the network.

4.1.3 The works required for the vast majority of these interventions will be very minor (e.g. meter installation) 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 or identify specific locations where such measures might be applied at the WRMP-level and so effects on specific European sites cannot be identified.

4.1.4 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.

4.2 Supply-side options

4.2.1 The initial 'alone' screening assessments for each preferred option are set out in **Tables 4.2 – 4.7** below. 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.

Table 4.1 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.
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 4.2 Option screening summary – 22.04

22.04			
Weymouth Source Improvements			
Option Summary			
Network reconfiguration and treatment works improvement in the Weymouth area to increase yield from a local source.			
General Assessment Notes			
It is understood that this is essentially a network solution only, with minor construction works at a WTW required to realise the output; on this basis no effects on any sites would be anticipated given the distance to the site and absence of effect pathways.			
European sites in scope	Dist (km)*	LSE (alone?)	Notes
Chesil and Fleet SAC	5.8	0	Site/features not exposed and sensitive to likely outcomes of option (separate catchment; distance)
Chesil Beach and The Fleet Ramsar	5.8	0	Site/features not exposed and sensitive to likely outcomes of option (separate catchment; distance). Mobile features (waterbirds) not functionally dependent on habitats affected by works.
Chesil Beach and The Fleet SPA	5.8	0	Site/features not exposed and sensitive to likely outcomes of option (separate catchment; distance). Mobile features not functionally dependent on habitats affected by works.
Crookhill Brick Pit Pit SAC	5.8	0	Site/features not exposed and sensitive to likely outcomes of option (separate catchment; distance) Mobile feature of site (great crested newt) is a short-range disperser and will not be dependent on habitats more than a few hundred metres from the site.
Isle of Portland to Studland Cliffs SAC	6.0	0	Site/features not exposed and sensitive to likely outcomes of option (separate catchment; distance)
Lyme Bay and Torbay SAC	8.7	0	Site/features not exposed and sensitive to likely outcomes of option (separate catchment; distance)
Dorset Heathlands Ramsar	9.7	0	Site/features not exposed and sensitive to likely outcomes of option (separate catchment; distance)

European sites in scope	Dist (km)*	LSE (alone?)	Notes
Dorset Heaths SAC	9.7	0	Site/features not exposed and sensitive to likely outcomes of option (separate catchment; distance) Mobile features of site (southern damselfly; great crested newt) are short-range dispersers and will not be dependent on habitats more than a few hundred metres from the site.
Dorset Heathlands SPA	9.9	0	Site/features not exposed and sensitive to likely outcomes of option (separate catchment; distance). Mobile features not functionally dependent on habitats affected by works.
Cerne and Sydling Downs SAC	11.0	0	Site/features not exposed and sensitive to likely outcomes of option (separate catchment; distance). Mobile features of site (marsh fritillary butterfly) are short-range dispersers and will not be dependent on habitats more than a few hundred metres from the site.
Studland to Portland SAC	11.7	0	Site/features not exposed and sensitive to likely outcomes of option (separate catchment; distance)
West Dorset Alder Woods SAC	13.6	0	Site/features not exposed and sensitive to likely outcomes of option (separate catchment; distance). Mobile features of site (marsh fritillary butterfly; great crested newt) are short-range dispersers and will not be dependent on habitats more than a few hundred metres from the site.
Isle of Portland to Studland Cliffs SAC	6.0	0	Site/features not exposed and sensitive to likely outcomes of option (separate catchment; distance)
Lyme Bay and Torbay SAC	8.7	0	Site/features not exposed and sensitive to likely outcomes of option (separate catchment; distance)
Dorset Heathlands Ramsar	9.7	0	Site/features not exposed and sensitive to likely outcomes of option (separate catchment; distance)

Table 4.3 Option screening summary – 39.01

39.01			
Under-utilised licence - North Bath Source			
Option Summary			
Increase utilisation of a small reservoir North of Bath to help meet peak demands through a new pre-treatment works, and use of existing infrastructure for ongoing treatment and distribution.			
General Assessment Notes			
This option would utilise spare water that is currently unused in a small reservoir North of Bath; it is assumed that all current operational requirements (e.g. compensation releases if required) will be maintained, and hence no effects on downstream receptors would be anticipated. Construction works would be relatively small scale, located adjacent to the reservoir, and effects on European sites would not occur irrespective of mitigation measures due to the distance to the sites.			
European sites in scope	Dist (km)*	LSE (alone?)	Notes
Bath and Bradford-on-Avon Bats SAC	5.8	0	Site not exposed to construction effects (distance, no pollutant pathways); construction is located beyond the Core Sustainance Zone (CSZ; see Appendix B) defined for the mobile interest feature of the site although potential effects on this site as part of the south-west network of bat sites is considered through AA.
Avon Gorge Woodlands SAC	19.2	0	Site/feature not exposed and sensitive to likely outcomes of option (distance)
Severn Estuary Ramsar	DS	0	Site/feature not exposed and sensitive to likely outcomes of option (distance, option characteristics)
Severn Estuary SPA	DS	0	Site/feature not exposed and sensitive to likely outcomes of option (distance, option characteristics)
Severn Estuary/ Môr Hafren SAC	DS	0	Site/feature not exposed and sensitive to likely outcomes of option (distance, option characteristics)

Table 4.4 Option screening summary – 39.02

39.02

Under-utilised Licence - North Warminster

Option Summary

The option involved drilling two new boreholes at an existing site north of Warminster to improve the yield of the source.

General Assessment Notes

This option involves the replacement of under-performing boreholes; abstraction would remain within the terms of the existing licence. Construction works would be relatively small scale, and effects on downstream European sites (Severn estuary sites) would not occur irrespective of mitigation measures due to the distance to the sites. With regard to operation, the WFD assessment concluded that the option had the potential for localised impacts on baseflows in the Biss Brook (which flows towards the Bristol Avon), and potentially the Upper Hampshire Avon Water Body; however, this licence has not been identified for sustainability reductions in relation to the Hampshire Avon and the ALS for the closest assessment point (AP) on the Avon indicates that restricted water is available for licensing (this takes account of the current consent); on this basis the improvement of the borehole yield will not significantly affect the River Avon SAC.

European sites in scope	Dist (km)*	LSE (alone?)	Notes
Salisbury Plain SAC	1.4	U*	Site not exposed to construction effects (distance, up-catchment, no pollutant pathways); pipeline may affect functionally associated land for the mobile species.
Salisbury Plain SPA	1.4	U*	Site not exposed to construction effects (distance, up-catchment, no pollutant pathways); pipeline may affect functionally associated land for the mobile species.
River Avon SAC	4.5	0	Site/features not exposed to construction effects (distance, separate catchment); operation of boreholes is within the terms of the licence which not been identified for sustainability reductions in relation to the Hampshire Avon and the ALS for the closest assessment point (AP) on the Avon indicates that restricted water is available for licensing (this takes account of the current consent); on this basis the improvement of the borehole yield will not significantly affect the River Avon SAC.
Mells Valley SAC	10.6	0	Site not exposed to construction effects (distance, no pollutant pathways); pipeline is located beyond the the Core Sustenance Zone (CSZ; see Appendix B) defined for the mobile interest feature of the site although potential effects on this site as part of the south-west network of bat sites is considered through AA.

European sites in scope	Dist (km)*	LSE (alone?)	Notes
Bath and Bradford-on-Avon Bats SAC	14.1	0	Site not exposed to construction effects (distance, no pollutant pathways); pipeline is located beyond the the Core Sustenance Zone (CSZ; see Appendix B) defined for the mobile interest feature of the site although potential effects on this site as part of the south-west network of bat sites is considered through AA.
Mendip Woodlands SAC	15.0	0	Site/feature not exposed and sensitive to likely outcomes of option (distance, option characteristics, scale of works)

Table 4.5 Option screening summary – 59.01

59.01			
Mere Stream Support			
Option Summary			
Option to provide stream support to an upper Dorset Stour tributary to allow current abstraction in the catchment to continue.			
General Assessment Notes			
Option will not affect any European sites due to the scale of the works and the distance to nearest sites (i.e. no features likely to be exposed to any environmental changes associated with the scheme).			
European sites in scope	Dist (km)*	LSE (alone?)	Notes
River Avon SAC	8.4	0	Site/features not exposed and sensitive to likely outcomes of option (distance, separate catchment)
Fontmell and Melbury Downs SAC	13.5	0	Site/features not exposed and sensitive to likely outcomes of option (distance)
Salisbury Plain SAC	13.5	0	Site/features not exposed and sensitive to likely outcomes of option (distance). Mobile features of site (marsh fritillary butterfly) are short-range dispersers and will not be dependent on habitats more than a few hundred metres from the site.
Salisbury Plain SPA	13.5	0	Site/features not exposed and sensitive to likely outcomes of option (distance). Mobile features of site (Hen harrier; Eurasian hobby; Common quail; Stone-curlew) are strongly associated with the habitats of the site and population integrity will not be reliant on agricultural habitats temporarily affected by pipeline construction at this distance.
Mendip Woodlands SAC	14.8	0	Site/features not exposed and sensitive to likely outcomes of option (distance)
Mells Valley SAC	15.1	0	Site/features not exposed and sensitive to likely outcomes of option (distance). Pipeline is located beyond the Core Sustainance Zone (CSZ; see Appendix B) defined for the mobile interest feature (greater horseshoe bat) of the site although potential effects on this site as part of the south-west network of bat sites is considered through AA.

European sites in scope	Dist (km)*	LSE (alone?)	Notes
Chilmark Quarries SAC	15.2	0	Site/features not exposed and sensitive to likely outcomes of option (distance). Pipeline is located beyond the Core Sustainance Zone (CSZ; see Appendix B) defined for the mobile interest features (lesser horseshoe, greater horseshoe, Barbastelle and Bechstein bats) of the site although potential effects on this site as part of the south-west network of bat sites is considered through AA.
Prescombe Down SAC	17.4	0	Site/features not exposed and sensitive to likely outcomes of option (distance). Mobile features of site (marsh fritillary butterfly) are short-range dispersers and will not be dependent on habitats more than a few hundred metres from the site.
Solent and Dorset Coast SPA	DS	0	Site/features not exposed and sensitive to likely outcomes of option (distance). Mobile features not functionally dependent on habitats affected by works.

Table 4.6 Option screening summary – 70.01

70.01			
Bristol Import and onwards transfer I			
Option Summary			
This option has two components: an import from Bristol (formerly option 18.26) and network improvements between Bowden and Devizes (formerly option 18.09).			
General Assessment Notes			
The Bristol import component of the option will not affect any sites (no construction required; option utilises surplus water from Bristol Water so no operational effects). The Bowden-Devizes transfer is moving spare treated water and so operational effects will not occur / be anticipated. Construction would cross tributaries of the River Avon SAC (>15km downstream) and hence the Solent and Dorset Coast SPA, and the Severn Estuary Ramsar/SPA and Severn Estuary/Môr Hafren SAC (approximately 40km d/s); effects on these sites are likely to be nil or negligible irrespective of any mitigation applied at the scheme-level (distance, attenuation). Construction will be required within 1km of the Bat sites within 20km (No other sites are exposed to potentially notable effects).			
European sites in scope	Dist (km)*	LSE (alone?)	Notes
Salisbury Plain SAC	3.8	0	Site is up-catchment so no risk of construction run-off affecting site; mobile features of site (marsh fritillary butterfly) are short-range dispersers and will not be dependent on habitats more than a few hundred metres from the site.
Salisbury Plain SPA	4.4	U*	Site is up-catchment so no risk of construction run-off affecting site. Mobile features of site (Hen harrier; Eurasian hobby; Common quail; Stone-curlew) are strongly associated with the habitats of the site and population integrity will not be reliant on the agricultural habitats temporarily affected by pipeline construction.
Pewsey Downs SAC	6.0	0	Site/feature not exposed and sensitive to likely outcomes of option (upstream site; distance)
Bath and Bradford-on-Avon Bats SAC	1.1	U*	Site not exposed to construction effects (distance, no pollutant pathways); pipeline is located within the Core Sustainance Zone the mobile interest feature of the site, lesser and greater horseshoe bats (CSZ; see Appendix B). Potential effects on this site as part of the south-west network of bat sites is considered through AA.
Mells Valley SAC	9.9	U*	Site/feature not exposed and sensitive to likely outcomes of option (upstream site; distance; feature distribution in site; species behaviour). Pipeline is located beyond the Core Sustainance Zone (CSZ; see Appendix B) defined for the mobile interest feature (greater horseshoe bat) of the site although potential effects on this site as part of the south-west network of bat sites is considered through AA.

European sites in scope	Dist (km)*	LSE (alone?)	Notes
River Avon SAC	10.4	0	A very small part of the pipeline near Devizes is technically within the upper reaches of the Hampshire Avon catchment, although there are no surface watercourses in this area that would provide a clear pathway for site-derived pollutants to reach this site.
Chew valley Lake SPA	13.4	0	Site/feature not exposed and sensitive to likely outcomes of option (separate catchment; distance)
Mendip Woodlands SAC	13.0	0	Site/feature not exposed and sensitive to likely outcomes of option (upstream site; distance)
Avon Gorge Woodlands SAC	15.9	0	Site/feature not exposed and sensitive to likely outcomes of option (distance; feature characteristics)
North Somerset and Mendip Bats SAC	18.2	0	Site/feature not exposed and sensitive to likely outcomes of option (separate catchment; distance; species behaviour). Pipeline is located beyond the Core Sustenance Zone (CSZ; see Appendix B) defined for the mobile interest features (greater and lesser horseshoe bats) of the site although potential effects on this site as part of the south-west network of bat sites is considered through AA.
Severn Estuary Ramsar	DS	0	The pipeline is within the upper reaches of the Bristol Avon catchment, and crosses minor unnamed streams that ultimately flow to this site, although potential construction effects on the site itself will self-evidently be nil (distance, attenuation) irrespective if mitigation; the features of this site will not be reliant on habitats closer to the construction areas that are likely to be exposed to environmental changes as a result of construction.
Severn Estuary SPA	DS	0	The pipeline is within the upper reaches of the Bristol Avon catchment, and crosses minor unnamed streams that ultimately flow to this site, although potential construction effects on the site itself will self-evidently be nil (distance, attenuation) irrespective if mitigation; the features of this site will not be reliant on habitats closer to the construction areas that are likely to be exposed to environmental changes as a result of construction.
Severn Estuary/ Môr Hafren SAC	DS	0	The pipeline is within the upper reaches of the Bristol Avon catchment, and crosses minor unnamed streams that ultimately flow to this site, although potential construction effects on the site itself will self-evidently be nil (distance, attenuation) irrespective if mitigation.
Solent and Dorset Coast SPA	DS	0	A very small part of the pipeline near Devizes is within the upper reaches of the Avon catchment (hence this site), although there are no surface watercourses in this area that would provide a clear pathway for site-derived pollutants to reach this site.

Table 4.7 Option screening summary – 70.06

70.06			
Increased Reservoir Capacity and East Transfer			
Option Summary			
This option has two components: an increase in reservoir peak capacity (formerly option 23.01) and upgrades to the CALM main (formerly option 18.02).			
General Assessment Notes			
No European sites or features are exposed to the likely effects of the increase in reservoir peak capacity (within existing licence and no additional abstraction over recent actuals required from Yeo, therefore the downstream sites associated with the Yeo (Somerset Levels SPA/Ramsar) will not be affected). The CALM main would be moving spare treated water and so operational effects would not be anticipated. Construction would cross tributaries of the Somerset Levels and Moors Ramsar/SPA, plus tributaries of the Severn Estuary Ramsar/SPA and Severn Estuary/Môr Hafren SAC, and of the Solent and Dorset Coast SPA (although these sites are all a substantial distance downstream); effects associated with construction can be avoided with established best-practice and are unlikely to present a constraint. No other sites are exposed to potentially notable effects.			
European sites in scope	Dist (km)*	LSE (alone?)	Notes
Somerset Levels and Moors Ramsar	5.8/DS	U*	Downstream receptor from construction areas; small risk of construction run-off affecting site but can be avoided using established scheme-level measures; 'screened in' for consistency with PoW.
Somerset Levels and Moors SPA	5.9/DS	U*	Downstream receptor from construction areas; small risk of construction run-off affecting site but can be avoided using established scheme-level measures; 'screened in' for consistency with PoW.
Bracket`s Coppice SAC	5.4	U*	Site not exposed to construction effects (distance, no pollutant pathways); pipeline is located beyond the Core Sustenance Zone (CSZ; see Appendix B) defined for the mobile interest feature of the site although potential effects on this site as part of the south-west network of bat sites is considered through AA.
West Dorset Alder Woods SAC	7.5	0	Site/feature not exposed to likely outcomes of option (distance, separate catchment)
River Avon SAC	8.5	0	Site/features not exposed to likely outcomes of option (distance, separate catchment)
Holnest SAC	10.7	0	Site/feature not exposed to likely outcomes of option (distance, separate catchment)
Chilmark Quarries SAC	12.7	0	Site not exposed to construction effects (distance, no pollutant pathways); pipeline is located beyond the the Core Sustenance Zone (CSZ; see Appendix B) defined for the mobile interest feature of the site although potential effects on this site as part of the south-west network of bat sites is considered through AA.

European sites in scope	Dist (km)*	LSE (alone?)	Notes
Mendip Woodlands SAC	13.2	0	Site/feature not exposed to likely outcomes of option (distance, separate catchment)
Salisbury Plain SAC	13.5	0	Site not exposed to likely outcomes of option (distance, separate catchment); mobile features will not be functionally reliant on the habitats affected by the pipeline (roads, agricultural land).
Salisbury Plain SPA	13.5	0	Site not exposed to likely outcomes of option (distance, separate catchment); mobile features will not be functionally reliant on the habitats affected by the pipeline (roads, agricultural land).
Mells Valley SAC	14.0	0	Site not exposed to construction effects (distance, no pollutant pathways); pipeline is located beyond the the Core Sustenance Zone (CSZ; see Appendix B) defined for the mobile interest feature of the site although potential effects on this site as part of the south-west network of bat sites is considered through AA.
Fontmell and Melbury Downs SAC	15.3	0	Site/feature not exposed to likely outcomes of option (distance, separate catchment)
Rooksmoor SAC	16.4	0	Site/feature not exposed to likely outcomes of option (distance, separate catchment)
Cerne and Sydling Downs SAC	18.8	0	Site/feature not exposed to likely outcomes of option (distance, separate catchment)
Prescombe Down SAC	19.3	0	Site/feature not exposed to likely outcomes of option (distance, separate catchment)
Severn Estuary Ramsar	DS	0	Pipeline crosses tributaries of this site in the upper reaches of its catchment; construction effects are likely to be nil irrespective of mitigation due to the distance downstream (>40km) and attenuation of any site-derived pollutants. Mobile features not functionally dependent on habitats affected by works. No operational effects.
Severn Estuary SPA	DS	0	Pipeline crosses tributaries of this site in the upper reaches of its catchment; construction effects are likely to be nil irrespective of mitigation due to the distance downstream (>40km) and attenuation of any site-derived pollutants. Mobile features not functionally dependent on habitats affected by works. No operational effects.
Severn Estuary/ Môr Hafren SAC	DS	0	Pipeline crosses tributaries of this site in the upper reaches of its catchment; construction effects are likely to be nil irrespective of mitigation due to the distance downstream (>40km) and attenuation of any site-derived pollutants. Mobile features not functionally dependent on habitats affected by works. No operational effects.

4.3 Inter-option ‘in combination’ screening assessment

- 4.3.1 The inter-option in combination screening assessment is summarised in **Table 4.8**. This identifies all those European sites that could potentially be affected by two or more rdWRMP24 options, and then determines whether ‘in combination’ likely significant effects can be excluded.

Table 4.8 Summary of screening stage inter-option ‘in combination’ assessment

Site	Screening summary					In combination summary
	22.04	39.01	39.02	59.01	70.01	
Avon Gorge Woodlands SAC		0			0	Not exposed to effects from any options; no effects are anticipated, therefore no possibility of in combination effects with other options or other projects / plans / programmes.
Bath and Bradford-on-Avon Bats SAC		0	0		U*	Potentially exposed to construction effects from more than one option, although likely to be avoidable with measures that can be introduced at the AA stage; considered collectively with the other bat sites due to potential functional linkages.
Bracket’s Coppice SAC						U* Only potentially exposed to effects from one option; no inter-option in combination effects. Considered collectively with the other bat sites due to potential functional linkages
Cerne and Sydling Downs SAC	0					0 Not exposed to effects from any options; no effects are anticipated, therefore no possibility of in combination effects with other options or other projects / plans / programmes.
Chesil and Fleet SAC	0					Not exposed to effects from any options; no effects are anticipated, therefore no possibility of in combination effects with other options or other projects / plans / programmes.
Chesil Beach and The Fleet Ramsar	0					Not exposed to effects from any options; no effects are anticipated, therefore no possibility of in combination effects with other options or other projects / plans / programmes.
Chesil Beach and The Fleet SPA	0					Not exposed to effects from any options; no effects are anticipated, therefore no possibility of in combination effects with other options or other projects / plans / programmes.

Site	Screening summary						In combination summary
	22.04	39.01	39.02	59.01	70.01	70.06	
Chew Valley Lake SPA					0		Not exposed to effects from any options (note, there is a functional relationship between this site and the Somerset Levels SPA/Ramsar, although this aspect is addressed through the assessment of those sites).
Chilmark Quarries SAC				0		0	Not exposed to effects from any options; however, considered collectively with the other bat sites due to potential functional linkages.
Crookhill Brick Pit Pit SAC	0						Not exposed to effects from any options; no effects are anticipated, therefore no possibility of in combination effects with other options or other projects / plans / programmes.
Dorset Heathlands Ramsar	0						Not exposed to effects from any options; no effects are anticipated, therefore no possibility of in combination effects with other options or other projects / plans / programmes.
Dorset Heathlands SPA	0						Not exposed to effects from any options; no effects are anticipated, therefore no possibility of in combination effects with other options or other projects / plans / programmes.
Dorset Heaths SAC	0						Not exposed to effects from any options; no effects are anticipated, therefore no possibility of in combination effects with other options or other projects / plans / programmes.
Fontmell and Melbury Downs SAC				0		0	Not exposed to effects from any options; no effects are anticipated, therefore no possibility of in combination effects with other options or other projects / plans / programmes.
Holnest SAC						0	Not exposed to effects from any options; no effects are anticipated, therefore no possibility of in combination effects with other options or other projects / plans / programmes.

Site	Screening summary						In combination summary
	22.04	39.01	39.02	59.01	70.01	70.06	
Isle of Portland to Studland Cliffs SAC	0						Not exposed to effects from any options; no effects are anticipated, therefore no possibility of in combination effects with other options or other projects / plans / programmes.
Lyme Bay and Torbay SAC	0						Not exposed to effects from any options; no effects are anticipated, therefore no possibility of in combination effects with other options or other projects / plans / programmes.
Mells Valley SAC			0	0	U*	0	Potentially exposed to construction effects from more than one option, although likely to be avoidable with measures that can be introduced at the AA stage; considered collectively with the other bat sites due to potential functional linkages.
Mendip Woodlands SAC			0	0	0	0	Not exposed to effects from any options; no effects are anticipated, therefore no possibility of in combination effects with other options or other projects / plans / programmes.
North Somerset and Mendip Bats SAC					0		Not exposed to effects from any options; however, considered collectively with the other bat sites due to potential functional linkages.
Pewsey Downs SAC					0		Not exposed to effects from any options; no effects are anticipated, therefore no possibility of in combination effects with other options or other projects / plans / programmes.
Prescombe Down SAC				0		0	Not exposed to effects from any options; no effects are anticipated, therefore no possibility of in combination effects with other options or other projects / plans / programmes.
River Avon SAC			0	0	0	0	Not exposed to effects from any options; no effects are anticipated, therefore no possibility of in combination effects with other options or other projects / plans / programmes.

Site	Screening summary						In combination summary
	22.04	39.01	39.02	59.01	70.01	70.06	
Rooksmoor SAC						0	Not exposed to effects from any options; no effects are anticipated, therefore no possibility of in combination effects with other options or other projects / plans / programmes.
Salisbury Plain SAC			U*	0	0	0	Potentially exposed to construction effects from more than one option, although construction effects likely to be avoidable with measures that can be introduced at the AA stage.
Salisbury Plain SPA			U*	0	U*	0	Potentially exposed to construction effects from more than one option, although construction effects likely to be avoidable with measures that can be introduced at the AA stage.
Severn Estuary Ramsar		0			0	0	Not exposed to effects from any options; no effects are anticipated, therefore no possibility of in combination effects with other options or other projects / plans / programmes.
Severn Estuary SPA		0			0	0	Not exposed to effects from any options; no effects are anticipated, therefore no possibility of in combination effects with other options or other projects / plans / programmes.
Severn Estuary/ Môr Hafren SAC		0			0	0	Not exposed to effects from any options; no effects are anticipated, therefore no possibility of in combination effects with other options or other projects / plans / programmes.
Solent and Dorset Coast SPA				0	0		Not exposed to effects from any options; no effects are anticipated, therefore no possibility of in combination effects with other options or other projects / plans / programmes.
Somerset Levels and Moors Ramsar						U*	Only potentially exposed to effects from one option, so no inter-option in combination effects possible.
Somerset Levels and Moors SPA						U*	Only potentially exposed to effects from one option, so no inter-option in combination effects possible.

Site	Screening summary						In combination summary
	22.04	39.01	39.02	59.01	70.01	70.06	
Studland to Portland SAC	0						Not exposed to effects from any options; no effects are anticipated, therefore no possibility of in combination effects with other options or other projects / plans / programmes.
West Dorset Alder Woods SAC	0					0	Not exposed to effects from any options; no effects are anticipated, therefore no possibility of in combination effects with other options or other projects / plans / programmes.

4.4 Screening Conclusions

4.4.1 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 4.9 Summary of options and sites requiring ‘appropriate assessment’

European site	Preferred Portfolio Options	Alone or IC*?
Bath and Bradford-on-Avon Bats SAC	39.01 39.02 59.01 70.01 70.06	Bat sites collectively
Bracket’s Coppice SAC	39.01 39.02 59.01 70.01 70.06	Bat sites collectively
Chilmark Quarries SAC	39.01 39.02 59.01 70.01 70.06	Bat sites collectively
Mells Valley SAC	39.01 39.02 59.01 70.01 70.06	Bat sites collectively
North Somerset and Mendip Bats SAC	39.01 39.02 59.01 70.01 70.06	Bat sites collectively
Salisbury Plain SAC / SPA	39.02 70.01	Alone / IC
Somerset Levels and Moors SPA / Ramsar	70.06	Alone

5. Appropriate Assessment – Bat Sites

5.1 Screening Summary

5.1.1 There are a number of sites designated for their bat populations in the Wessex area; sites within 20km of an option are as follows:

Table 5.1 European sites designated for bats within 20km of an option

Site	Distance (km) from option					
	22.04	39.01	39.02	59.01	70.01	70.06
Bath and Bradford-on-Avon Bats SAC		5.8	14.1		1.1	
Bracket's Coppice SAC						5.4
Chilmark Quarries SAC			18.1	15.2		12.7
Mells Valley SAC			10.6	15.1	9.9	14.0
North Somerset and Mendip Bats SAC					18.2	

5.1.2 Although bats will utilise wetland habitats for foraging they are not considered 'water resource dependent' features, insomuch as they are relatively insensitive to water volumes (etc.) *per se*; and none of these bat sites support ground- or surface-water dependent habitats. Furthermore, none of these options will have operational effects, all being transfer schemes or asset upgrades to improve treatment and resilience.

5.1.3 The proposed construction works will have no effects on the sites themselves due to the distance and absence of effect pathways, and so the qualifying habitats of these sites (see **Table 5.2**) are screened out and not considered further. However, the mobile features of the sites will be vulnerable to environmental changes associated with construction (e.g. lighting, severance effects on habitats used for commuting and/or foraging).

5.1.4 Given the similarities of these sites' qualifying features and the expected environmental changes associated with these options, the effects on these sites are considered together within this section.

5.2 European site summary

Sites overview

5.2.1 The south-west of England is a stronghold for the rarer UK bat species, notably Bechstein's bat, Barbastelle, greater horseshoe and lesser horseshoe. A number of European sites in the south-west are partly or wholly designated for their value to bats, including the seven sites within 20km of a rdWRMP option that are noted in **Table 5.1**.

5.2.2 Whilst some sites (typically the larger woodland sites) may include areas of supporting habitat used for foraging, the principal focus of the designations tends to be key roosting

locations for local bat populations throughout their lifecycles, including maternity and hibernation roosts. They may also be important for other activities including swarming. Some of the sites therefore have several geographically separate site units.

- 5.2.3 The usage of these sites by the local bat populations is complex, although it is clear that bat populations in the south-west move between these sites (plus many non-European designated sites, and undesignated sites and habitats) both seasonally and over shorter time periods depending on resource requirements. As a result it is not necessarily appropriate to consider the sites in isolation when considering potential effects on the qualifying features, and substantial areas of non-designated land will be functionally critical to the integrity of these sites and their populations.

Interest Features and Conservation Objectives

- 5.2.4 **Table 5.2** summarises the interest features of the bat sites within the assessment scope.

Table 5.2 Bat site interest features

Site	Qualifying features	Typical species / functional habitat
Bath and Bradford-on-Avon Bats SAC	<ul style="list-style-type: none"> • Lesser horseshoe bat <i>Rhinolophus hipposideros</i> • Greater horseshoe bat <i>Rhinolophus ferrumequinum</i> • Bechstein`s bat <i>Myotis bechsteini</i> 	Comprises ten discrete sites that include abandoned limestone mines used for hibernation by the bat species, together with some supporting habitat. No typical species are identified in the SACO; unspecified areas outside the SAC (typically within 4km) used for foraging are considered functionally linked, although other areas may be seasonally important when migrating to and from the site.
Bracket`s Coppice SAC	<ul style="list-style-type: none"> • Molinia meadows on calcareous, peaty or clayey-silt-laden soils (<i>Molinion caeruleae</i>) • Bechstein`s bat <i>Myotis bechsteini</i> 	Woodland site that provides maternity and (potentially) hibernation roosts for Bechstein`s bat. Typical species identified in the SACO are all associated with the <i>Molinia</i> meadows feature; no specific areas of functional land outside the SAC are identified (and it is recognised that Bechstein`s bat is strongly associated with woodland hence the site itself) although areas near the site may be seasonally important when migrating or for foraging.
Chilmark Quarries SAC	<ul style="list-style-type: none"> • Lesser horseshoe bat <i>Rhinolophus hipposideros</i> • Greater horseshoe bat <i>Rhinolophus ferrumequinum</i> • Barbastelle <i>Barbastella barbastellus</i> • Bechstein`s bat <i>Myotis bechsteini</i> 	Comprises two SSSIs that form a complex of abandoned mines and subterranean follies used for hibernation, with some quarries and associated buildings using for mating, nursery and summer roosts. No typical species are identified in the SACO; unspecified areas outside the SAC (typically within 4km) used for foraging are considered 'functionally linked, although other areas may be seasonally important when migrating to and from the site.
Mells Valley SAC	<ul style="list-style-type: none"> • Semi-natural dry grasslands and scrubland facies on calcareous substrates (<i>Festuco-Brometalia</i>) (* important orchid sites) • Caves not open to the public • Greater horseshoe bat <i>Rhinolophus ferrumequinum</i> 	Composite site comprising a former industrial area and nearby limestone caves; the industrial area formerly supported a significant Greater horseshoe bat maternity colony, with hibernation sites in the caves. Typical species identified in the SACO are all associated with the qualifying habitats. No specific areas of functional land outside the SAC are identified although areas near the site will provide foraging resources for this species and may be seasonally important when migrating.

Site	Qualifying features	Typical species / functional habitat
North Somerset and Mendip Bats SAC	<ul style="list-style-type: none"> • Semi-natural dry grasslands and scrubland facies on calcareous substrates (<i>Festuco-Brometalia</i>) (* important orchid sites) • Caves not open to the public • Tilio-Acerion forests of slopes, screes and ravines • Lesser horseshoe bat <i>Rhinolophus hipposideros</i> • Greater horseshoe bat <i>Rhinolophus ferrumequinum</i> 	<p>Composite site comprising areas of ancient woodland and cave systems supporting breeding and hibernating bats and associated foraging habitats. Typical species identified in the SACO are all associated with the qualifying habitats. No specific areas of functional land outside the SAC are identified although areas near the site will provide foraging resources for these species and may be seasonally important when migrating.</p>

- 5.2.5 The overarching **conservation objectives** for all of the sites are essentially as per those outlined in **Section 3.3**. Specific attributes and targets associated with the conservation objectives are provided in the ‘Supplementary advice on conservation objectives’; these are not explicitly listed here but are available online and are referred to as appropriate in the assessment sections below.

5.3 Assessment of Effects

- 5.3.1 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).
- 5.3.2 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.
- 5.3.3 All of the options are outside the CSZs for the relevant species.
- 5.3.4 Outside of the CSZs, the risk of potentially notable effects due to construction on functional habitats (sufficient to adversely affect the integrity of the sites) is low. This is due to the inherent scale and temporary nature of the construction works, and whilst effects on habitats periodically utilised by bats associated with these sites cannot be categorically excluded it is clear that established measures for avoiding or minimising effects on bats (e.g. surveys and planning; designed avoidance such as directional drilling or route micro-siting; seasonal working; see Appendix C) can be relied on to ensure that adverse effects do not occur.
- 5.3.5 On this basis the options will have **no adverse effects**, on the Bath and Bradford-on-Avon Bats SAC, Bracket’s Coppice SAC, Chilmark Quarries SAC, Mells Valley SAC or North Somerset and Mendip Bats SAC.

Option uncertainties

- 5.3.6 There are no key uncertainties over the intended operation of the options.

Other projects ‘in combination’

Options in other WW plans

- 5.3.7 With regard to other WW plans:
- The drought options identified in WW’s revised draft **Drought Plan 2021** do not affect these European sites.

- The interaction of the rdWRMP options with specific schemes derived from the emerging **Drainage and Wastewater Management Plan** (DWMP) can only be assessed at the project level due to the generic nature of the DWMP options.

Minor projects

- 5.3.8 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.

Major Projects

- 5.3.9 Reference has been made to the Planning Inspectorate's National Infrastructure Projects database³⁰ which includes major projects; no major projects are identified on this database that are likely to affect these sites.

Uncertainties and preliminary conclusion

- 5.3.10 There are no substantive uncertainties regarding operation of the options and effects on these sites; there is a minor residual uncertainty in relation to functional land that may be affected by construction but habitats that are functionally critical to the integrity of the SACs will not be permanently affected, and risks during construction will be low (based on the indicative pipeline routes and nature of the infrastructure). These residual risks can clearly be managed / avoided using established project-level measures (see Appendix C); application of these measures will ensure that the options will have **no adverse effects, alone or in combination**, on the integrity of **Bath and Bradford-on-Avon Bats SAC, Bracket's Coppice SAC, Chilmark Quarries SAC, Mells Valley SAC or North Somerset and Mendip Bats SAC**).

³⁰ <https://infrastructure.planninginspectorate.gov.uk/projects/>

6. Appropriate Assessment – Somerset Moors and Levels SPA / Ramsar

6.1 Screening Summary

6.1.1 The Somerset Moors and Levels SPA and Somerset Moors and Levels Ramsar are addressed together in the following sections as the site boundaries and interest features are practically and ecologically coincident.

6.1.2 One option (the 70.06) is located within 20km or upstream of the SPA / Ramsar; this option has the potential to affect these sites through construction of the various components. The scheme will not alter the overall environmental operation of the Sutton Bingham reservoir (i.e. all compensation releases etc. will be maintained) and so operational effects on downstream receptors will not occur.

6.2 European site summaries

Site overview

6.2.1 The Somerset Levels are an extensive area of lowland wet grassland and associated wetlands, much of which is more or less at sea level, located between the Mendip and Quantock hills. The Levels have been subject to significant modification through drainage and reclamation, with water levels now generally managed through a complex system of sea walls, raised banks, ditches, sluices and pumped drainage. The **Somerset Levels SPA** and **Somerset Levels Ramsar** site (which are largely coincident) cover a complex of around twelve SSSIs across various surface water catchments, and are designated for their wintering birds, the associated wetland habitats, and populations of rarer invertebrates.

Interest Features and Conservation Objectives

6.2.2 The SPA has the following qualifying species:

- Qualifying individual species listed in Annex I of the Wild Birds Directive (Article 4.1):
 - ▶ Bewick's swan;
 - ▶ Golden plover;
- Qualifying individual species not listed in Annex I of the Wild Birds Directive (Article 4.2):
 - ▶ Eurasian teal;
 - ▶ Northern lapwing
- The site qualifies under Article 4.2 as it is used regularly by over 20,000 waterfowl in winter.

6.2.3 The site meets the following Ramsar criteria:

- Criterion 2: The site supports 17 species of Red Data Book invertebrates including *Hydrochara caraboides*, *Bagous nodulosus*, *Odontomyia angulata*, *Oulema erichsoni*,

Valvata macrostoma, Odontomyia ornata, Stethophyma grossum, Pteromicra leucopeza, Lejops vittata, Cantharis fusca, Paederus caligatus, Hydaticus transversalis, Dytiscus dimidiatus, Hydrophilus piceus, Limnebus aluta and Laccornis oblongus.

- Criterion 5: The site supports a waterfowl assemblage of international importance.
- Criterion 6: The site supports the following qualifying species:
 - ▶ Eurasian teal;
 - ▶ Northern lapwing;
 - ▶ Eurasian Wigeon (included for possible future consideration under criterion 6);
 - ▶ Mute swan (included for possible future consideration under criterion 6);
 - ▶ Northern pintail (included for possible future consideration under criterion 6);
 - ▶ Northern shoveler (included for possible future consideration under criterion 6).

6.2.4 With regard to the **supporting habitats** for the SPA qualifying features, these are identified in the ‘supplementary advice’ as those that support the key behaviours of the nonbreeding/wintering period (moulting, roosting, loafing and feeding), i.e. open water, grazing marsh, fen, reedbeds, species-rich and species-poor neutral grassland, open water, rivers, artificial drainage channels and ditches. Specific targets for each habitat are not set, however, due to the large number of species and natural fluctuations in the overall composition of an assemblage; rather the diversity and overall functionality of the habitats is critical.

6.2.5 Specific areas of **‘functional land’** are not generally identified in the ‘supplementary advice’ (although the RSPB reserves at Greylake and Ham Wall are noted, and there is a known flyway between the Levels and the Severn Estuary) as the location and extent of such land cannot necessarily be precisely defined since it will (to some extent) vary seasonally and with longer-term changes in land-use.

6.2.6 The ‘supplementary advice’ notes that “Land of functional importance on the floodplain outside the SPA boundary includes arable land, species-poor grassland, species-rich grassland and a variety of wetland habitats in nature conservation reserves”. There is a difference between land that is fundamentally critical to the functional integrity of the SPA/Ramsar and its qualifying features (a known significant roosting site, for example) and land which may be periodically used by these species and which contributes to the overall habitat resource, but as the European sites cover only 12% of the Somerset Levels floodplain it is self-evident that a substantial habitat resource outside the site boundary is critical to the integrity of the SPA/Ramsar (collectively, if not necessarily in isolation). The total resource and management of functional land is therefore something that can only (and must) be addressed at the landscape scale.

6.2.7 The overarching **conservation objectives** for the site are essentially as per those outlined in Section 3.3. Specific attributes and targets associated with the conservation objectives are provided in the ‘Supplementary advice on conservation objectives’; these are not explicitly listed here but are available online³¹ and are referred to as appropriate in the assessment sections below.

³¹ Available at: <http://publications.naturalengland.org.uk/file/4881623615275008>

Condition, Pressures and Threats

- 6.2.8 The condition assessments for the SSSI units underpinning the SPA were updated in 2021, with the result that the majority of the units that are potentially exposed to effects associated with the Drought Plan options are currently categorised as being ‘unfavourable declining’ condition (previously, the units were mostly classified as ‘favourable’ or ‘unfavourable recovering’ condition). This is principally due to water quality causing ditch and invertebrate assemblage (Ramsar feature) targets to fail; the effect of this on wintering birds is less clear, however.
- 6.2.9 Other reasons noted for SSSI units being in ‘unfavourable declining’ or ‘unfavourable recovering’ include:
- Freshwater drainage (relates primarily to deep and prolonged flooding).
 - Freshwater pollution (primarily in relation to elevated phosphate levels and from agricultural discharges and urban and/or road sources)
 - Management (inappropriate cutting/mowing; undergrazing);
 - Inappropriate weirs, dams and other structures (primarily in relation to control of water levels);
 - Lack of corrective works.
 - Inappropriate weed control.
 - Public access/disturbance.
- 6.2.10 Accordingly, the SIP identifies the following as pressures or threats affecting site integrity in those areas potentially sensitive to the options;
- Drainage;
 - Inappropriate water levels;
 - Requirement for maintenance and upgrading of water management structures;
 - Changes in land management;
 - Agricultural management practices;
 - Peat extraction;
 - Public Access/Disturbance;
 - Offsite habitat availability/ management

6.3 Assessment of Effects

- 6.3.1 This site is exposed to one option (**Option 70.06: Increased Reservoir Capacity and East Transfer**), which has two components: an **increase in reservoir peak capacity** (formerly option 23.01) and **upgrades to the CALM main** (formerly option 18.02).

Increased Reservoir Capacity

- 6.3.2 This component of the option requires minor treatment upgrade works at an impounding impounding reservoir up-catchment from the Somerset Levels to enable the WSW output to reach 22MI/d (installation of a Dissolved Air Flotation (DAF) process). The scheme will not alter the overall environmental operation of the reservoir (i.e. all compensation

releases etc. will be maintained) and so operational effects on downstream receptors will not occur.

6.3.3 The potential pathways for effects on the SPA / Ramsar are therefore:

- via site-derived pollutants entering the River Yeo and hence potentially Wet Moor SSSI (~25km downstream of the reservoir);
- construction-related disturbance of birds associated with the SPA/Ramsar that may utilise the reservoir as 'functional habitat'.

6.3.4 With regard to site-derived pollutants affecting this site itself via the Yeo, this pathway can be reliably prevented using established project-level measures (see Appendix C); application of these measures will ensure that the scheme has 'no effect' on the habitats of the SPA / Ramsar or its interest features through this mechanism.

6.3.5 With regard to disturbance of SPA/Ramsar birds utilising the reservoir, the potential for adverse effects on the SPA/Ramsar population is considered low:

- Records data from the reservoir do not suggest that the qualifying features of the SPA/Ramsar are a significant component of the winter assemblage at the reservoir, with this tending to be dominated by species that favour deeper open water habitats (e.g. pochard, tufted duck, gadwall).
- The reservoir does not have particularly extensive areas of shallow wetland or seasonally inundated land associated with it that would be attractive to the SPA/Ramsar species.
- Significant areas of more-favoured habitats (designated and undesignated) are available across the Somerset Levels, and would be preferentially used and/or available if birds are displaced from the reservoir by construction disturbance.
- The reservoir is used extensively for recreation (including sailing) and so is not an inherently 'low disturbance' environment.

6.3.6 In addition, it is clear that potential effects on SPA/Ramsar the bird interest of the site can be avoided or substantially minimised through established best-practice and avoidance measures outlined in Appendix C, including:

- pre-development surveys;
- avoiding construction during the winter period, if required;
- monitoring construction works and pausing if significant aggregations of qualifying bird species are present close to the construction area;
- construction management measures (e.g. 'soft-start' of machinery).

6.3.7 Therefore, there is a high degree of confidence that adverse effects will not occur as a result of this option.

CALM main upgrade and reversal

6.3.8 This option is a transfer scheme moving spare treated water between two service reservoirs, and so operational effects will not occur. The scheme would require construction of a new ~43km main with a booster station required near Yarlinton. The new main would need to cross tributaries of the Wet Moor SSSI component of the SPA/Ramsar, including the River Cam and River Yeo. The construction works are all over 5km from the nearest units of the SPA/Ramsar and so proximity-associated effects on the sites (e.g. air quality changes, disturbance of species utilising site habitats) will not occur.

- 6.3.9 The potential pathways for effects on the SPA / Ramsar are therefore:
- via site-derived pollutants entering tributaries of Wet Moor SSSI via the River Yeo;
 - through possible construction noise or visual disturbance affecting birds using non-designated functional land closer to the pipeline route;
 - through temporary effects on non-designated functional land along the pipeline route.
- 6.3.10 With regard to site-derived pollutants affecting this site itself (or functional land), this pathway can be reliably prevented using established project-level measures (see Appendix C); application of these measures will ensure that the scheme has ‘no effect’ on the habitats of the SPA / Ramsar or its interest features.
- 6.3.11 With regard to functional land, the areas affected by the pipeline are mostly outside the wider Somerset Levels and do not affect habitats likely to be particularly favoured by the qualifying features, so the risk of effects is generally low. The value of these areas to wintering birds associated with the sites cannot be determined without scheme-specific survey data, and so there is some residual uncertainty; however, it is clear that effects on the bird interest of the sites can be avoided or substantially minimised through established best-practice and avoidance measures outlined in Appendix C, including:
- pre-development surveys;
 - avoiding construction during the winter period;
 - monitoring construction works and pausing if significant aggregations of qualifying bird species are present close to the construction area;
 - construction management measures (e.g. ‘soft-start’ of machinery).
- 6.3.12 Therefore, there is a high degree of confidence that adverse effects will not occur as a result of this option.

Other projects ‘in combination’

Options in other WW plans

- 6.3.13 With regard to other WW plans:
- Currently, some of the drought options identified in WW’s revised draft **Drought Plan 2021** could affect these European sites, although the inclusion of these options is under review, and these options are not selected in the rdWRMP in any case. Furthermore, the impact of the Drought Plan options is primarily in relation to the invertebrate interest of the Ramsar site itself, which will not be exposed to effects from the rdWRMP options (with scheme-level mitigation), and so adverse effects on the SPA/Ramsar from the rdWRMP options in combination with the Drought Plan would not be expected.
 - The interaction of the rdWRMP options with specific schemes derived from the emerging **Drainage and Wastewater Management Plan (DWMP)** can only be assessed at the project level due to the generic nature of the DWMP options.

Minor projects

- 6.3.14 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.

Major Projects

- 6.3.15 Reference has been made to the Planning Inspectorate's National Infrastructure Projects database³² which includes major projects; no major projects are identified on this database that are likely to affect these sites in combination with the rdWRMP options.

Uncertainties and preliminary conclusion

- 6.3.16 There are no substantive uncertainties regarding operation of the options and effects on these sites; there is a minor residual uncertainty in relation to functional land that may be affected by construction but the likelihood of habitats that are functionally critical to the integrity of the SPA/Ramsar being affected is extremely low (based on the indicative pipeline routes and nature of the infrastructure). These residual risks can clearly be managed / avoided using established project-level measures (see Appendix C); application of these measures will ensure that the options will have **no adverse effects, alone or in combination, on the integrity of the Somerset Levels SPA / Ramsar**.

³² <https://infrastructure.planninginspectorate.gov.uk/projects/>

7. Appropriate Assessment – Salisbury Plain SAC / SPA

7.1 Screening Summary

- 7.1.1 Salisbury Plain SAC and Salisbury Plain SPA addressed together in the following sections due to the geographical and ecological overlaps.
- 7.1.2 Four options (39.02, 59.01, 70.01 and 70.06) are located within 20km or upstream of the SAC / SPA.
- 7.1.3 Two of these options will have no effect on the sites or their qualifying features (59.01, and 70.06) as all of the works required are (a) temporary construction works at least 10km from the sites (no risk of effects on ‘functional’ habitats); (b) in separate catchments or down-catchment from the sites (no pathways for site-derived pollutants); and transfer schemes only (no operational effects).
- 7.1.4 The remaining options involve construction works within 5km of the sites and so construction effects are possible in the absence of mitigation.

7.2 European site summaries

Site overview

- 7.2.1 Salisbury Plain is an extensive and open rolling chalk plateau cut by the Hampshire Avon and tributaries. The key habitat type is chalk grassland, with some secondary and ancient woodland present and substantial areas of juniper scrub on parts of Salisbury Plain and much of Porton Down. The SAC and SPA are largely coincident, and cover three main areas of chalk grassland (Salisbury Plain SSSI, Porton Down SSSI and Parsonage Down SSSI).

Interest Features and Conservation Objectives

- 7.2.2 The SAC has the following **qualifying features**:
- Annex I habitats:
 - ▶ *Juniperus communis* formations on heaths or calcareous grasslands
 - ▶ Semi-natural dry grasslands and scrubland facies on calcareous substrates (*Festuco-Brometalia*) (* important orchid sites)
 - Annex II species:
 - ▶ Marsh fritillary butterfly *Euphydryas* (*Eurodryas*, *Hypodryas*) *aurinia*"
- 7.2.3 The ‘supplementary advice’ also provides guidance on the ‘**typical species**’ considered to be associated with the site; these include:
- The constant and preferential vascular plants associated with the CG2 – CG7 NVC communities.
 - The assemblage of rare chalk grassland plants.

- The assemblage of chalk grassland invertebrates.
- The population of fairy shrimp *Chirocephalus diaphanous*.
- The population of European or common rabbit *Oryctolagus cuniculus*.

7.2.4 With regard to **functional land**, the SACO notes that “*Salisbury Plain SSSI and surrounding SSSIs and County Wildlife Sites on the chalk, are considered to be multiple ‘grassland ecological networks’ at a 250m species dispersal level e.g. marsh fritillary butterfly, and a single, much larger network at the 2,500m dispersal level*”. The land between these sites may provide critical functional connection for marsh fritillary butterfly (and other invertebrates).

7.2.5 The **SPA** has the following qualifying species:

- Hen harrier *Circus cyaneus* (Non-breeding)
- Eurasian hobby *Falco subbuteo* (Breeding)
- Common quail *Coturnix coturnix* (Breeding)
- Stone-curlew *Burhinus oedicephalus* (Breeding)

7.2.6 With regard to the **supporting habitats** for the SPA qualifying features, these are identified in the ‘supplementary advice’ as lowland calcareous grassland, semi-improved and improved grassland, and arable (all open landscape habitats), with small woods being used for breeding by Hobby.

7.2.7 Broad areas of **‘functional land’** are identified in the ‘supplementary advice’, including

- Everleigh Ashes (breeding hobby);
- local RSPB reserves to the east of the site and nearby downland (stone curlew)
- Bratton Downs to the north and Parsonage Down NNR (chalk grassland used by hen harrier);

7.2.8 The overarching **conservation objectives** for the site are essentially as per those outlined in Section 3.3. Specific attributes and targets associated with the conservation objectives are provided in the ‘Supplementary advice on conservation objectives’; these are not explicitly listed here but are available online³³ and are referred to as appropriate in the assessment sections below.

Condition, Pressures and Threats

7.2.9 The SSSI units underpinning the sites are all in favourable or unfavourable recovering condition. The SIP identifies the following as pressures or threats affecting site integrity in those areas potentially sensitive to the options:

- Change in species distribution;
- Air pollution (nitrogen deposition).

³³ Available at: <http://publications.naturalengland.org.uk/file/6316828921430016>;
<http://publications.naturalengland.org.uk/file/4892385184317440>

7.3 Assessment of Effects

Option 39.02 (Under-utilised licence - North Bath Source)

- 7.3.1 This option involves drilling two new boreholes into the chalk aquifer and laying ~500m of main between the boreholes and the existing WTW.
- 7.3.2 The option will operate within the terms of the existing abstraction licence, although the features of the SAC / SPA are not exposed or sensitive to groundwater abstraction (therefore no operational effects).
- 7.3.3 Construction will be required within ~1.4km of the SAC/SPA; there are no pathways for site-derived pollutants to affect the sites (distance; sites are up-catchment); the potential pathways for effects on the SAC / SPA are therefore:
- through possible construction noise or visual disturbance affecting birds within the SPA/Ramsar or using non-designated functional land closer to the pipeline route;
 - through temporary effects on non-designated functional land along the pipeline route.
- 7.3.4 With regard to functional land, the value of the areas affected by construction to birds associated with the SPA or invertebrates associated with the SAC (notably marsh fritillary) cannot be determined without scheme-specific survey data, and so there is some residual uncertainty; however, it is clear that effects on these features (if present) can be avoided or substantially minimised through established best-practice and avoidance measures outlined in Appendix C, including:
- pre-development surveys;
 - avoiding construction during the key periods;
 - monitoring construction works and pausing if qualifying bird species are present close to the construction area;
 - construction management measures (e.g. 'soft-start' of machinery).
- 7.3.5 Therefore, there is a high degree of confidence that adverse effects will not occur as a result of this option.

Option 70.01 (Bristol Import and onwards transfer I)

- 7.3.6 This option has two components: an import from Bristol (formerly option 18.26) and network improvements between Bowden and Devizes (formerly option 18.09), and involves pipeline construction within 5km of the site.
- 7.3.7 There will be no operational effects as a result of this option (features of the SAC / SPA are not exposed or sensitive to abstraction).
- 7.3.8 Construction will be required within ~4.4km of the SAC/SPA; there are no pathways for site-derived pollutants to affect the sites (distance; sites are up-catchment); the potential pathways for effects on the SAC / SPA are therefore:
- through possible construction noise or visual disturbance affecting birds within the SPA/Ramsar or using non-designated functional land closer to the pipeline route;
 - through temporary effects on non-designated functional land along the pipeline route.
- 7.3.9 With regard to functional land, the value of the areas affected by construction to birds associated with the SPA cannot be determined without scheme-specific survey data, and

so there is some residual uncertainty; however, it is clear that effects on these features (if present) can be avoided or substantially minimised through established best-practice and avoidance measures outlined in Appendix C, including:

- pre-development surveys;
- avoiding construction during the key periods;
- monitoring construction works and pausing if qualifying bird species are present close to the construction area;
- construction management measures (e.g. ‘soft-start’ of machinery).

7.3.10 Therefore, there is a high degree of confidence that adverse effects will not occur as a result of this option.

Other projects ‘in combination’

Options in other WW plans

7.3.11 With regard to other WW plans:

- The drought options identified in WW’s revised draft **Drought Plan 2021** do not affect these European sites.
- The interaction of the rdWRMP options with specific schemes derived from the emerging **Drainage and Wastewater Management Plan (DWMP)** can only be assessed at the project level due to the generic nature of the DWMP options.

Minor projects

7.3.12 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.

Major Projects

7.3.13 Reference has been made to the Planning Inspectorate’s National Infrastructure Projects database³⁴ which includes major projects; no major projects are identified on this database that are likely to affect these sites in combination with the rdWRMP options.

Uncertainties and preliminary conclusion

7.3.14 There are no substantive uncertainties regarding operation of the options and effects on these sites; there is a minor residual uncertainty in relation to functional land that may be affected by construction but the likelihood of habitats that are functionally critical to the integrity of the SAC/SPA being affected is extremely low (based on the indicative pipeline routes and nature of the infrastructure). These residual risks can clearly be managed / avoided using established project-level measures (see Appendix C); application of these

³⁴ <https://infrastructure.planninginspectorate.gov.uk/projects/>

measures will ensure that the options will have **no adverse effects, alone or in combination, on the integrity of the Salisbury Plain SAC / SPA).**

8. Demand-Side Options

8.1 Screening Summary

- 8.1.1 There is one demand-side option: Option 57.07 (Demand Strategy 7). This option will involve:
- Full urban smart AMI by 2030, rural also by 2035
 - Household water efficiency checks to be at the largest feasible scale by 2030
 - Non-household water efficiency checks to be at the largest feasible scale by 2030
 - Leakage profile will be linear to 2050 (~1 MI/d)
- 8.1.2 Some of these elements may require some form of physical intervention or amendment to the network.
- 8.1.3 The works required for the vast majority of these interventions will be very minor (e.g. meter installation) 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 or identify specific locations where such measures might be applied at the WRMP-level and so effects on specific European sites cannot be identified.
- 8.1.4 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.

8.2 Appropriate Assessment

- 8.2.1 Demand-side options 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; households requesting meters) 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.
- 8.2.2 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.
- 8.2.3 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 rdWRMP 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 rdWRMP 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. It can therefore be concluded that the demand side measures will have no adverse effects any European sites as a result of their implementation.

9. Strategic In Combination Assessment

9.1 Between-option 'in combination' effects

- 9.1.1 The effects of the rdWRMP options operating 'in combination' have been explored through the screening and appropriate assessment phases (see **Sections 5 – 8**). 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.

9.2 'In combination' effects with other Wessex Water Plans

Drought Plan

- 9.2.1 The rdWRMP is developed with reference to the current and emerging Drought Plans; the requirements of the Drought Plan are accounted for within the rdWRMP calculations and the HRA of this plan, and so there cannot be additional 'in combination' effects in respect of water resources between the rdWRMP and the Drought Plan. The Drought Plan does not require any construction works that will affect sites potentially exposed to effects from the rdWRMP.

Drainage and Wastewater Management Plan (DWMP)

- 9.2.2 Wessex Water's DWMP has identified 16 generic options that have been applied to 214 drainage areas. These drainage areas are geographically defined but (with the exception of options relating to the relevant wastewater treatment works) no further information on the approximate location of an option (or individual schemes that might make up the option) is provided; nor is information on other option characteristics (e.g. scale, construction requirements, operational outcomes). This would be completed as part of future planning stages and option / scheme delivery.
- 9.2.3 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 drainage areas 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.
- 9.2.4 Consequently, the interaction of the rdWRMP 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).

9.3 Between-company ‘in combination’ effects

WRMPs

9.3.1 Other water company plans are currently in preparation, and so an ‘in combination’ assessment cannot be fully finalised at this stage. However, it is expected that there will be no in combination effects with other water company plans as no European sites are likely to be affected by both the Wessex Water plan and the plans of other water companies, based on the locations of the European sites potentially exposed to effects from the Wessex Water options. In particular:

- Bristol Water is not predicting a deficit so is not developing supply-side options that might affect European sites.
- The Welsh Water options will only affect west Wales and (potentially) the lower reaches of the River Usk; the Wessex options will have no effects on this SAC or the Severn Estuary.
- South West Water’s dWRMP does not identify any options that will affect European sites potentially exposed to effects from the Wessex options; in practice, all construction effects will almost certainly be avoidable with normal measures, and no Wessex options will have operational effects on sites that may be affected by SWW’s operations.

Drought Plans

9.3.2 Other water company Drought Plans are currently in preparation, and so an ‘in combination’ assessment cannot be finalised at this stage; however, based on reviews of previous Drought Plans the options are unlikely to affect European sites that are also exposed to effects from the Wessex Water WRMP.

9.4 In combination effects with other plans and programmes

Effects with other strategic plans and water resource demand

9.4.1 The WRMP process 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.

9.4.2 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).

9.4.3 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.

9.4.4 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

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

9.4.6 With regard to individual projects interacting with specific options to affect particular sites, this is addressed in **Sections 5 – 8**.

9.4.7 In summary, reference has been made to the Planning Inspectorates National Infrastructure Projects database³⁵ 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.

9.4.8 This exercise did not identify any major projects likely to adversely affect the integrity of any sites in combination with the WRMP.

Minor projects

9.4.9 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

9.4.10 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

³⁵ <https://infrastructure.planninginspectorate.gov.uk/projects/>

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.

10. HRA Conclusions

10.1 Overview

- 10.1.1 Wessex Water has identified six supply-side options and one demand-side option to maintain supplies to customers in the south-west over the next 25 years.
- 10.1.2 Water company WRMPs are subject to the provisions of the *Conservation of Habitats and Species Regulations 2017*. Wessex Water has a statutory duty to prepare a WRMP and is therefore the Competent Authority for the HRA of that plan. This revised draft HRA report accompanies the rdWRMP24 that has been published for consultation, and summarises the current assessment of Wessex Water’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 rdWRMP24.
- 10.1.3 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 effects due to the option³⁶, and those where significant effects are likely or uncertain; and
 - an ‘appropriate assessment’ of any European sites for which significant effects cannot be excluded (this may include ‘down-the-line’ deferral of some options in accordance with established HRA practice, where appropriate).
- 10.1.4 The conservation objectives are taken into account at the screening and appropriate assessment stages as necessary.

10.2 Screening

- 10.2.1 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 10.1 Summary of options and sites requiring ‘appropriate assessment’

European site	Preferred Portfolio Options	Alone or IC*?
Bath and Bradford-on-Avon Bats SAC	39.01	Bat sites collectively
	39.02	
	59.01	
	70.01	
	70.06	
Bracket’s Coppice SAC	39.01	Bat sites collectively
	39.02	
	59.01	
	70.01	
	70.06	

³⁶ Note, for options with ‘no effects’ or positive effects there is no possibility of ‘in combination’ effects.

European site	Preferred Portfolio Options	Alone or IC*?
Chilmark Quarries SAC	39.01	Bat sites collectively
	39.02	
	59.01	
	70.01	
	70.06	
Mells Valley SAC	39.01	Bat sites collectively
	39.02	
	59.01	
	70.01	
	70.06	
North Somerset and Mendip Bats SAC	39.01	Bat sites collectively
	39.02	
	59.01	
	70.01	
	70.06	
Salisbury Plain SAC / SPA	39.02	Alone / IC
	70.01	
Somerset Levels and Moors SPA / Ramsar	70.06	Alone

*IC – ‘In combination’ with other WRMP options

10.3 Appropriate Assessments

- 10.3.1 Appropriate assessments were undertaken for those European sites that may be significantly affected by rdWRMP options (or where there was uncertainty at the screening stage), alone or in combination.
- 10.3.2 With regard to **demand-side measures**, 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; households requesting meters) is not available without specific investigations, which would form part of the option package, 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.
- 10.3.3 With regard to the **supply-side options**, it can be concluded that there will be no adverse effects on any European sites as a result of the rdWRMP options, with the implementation of established scheme-level mitigation.
- 10.3.4 **Therefore, it can be concluded that the rdWRMP24, if published as currently drafted, will have no adverse effects on any European sites, alone or in combination.**

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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 Wessex Water supply area might theoretically be exposed to effects of some demand-side options, but these sites are not listed here for clarity.

<p>Avon Gorge Woodlands SAC</p> <p>Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-Brometalia) (* important orchid sites)</p> <p>Tilio-Acerion forests of slopes, screes and ravines</p>
<p>Avon Valley Ramsar</p> <p>Crit. 1 - sites containing representative, rare or unique wetland types</p> <p>Crit. 2 - supports vulnerable, endangered, or critically endangered species or threatened eco. communities</p> <p>Crit. 6 - regularly supports 1% of the individuals in a population of one species/subspecies of waterbirds</p>
<p>Avon Valley SPA</p> <p>Tundra swan <i>Cygnus columbianus bewickii</i></p> <p>Gadwall <i>Anas strepera</i></p>
<p>Bath and Bradford-on-Avon Bats SAC</p> <p>Lesser horseshoe bat <i>Rhinolophus hipposideros</i></p> <p>Greater horseshoe bat <i>Rhinolophus ferrumequinum</i></p> <p>Bechstein`s bat <i>Myotis bechsteini</i></p>
<p>Bracket`s Coppice SAC</p> <p>Molinia meadows on calcareous, peaty or clayey-silt-laden soils (<i>Molinion caeruleae</i>)</p> <p>Bechstein`s bat <i>Myotis bechsteini</i></p>
<p>Cerne and Sydling Downs SAC</p> <p>Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-Brometalia) (* important orchid sites)</p> <p>Marsh fritillary butterfly <i>Euphydryas (Eurodryas, Hypodryas) aurinia</i></p>
<p>Chesil and the Fleet SAC</p> <p>Coastal lagoons</p> <p>Annual vegetation of drift lines</p> <p>Perennial vegetation of stony banks</p>

Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*)
 Mediterranean and thermo-Atlantic halophilous scrubs (*Sarcocornetea fruticosi*)

Chesil Beach and The Fleet Ramsar

Crit. 1 - sites containing representative, rare or unique wetland types
 Crit. 2 - supports vulnerable, endangered, or critically endangered species or threatened eco. communities
 Crit. 3 - supports populations of plant/animal species important for maintaining regional biodiversity
 Crit. 4 - supports plant/animal species at a critical stage in their life cycles, or provides refuge
 Crit. 6 - regularly supports 1% of the individuals in a population of one species/subspecies of waterbirds
 Crit. 8 - important source of food for fishes, spawning ground, nursery and/or migration path

Chesil Beach and The Fleet SPA

Eurasian wigeon *Anas penelope*
 Little tern *Sterna albifrons*

Chew Valley Lake SPA

Northern shoveler *Anas clypeata*

Chilmark Quarries SAC

Lesser horseshoe bat *Rhinolophus hipposideros*
 Greater horseshoe bat *Rhinolophus ferrumequinum*
 Barbastelle *Barbastella barbastellus*
 Bechstein's bat *Myotis bechsteini*

Cotswold Beechwoods SAC

Semi-natural dry grasslands and scrubland facies on calcareous substrates (*Festuco-Brometalia*) (* important orchid sites)
 Asperulo-Fagetum beech forests

Crookhill Brick Pit SAC

Great crested newt *Triturus cristatus*

Culm Grasslands SAC

Northern Atlantic wet heaths with *Erica tetralix*
 Molinia meadows on calcareous, peaty or clayey-silt-laden soils (*Molinion caeruleae*)
 Marsh fritillary butterfly *Euphydryas* (*Eurodryas*, *Hypodryas*) *aurinia*

Dartmoor SAC

Northern Atlantic wet heaths with *Erica tetralix*
 European dry heaths
 Blanket bogs (* if active bog)
 Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles
 Southern damselfly *Coenagrion mercuriale*
 Atlantic salmon *Salmo salar*

Otter *Lutra lutra*

Dawlish Warren SAC

Shifting dunes along the shoreline with *Ammophila arenaria* ("white dunes")

Fixed coastal dunes with herbaceous vegetation ("grey dunes")

Humid dune slacks

Petalwort *Petalophyllum ralfsii*

Dorset Heathlands Ramsar

Crit. 1 - sites containing representative, rare or unique wetland types

Crit. 2 - supports vulnerable, endangered, or critically endangered species or threatened eco. communities

Crit. 3 - supports populations of plant/animal species important for maintaining regional biodiversity

Dorset Heathlands SPA

Hen harrier *Circus cyaneus*

Merlin *Falco columbarius*

European nightjar *Caprimulgus europaeus*

Wood lark *Lullula arborea*

Dartford warbler *Sylvia undata*

Dorset Heaths (Purbeck and Wareham) and Studland Dunes SAC

Embryonic shifting dunes

Shifting dunes along the shoreline with *Ammophila arenaria* ("white dunes")

Atlantic decalcified fixed dunes (*Calluno-Ulicetea*)

Humid dune slacks

Oligotrophic waters containing very few minerals of sandy plains (*Littorelletalia uniflorae*)

Northern Atlantic wet heaths with *Erica tetralix*

Temperate Atlantic wet heaths with *Erica ciliaris* and *Erica tetralix*

European dry heaths

Molinia meadows on calcareous, peaty or clayey-silt-laden soils (*Molinion caeruleae*)

Depressions on peat substrates of the *Rhynchosporion*

Calcareous fens with *Cladium mariscus* and species of the *Caricion davallianae*

Alkaline fens

Old acidophilous oak woods with *Quercus robur* on sandy plains

Bog woodland

Southern damselfly *Coenagrion mercuriale*

Great crested newt *Triturus cristatus*

Dorset Heaths SAC

Northern Atlantic wet heaths with *Erica tetralix*

European dry heaths

Molinia meadows on calcareous, peaty or clayey-silt-laden soils (*Molinia caerulea*)

Depressions on peat substrates of the Rhynchosporion

Calcareous fens with *Cladium mariscus* and species of the *Caricion davallianae*

Alkaline fens

Old acidophilous oak woods with *Quercus robur* on sandy plains

Southern damselfly *Coenagrion mercuriale*

Great crested newt *Triturus cristatus*

East Devon Heaths SPA

European nightjar *Caprimulgus europaeus*

Dartford warbler *Sylvia undata*

East Devon Pebblebed Heaths SAC

Northern Atlantic wet heaths with *Erica tetralix*

European dry heaths

Southern damselfly *Coenagrion mercuriale*

Exe Estuary Ramsar

Crit. 5 - regularly supports 20,000 or more waterbirds

Crit. 6 - regularly supports 1% of the individuals in a population of one species/subspecies of waterbirds

Exe Estuary SPA

Slavonian grebe *Podiceps auritus*

Eurasian oystercatcher *Haematopus ostralegus*

Pied avocet *Recurvirostra avosetta*

Grey plover *Pluvialis squatarola*

Black-tailed godwit *Limosa limosa islandica*

Dunlin *Calidris alpina alpina*

Dark-bellied brent goose *Branta bernicla bernicla*

Waterbird assemblage

Exmoor and Quantock Oakwoods SAC

Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles

Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion*, *Alnion incanae*, *Salicion albae*)

Barbastelle *Barbastella barbastellus*

Bechstein's bat *Myotis bechsteini*

Otter *Lutra lutra*

Exmoor Heaths SAC

Vegetated sea cliffs of the Atlantic and Baltic Coasts

Northern Atlantic wet heaths with *Erica tetralix*

European dry heaths

Blanket bogs (* if active bog)
 Alkaline fens
 Old sessile oak woods with Ilex and Blechnum in the British Isles

Fontmell and Melbury Downs SAC

Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-Brometalia) (* important orchid sites)
 Early gentian *Gentianella anglica*

Great Yews SAC

Taxus baccata woods of the British Isles

Hestercombe House SAC

Lesser horseshoe bat *Rhinolophus hipposideros*

Holme Moor and Clean Moor SAC

Molinia meadows on calcareous, peaty or clayey-silt-laden soils (*Molinion caeruleae*)
 Calcareous fens with *Cladium mariscus* and species of the *Caricion davallianae*
 Alkaline fens

Holnest SAC

Great crested newt *Triturus cristatus*

Isle of Portland to Studland Cliffs SAC

Annual vegetation of drift lines
 Vegetated sea cliffs of the Atlantic and Baltic Coasts
 Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-Brometalia) (* important orchid sites)
 Early gentian *Gentianella anglica*

Kennet and Lambourn Floodplain SAC

Desmoulin's whorl snail *Vertigo moulinsiana*

Lyme Bay and Torbay SAC

Reefs
 Submerged or partially submerged sea caves

Mells Valley SAC

Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-Brometalia) (* important orchid sites)
 Caves not open to the public
 Greater horseshoe bat *Rhinolophus ferrumequinum*

Mendip Limestone Grasslands SAC

European dry heaths
 Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-Brometalia) (* important orchid sites)
 Caves not open to the public

Tilio-Acerion forests of slopes, screes and ravines
Greater horseshoe bat *Rhinolophus ferrumequinum*

Mendip Woodlands SAC

Tilio-Acerion forests of slopes, screes and ravines

Mottisfont Bats SAC

Barbastelle *Barbastella barbastellus*

New Forest SPA

European honey-buzzard *Pernis apivorus*
Hen harrier *Circus cyaneus*
Eurasian hobby *Falco subbuteo*
European nightjar *Caprimulgus europaeus*
Wood lark *Lullula arborea*
Dartford warbler *Sylvia undata*
Wood warbler *Phylloscopus sibilatrix*

North Somerset and Mendip Bats SAC

Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-Brometalia) (* important orchid sites)
Caves not open to the public
Tilio-Acerion forests of slopes, screes and ravines
Lesser horseshoe bat *Rhinolophus hipposideros*
Greater horseshoe bat *Rhinolophus ferrumequinum*

Pewsey Downs SAC

Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-Brometalia) (* important orchid sites)
Early gentian *Gentianella anglica*

Phoenix United Mine and Crow`s Nest SAC

Calaminarian grasslands of the *Violetalia calaminariae*

Plymouth Sound and Estuaries SAC

Sandbanks which are slightly covered by sea water all the time
Estuaries
Mudflats and sandflats not covered by seawater at low tide
Large shallow inlets and bays
Reefs
Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*)

Allis shad *Alosa alosa*
Shore dock *Rumex rupestris*

Poole Harbour Ramsar

- Crit. 1 - sites containing representative, rare or unique wetland types
- Crit. 2 - supports vulnerable, endangered, or critically endangered species or threatened eco. communities
- Crit. 3 - supports populations of plant/animal species important for maintaining regional biodiversity
- Crit. 5 - regularly supports 20,000 or more waterbirds
- Crit. 6 - regularly supports 1% of the individuals in a population of one species/subspecies of waterbirds

Poole Harbour SPA

- Little egret *Egretta garzetta*
- Common shelduck *Tadorna tadorna*
- Pied avocet *Recurvirostra avosetta*
- Mediterranean gull *Larus melanocephalus*
- Sandwich tern *Sterna sandvicensis*
- Common tern *Sterna hirundo*
- Eurasian spoonbill *Platalea leucorodia leucorodia*
- Black-tailed godwit *Limosa limosa islandica*
- Waterbird assemblage

Porton Down SPA

- Stone-curlew *Burhinus oedicephalus*

Prescombe Down SAC

- Semi-natural dry grasslands and scrubland facies on calcareous substrates (*Festuco-Brometalia*) (* important orchid sites)
- Marsh fritillary butterfly *Euphydryas (Eurodryas, Hypodryas) aurinia*
- Early gentian *Gentianella anglica*

Quants SAC

- Marsh fritillary butterfly *Euphydryas (Eurodryas, Hypodryas) aurinia*

River Avon SAC

- Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitriche-Batrachion* vegetation
- Desmoulin's whorl snail *Vertigo moulinsiana*
- Sea lamprey *Petromyzon marinus*
- Brook lamprey *Lampetra planeri*
- Atlantic salmon *Salmo salar*
- Bullhead *Cottus gobio*

River Axe SAC

- Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitriche-Batrachion* vegetation
- Sea lamprey *Petromyzon marinus*
- Brook lamprey *Lampetra planeri*
- Bullhead *Cottus gobio*

River Wye/ Afon Gwy SAC

Water courses of plain to montane levels with the Ranunculion fluitantis and Callitriche-Batrachion vegetation

Transition mires and quaking bogs

White-clawed (or Atlantic stream) crayfish *Austropotamobius pallipes*

Sea lamprey *Petromyzon marinus*

Brook lamprey *Lampetra planeri*

River lamprey *Lampetra fluviatilis*

Allis shad *Alosa alosa*

Twaite shad *Alosa fallax*

Atlantic salmon *Salmo salar*

Bullhead *Cottus gobio*

Otter *Lutra lutra*

Rodborough Common SAC

Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-Brometalia) (* important orchid sites)

Rooksmoor SAC

Molinia meadows on calcareous, peaty or clayey-silt-laden soils (Molinion caeruleae)

Marsh fritillary butterfly *Euphydryas* (*Eurodryas*, *Hypodryas*) *aurinia*

Salisbury Plain SAC

Juniperus communis formations on heaths or calcareous grasslands

Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-Brometalia) (* important orchid sites)

Marsh fritillary butterfly *Euphydryas* (*Eurodryas*, *Hypodryas*) *aurinia*

Salisbury Plain SPA

Hen harrier *Circus cyaneus*

Eurasian hobby *Falco subbuteo*

Common quail *Coturnix coturnix*

Stone-curlew *Burhinus oedicephalus*

Severn Estuary Ramsar

Crit. 1 - sites containing representative, rare or unique wetland types

Crit. 3 - supports populations of plant/animal species important for maintaining regional biodiversity

Crit. 4 - supports plant/animal species at a critical stage in their life cycles, or provides refuge

Crit. 5 - regularly supports 20,000 or more waterbirds

Crit. 6 - regularly supports 1% of the individuals in a population of one species/subspecies of waterbirds

Crit. 8 - important source of food for fishes, spawning ground, nursery and/or migration path

Severn Estuary SPA

Tundra swan *Cygnus columbianus bewickii*

Common shelduck *Tadorna tadorna*
 Gadwall *Anas strepera*
 Common redshank *Tringa totanus*
 Greater white-fronted goose *Anser albifrons albifrons*
 Dunlin *Calidris alpina alpina*
 Waterbird assemblage

Severn Estuary/ Môr Hafren SAC

Sandbanks which are slightly covered by sea water all the time
 Estuaries
 Mudflats and sandflats not covered by seawater at low tide
 Reefs
 Atlantic salt meadows (*Glauco-Puccinellietalia maritima*)
 Sea lamprey *Petromyzon marinus*
 River lamprey *Lampetra fluviatilis*
 Twaite shad *Alosa fallax*

Sidmouth to West Bay SAC

Annual vegetation of drift lines
 Vegetated sea cliffs of the Atlantic and Baltic Coasts
 Tilio-Acerion forests of slopes, screes and ravines

Solent and Dorset Coast SPA

Sandwich tern *Sterna sandvicensis*
 Common tern *Sterna hirundo*
 Little tern *Sterna albifrons*

Solent and Southampton Water Ramsar

Crit. 1 - sites containing representative, rare or unique wetland types
 Crit. 2 - supports vulnerable, endangered, or critically endangered species or threatened eco. communities
 Crit. 5 - regularly supports 20,000 or more waterbirds
 Crit. 6 - regularly supports 1% of the individuals in a population of one species/subspecies of waterbirds

Solent and Southampton Water SPA

Eurasian teal *Anas crecca*
 Ringed plover *Charadrius hiaticula*
 Mediterranean gull *Larus melanocephalus*
 Sandwich tern *Sterna sandvicensis*
 Roseate tern *Sterna dougallii*
 Common tern *Sterna hirundo*
 Little tern *Sterna albifrons*

Black-tailed godwit *Limosa limosa islandica*
 Dark-bellied brent goose *Branta bernicla bernicla*
 Waterbird assemblage

Solent Maritime SAC

Sandbanks which are slightly covered by sea water all the time
 Estuaries
 Mudflats and sandflats not covered by seawater at low tide
 Coastal lagoons
 Annual vegetation of drift lines
 Perennial vegetation of stony banks
 Salicornia and other annuals colonizing mud and sand
 Spartina swards (*Spartinion maritimae*)
 Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*)
 Shifting dunes along the shoreline with *Ammophila arenaria* ("white dunes")
 Desmoulin's whorl snail *Vertigo moulinsiana*

Somerset Levels and Moors Ramsar

Crit. 2 - supports vulnerable, endangered, or critically endangered species or threatened eco. communities
 Crit. 5 - regularly supports 20,000 or more waterbirds
 Crit. 6 - regularly supports 1% of the individuals in a population of one species/subspecies of waterbirds

Somerset Levels and Moors SPA

Tundra swan *Cygnus columbianus bewickii*
 Eurasian teal *Anas crecca*
 European golden plover *Pluvialis apricaria*
 Northern lapwing *Vanellus vanellus*
 Waterbird assemblage

South Dartmoor Woods SAC

European dry heaths
 Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles

South Hams SAC

Vegetated sea cliffs of the Atlantic and Baltic Coasts
 European dry heaths
 Semi-natural dry grasslands and scrubland facies on calcareous substrates (*Festuco-Brometalia*) (* important orchid sites)
 Caves not open to the public
 Tilio-Acerion forests of slopes, screes and ravines
 Greater horseshoe bat *Rhinolophus ferrumequinum*

<p><u>South Wight Maritime SAC</u></p> <p>Reefs</p> <p>Vegetated sea cliffs of the Atlantic and Baltic Coasts</p> <p>Submerged or partially submerged sea caves</p>
<p><u>St Albans Head to Durlston Head SAC</u></p> <p>Vegetated sea cliffs of the Atlantic and Baltic Coasts</p> <p>Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-Brometalia) (* important orchid sites)</p> <p>Greater horseshoe bat <i>Rhinolophus ferrumequinum</i></p> <p>Early gentian <i>Gentianella anglica</i></p>
<p><u>Studland to Portland SAC</u></p> <p>Reefs</p>
<p><u>Tamar Estuaries Complex SPA</u></p> <p>Little egret <i>Egretta garzetta</i></p> <p>Pied avocet <i>Recurvirostra avosetta</i></p>
<p><u>The New Forest Ramsar</u></p> <p>Crit. 1 - sites containing representative, rare or unique wetland types</p> <p>Crit. 2 - supports vulnerable, endangered, or critically endangered species or threatened eco. communities</p> <p>Crit. 3 - supports populations of plant/animal species important for maintaining regional biodiversity</p>
<p><u>The New Forest SAC</u></p> <p>Oligotrophic waters containing very few minerals of sandy plains (<i>Littorelletalia uniflorae</i>)</p> <p>Oligotrophic to mesotrophic standing waters with vegetation of the <i>Littorelletea uniflorae</i> and/or of the <i>Isoëto-Nanojuncetea</i></p> <p>Northern Atlantic wet heaths with <i>Erica tetralix</i></p> <p>European dry heaths</p> <p>Molinia meadows on calcareous, peaty or clayey-silt-laden soils (<i>Molinion caeruleae</i>)</p> <p>Transition mires and quaking bogs</p> <p>Depressions on peat substrates of the <i>Rhynchosporion</i></p> <p>Alkaline fens</p> <p>Atlantic acidophilous beech forests with <i>Ilex</i> and sometimes also <i>Taxus</i> in the shrublayer (<i>Quercion robori-petraeae</i> or <i>Ilici-Fagenion</i>)</p> <p>Asperulo-Fagetum beech forests</p> <p>Old acidophilous oak woods with <i>Quercus robur</i> on sandy plains</p> <p>Bog woodland</p> <p>Alluvial forests with <i>Alnus glutinosa</i> and <i>Fraxinus excelsior</i> (<i>Alno-Padion</i>, <i>Alnion incanae</i>, <i>Salicion albae</i>)</p> <p>Southern damselfly <i>Coenagrion mercuriale</i></p> <p>Stag beetle <i>Lucanus cervus</i></p>

Great crested newt *Triturus cristatus*

Walmore Common Ramsar

Crit. 6 - regularly supports 1% of the individuals in a population of one species/subspecies of waterbirds

Walmore Common SPA

Tundra swan *Cygnus columbianus bewickii*

West Dorset Alder Woods SAC

Molinia meadows on calcareous, peaty or clayey-silt-laden soils (*Molinion caeruleae*)

Old acidophilous oak woods with *Quercus robur* on sandy plains

Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion*, *Alnion incanae*, *Salicion albae*)

Marsh fritillary butterfly *Euphydryas* (*Eurodryas*, *Hypodryas*) *aurinia*

Great crested newt *Triturus cristatus*

Wye Valley and Forest of Dean Bat Sites/ Safleoedd Ystumod Dyffryn Gwy a Fforest y Ddena SAC

Lesser horseshoe bat *Rhinolophus hipposideros*

Greater horseshoe bat *Rhinolophus ferrumequinum*

Wye Valley Woodlands/ Coetiroedd Dyffryn Gwy SAC

Asperulo-Fagetum beech forests

Tilio-Acerion forests of slopes, screes and ravines

Taxus baccata woods of the British Isles

Lesser horseshoe bat *Rhinolophus hipposideros*

Appendix B

Notes on Effect Pathways

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 B2 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)
<p>Physical loss:</p> <ul style="list-style-type: none"> Removal (including offsite effects, e.g. foraging habitat, and removal of supporting habitat within boundary of a SPA) Smothering 	<p>Development of infrastructure associated with scheme, e.g. new or temporary pipelines, transport infrastructure, temporary weirs.</p> <p>Indirect effects from a reduction in flows e.g. drying out marginal habitat.</p> <p>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).</p>
<p>Physical damage:</p> <ul style="list-style-type: none"> 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 	<p>Reduction in river flow leading to permanent and/or temporary loss of available habitat, sedimentation/siltation, fragmentation, etc.</p> <p>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).</p>
<p>Non-physical disturbance:</p> <ul style="list-style-type: none"> Noise (incl. underwater) Visual presence Human presence Light pollution Vibration (incl. underwater). 	<p>Noise from temporary construction or temporary pumping activities.</p> <p>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</p>

Broad categories of potential impacts on European sites, with examples	Examples of operations responsible for impacts (distance assumptions in italics)
	<p>could be significant up to 1km from the boundary of the European site³⁷.</p> <p>Noise from vehicular traffic during operation of a scheme.</p> <p>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.</p> <p>Plant and personnel involved in in operation of the scheme.</p> <p>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).</p> <p>Schemes which might include artificial lighting, e.g. for security around a temporary pumping station.</p> <p>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.</p> <p>Vibration from temporary construction</p> <p>From a review of Environment Agency internal guidance on HRA and various websites/sources^{38,39,40} it is considered that effects of vibration are more likely to be significant if development is within 500m of a European site.</p>
<p>Water table/availability:</p> <ul style="list-style-type: none"> • 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 	<p>Changes to water levels and flows due to increased water abstraction, reduced storage or reduced flow releases from reservoirs to river systems.</p> <p>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.</p>

³⁷ British Standards Institute (BSI) (2009) BS5228 - Noise and Vibration Control on Construction and Open Sites. BSI, London.

³⁸ Institute of Lighting Professionals (2011) Guidance Notes for the Reduction of Obtrusive Light GN01:2011

³⁹ 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.

⁴⁰ 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)

<p>Toxic contamination:</p> <ul style="list-style-type: none"> • Water pollution • Soil contamination • Air Pollution 	<p>Reduced dilution in downstream or receiving waterbodies due to changes in abstraction or reduced compensation flow releases to river systems.</p> <p>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.</p> <p>Air emissions associated with plant and vehicular traffic during construction and operation of schemes.</p> <p>The effect of dust is only likely to be significant where site is within or in proximity to the boundary of the European site^{41,42}. 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.</p> <p>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 affected⁴³.</p>
<p>Non-toxic contamination:</p> <ul style="list-style-type: none"> • 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 <p>Changes in sedimentation/silting</p>	<p>Changes to water salinity, nutrient levels, turbidity, thermal regime due to increased water abstraction, storage, or reduced compensation flow releases to river systems.</p> <p>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.</p>
<p>Biological disturbance:</p> <ul style="list-style-type: none"> • Direct mortality • Changes to habitat availability • Out-competition by non-native species • Selective extraction of species • Introduction of disease 	<p>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.</p> <p>Creation of new pathway of non-native invasive species.</p>

⁴¹ Highways Agency (2003) Design Manual for Roads and Bridges (DMRB), Volume 11.

⁴² Institute of Air Quality Management (2014) Guidance on the assessment of dust from demolition and construction v1.1.

⁴³ 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)
<ul style="list-style-type: none"> Rapid population fluctuations Natural succession	<p>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)</p> <p>Entrapment during in-river or terrestrial construction works causing injury and/or mortality of mobile species</p> <p>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.</p> <p>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.</p> <p>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.</p>

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 aquatic features (fish, otter) and 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).

Estuarine birds and freshwater flows

Several studies have suggested that the number and densities of wintering waterbirds around estuarine freshwater channels are consistently greater than across associated mudflats, and that several bird species show significant preferences for freshwater flow areas over mudflats (e.g. Ravenscroft et al. (1997), Ravenscroft (1998, 1999), Ravenscroft & Beardall (2002) & Ravenscroft & Emes (2004)), although other studies have indicated that deeply incised channels associated with large volume inflows are less attractive to birds (Ravenscroft & Beardall, 2002).

There are a number of possible mechanisms for this. Correlations between freshwater flow and particle size (e.g. Ravenscroft & Emes (2004)), and substrate particle size distribution and invertebrate distribution have been recognised (e.g. Goss-Custard et al. (1991), Colwell and Landrum (1993), Yates et al. (1993)). Freshwater flow, salinity and invertebrate distribution have also been correlated (Kelly (2001)).

These physical relationships between invertebrate distributions and freshwater flows are important since there are numerous studies detailing relationships between overwintering waterbirds and the densities or distributions of their invertebrate prey (e.g. Goss-Custard et al. (1991), Colwell (1993), Colwell and Landrum (1993), Yates et al. (1993), Dierschke et al. (1999), Ravenscroft et al. (2002, 2004). Associations between bird densities and particle size (Granadeiro et al. 2004) have also been recognised.

Possible relationships between birds and freshwater flows were investigated in detail through a series of studies in The Swale SPA/Ramsar and the Medway Estuary and Marshes SPA/Ramsar (RPS 2004a, 2004b, 2004c, 2005a; Humpheryes & Kellett 2003). These studies found few consistent patterns, however; for example:

- Whilst the general relationship of birds and creek corridors (rather than channels) was usually replicated between watercourses and embayments, the species assemblage was variable between creeks and years, suggesting that creek-specific variables may be less important for determining the community composition than environmental or community processes operating in the wider estuary or beyond. Most species (67%) displayed no, or a negative, association with creeks (70% when feeding behaviour only was considered).
- Latitudinal relationships between creeks and invertebrates were inconsistent, with only a slight tendency for invertebrate biomass to be higher within the creek corridor than the channel or surrounding mudflats.
- Significant decreases in invertebrate abundance and biomass down longitudinal gradients (potentially related to greater exposure to tidal processes) were recorded, although bird numbers showed the opposite (i.e. greater numbers towards the sea), perhaps reflecting greater foraging accessibility due to interstitial water, or less disturbance.

Furthermore, no significant differences in the usage of creeks by birds were recorded between freshwater creeks and those that were predominantly saline.

A broad consensus position appears to be that it is not freshwater flow volumes *per se* that are critical to the bird / intertidal channel relationship, rather the presence of some flows within channels to maintain morphology, and that bird distributions are often influenced instead by estuary-wide factors (e.g. changes in disturbance levels, reductions in bird populations altering estuary usage, proximity of roost sites), local factors (e.g. the role of creek morphology or substrate penetrability) and small-scale interactions (e.g. inter and intra-specific bird relationships, or prey availability associated with behavioural or physiological responses to intertidal exposure).

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 area⁴⁴.

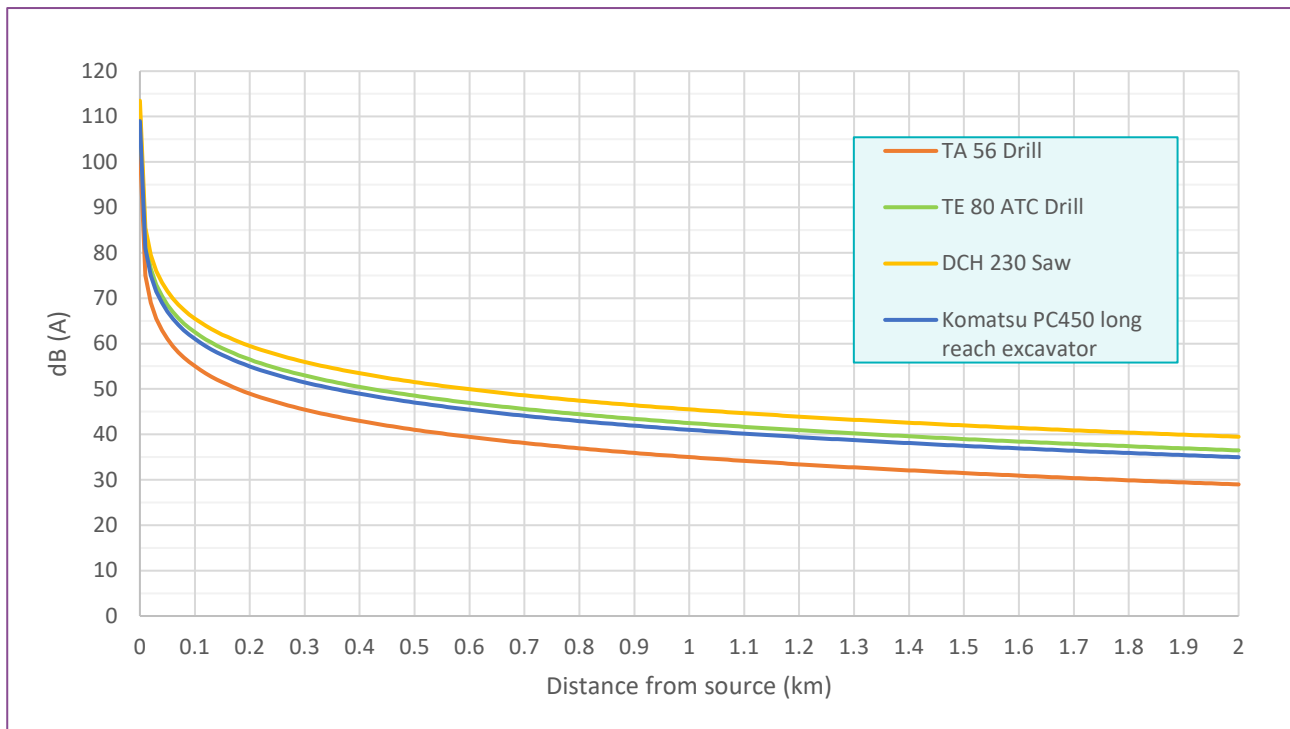
The sensitivity of the interest features will depend on their behavioural characteristics, their general tolerance / habituation to existing or new activities at a site, and the extent to which avoidance behaviours are achievable. This may also vary during the year (for example, most bird species will 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)⁴⁵ within 600m due to distance alone (see Figure B1).

⁴⁴ Noise levels do not operate additively, so the dB levels in an area are not the sum of the component sources.

⁴⁵ 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).

Figure 9.1 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)⁴⁶ 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.

Table B3 Construction activities and disturbance of estuarine birds (Cutts *et al.* 2009)

Activity	Observed Disturbance Level
Personnel and plant on mudflat	High
Personnel and plant on seaward toe and face	High to Moderate
Intermittent plant and personnel on crest	High to Moderate
Irregular piling noise (above 70 dB)	High to Moderate
Long term plant and personnel on crest	Moderate

⁴⁶ 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

Activity	Observed Disturbance Level
Regular piling noise (below 70dB)	Moderate
Irregular noise (50-70 dB)	Moderate
Regular noise (50-70dB)	Moderate to low
Occasional movement of the crane jib and load above sight-line	Moderate to low
Noise below 50 dB	Low
Long-term plant only on crest	Low
Activity behind flood bank (inland)	Low

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 (SO₂, typically from combustion of coal and heavy fuel oils although this has declined substantially), nitrogen oxides (NO_x, mainly from vehicles) and ammonia (NH₃, principally from agriculture), which (together with secondary aerosol pollutants⁴⁷) are deposited as wet or dry deposits. These pollutants affect habitats and species mainly through acidification and eutrophication.

⁴⁷ Secondary pollutants are not emitted, but are formed following further reactions in the atmosphere; for example, SO₂ and NO_x are oxidised to form SO₄²⁻ and NO₂⁻ compounds; ozone is formed by the reaction of other pollutants (e.g. NO_x or volatile organic compounds) with UV light; ammonia reacts with SO₄²⁻ and NO₂⁻ to form ammonium (NH₄⁺).

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)⁴⁸. 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 SO_x and NO_x 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*⁴⁹ 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 more slowly with increased distance⁵⁰. 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

⁴⁸ Nitrogen that is in a form that can be absorbed and used by plants.

⁴⁹ See <http://www.dft.gov.uk/webtag/documents/expert/unit3.3.3.php#013>; accessed 15/06/14.

⁵⁰ 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.

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 load⁵¹.

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 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. 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 Notes⁵², 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

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 (DP) 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:

- 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 routing studies.
- 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 NRW/NE.

⁵² 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.

- 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.

