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Water Resources West

Draft Regional Plan

Habitats Regulations Assessment



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Executive Summary

Overview

Water Resources West (WRW) is the regional group of abstractors established under the Environment Agency's National Framework for Water Resources¹ with responsibility for managing water resources in the North West of England, the West Midlands and the cross-border catchments with Wales. It comprises of five core members, Dŵr Cymru Welsh Water (DCWW), Hafren Dyfrdwy (HD), Severn Trent Water (STW), South Staffordshire Water (SSW) and United Utilities Water (UUW). The WRW area is shown in **Figure ES.1**.

In accordance with the requirements of the National Framework, WRW is preparing a Regional Plan that will set out how the supply of water for people, business, industry and agriculture will be managed in the region over the period 2025 to 2085. As part of the plan development process, WRW has prepared a draft Regional Plan alongside an aligned set of Water Resources Management Plans (WRMPs) prepared by the member water companies (referred to as the 'component draft WRMPs' for the purposes of this report). The component draft WRMPs set out how the balance between water supply and demand, and security of supply, will be maintained in each water company area over a minimum of 25 years in a way that is economically, socially and environmentally sustainable.

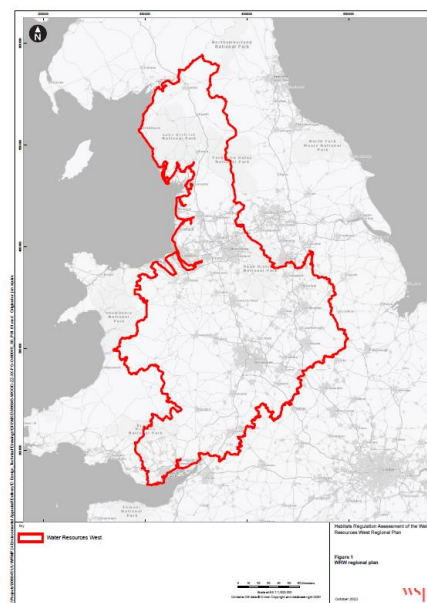


Figure ES.1 WRW Regional Plan Area

The draft Regional Plan includes a proposed draft Best Value Plan. The draft Best Value Plan comprises of water resource options from the component draft WRMPs and two strategic transfers from WRW to Water Resources South East (WRSE), the Grand Union Canal (GUC) transfer and the River Severn to River Thames (STT), with associated source options (Minworth Effluent Reuse, Severn Trent Sources and North West Transfer (NWT)). The strategic transfers and source options are all Strategic Resource Options (SROs) and subject to the Regulators Alliance for Progressing Infrastructure Development's (RAPID) separate, gated² decision-making process, supported by their own environmental assessments.

Regulator guidance^{3,4} requires that regional plans are subject to the provisions of the Conservation of Habitats and Species Regulations 2017 (as amended) (the 'Habitats Regulations')⁵. Regulation 63 of the Habitats Regulations states that if a plan or project is "(a) is likely to have a significant

¹ Environment Agency (2020) *Water Resources National Framework: Appendix 2: Regional planning*. Available from: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/872222/Appendix_2_Regional_planning.pdf [Accessed October 2022].

² Regulators Alliance for Progressing Infrastructure Development (RAPID) was established in 2019 to "help accelerate the development of new water infrastructure and design future regulatory frameworks. The joint team is made up of the 3 water regulators Ofwat, Environment Agency and Drinking Water Inspectorate". Available online <https://www.ofwat.gov.uk/regulated-companies/rapid/3/> [Accessed July 2022]

³ Environment Agency, Natural Resources Wales, and The Water Services Regulation Authority Government (2022) *Water Resource Planning Guidance (WRPG)* [online]. Available from: <https://www.gov.uk/government/publications/water-resources-planning-guideline/water-resources-planning-guideline> [Accessed October 2022].

⁴ Welsh Government (2022) *Guiding Principles for Developing Water Resources Management Plans*. Available from: <https://gov.wales/water-resources-management-plan-guidance>.

⁵ Statutory Instrument 2017 No.1012: *The Conservation of Habitats and Species Regulations 2017*.

effect on a European site⁶ or a European offshore marine site⁷ (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 of consent or authorisation. The plan or project can only be given effect if it can be concluded (following an ‘appropriate assessment’) that it “...will not adversely affect the integrity” of a site, unless the provisions of Regulation 64 are met.

This assessment process is known as Habitats Regulations Assessment (HRA)⁸. 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)⁹ and, if so, whether there will be any ‘adverse effects on site integrity’¹⁰.

WSP Environment & Infrastructure UK Ltd and Ricardo Energy and Environment (Ricardo) have been appointed to undertake the HRA of the WRW Regional Plan. **This Executive Summary presents an overview of the assessment of WRW’s draft Regional Plan against the requirements of the Habitats Regulations.**

The assessment presented in this report draws on the HRAs of the component draft WRMPs for STW¹¹, SSW¹², U UW¹³ and DCWW¹⁴. This HRA should therefore be read in conjunction with these reports¹⁵.

⁶ 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’).

⁷ ‘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.

⁸ 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.

⁹ Also referred to as the ‘test of significance’.

¹⁰ Also referred to as the ‘integrity test’.

¹¹ Ricardo and Wood (2022) *Habitats Regulations Assessment: Draft Water Resources Management Plan 2024 – Severn Trent Water*.

¹² Ricardo and Wood (2022) *Habitats Regulations Assessment: Draft Water Resources Management Plan 2024 – South Staffordshire Water*.

¹³ WSP (2022) *United Utilities Water: Habitats Regulations Assessment of the Water Resources Management Plan 2024*.

¹⁴ WSP (2022) *Dŵr Cymru Welsh Water: Habitats Regulations Assessment of the Water Resources Management Plan 2024*.

¹⁵ It should be noted that, at the time of writing, information relating to the HRA of the Hafren Dyfrdwy draft WRMP24 was not available.

Habitats Regulations Assessment Approach

For each option contained in WRW's draft Best Value Plan, the HRA comprises:

- a '**screening**' of European sites to identify those sites and features where there will self-evidently be 'no effect', 'no likely significant effects', or positive effects due to the option¹⁶, 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).

This option assessment process has been completed as part of the HRAs undertaken for the component draft WRMPs and is summarised in this report. The 'in combination' effects of the draft Best Value Plan options with each other, and of the draft Regional Plan with other plans, programmes and projects, are also considered.

Assessment of the Draft Regional Plan

Stage 1 Screening

'Screening' of the draft Best Value Plan options has concluded that **significant effects are either likely or uncertain** for a total of 30 European sites and 27 supply options, as listed in **Table ES.1** (note, this includes options that may rely on mitigation measures to prevent significant effects occurring).

Table ES.1 Summary of Draft Best Value Plan Options and Sites Requiring Appropriate Assessment

| European Site | Water Company | Option | Alone or I/C*? |
|--------------------------------------|--------------------|-----------------------------------------------------------|----------------|
| Bredon Hill SAC | Severn Trent Water | 66: Strensham WTW Expansion | Alone |
| Cannock Chase SAC | Severn Trent Water | 44: New River Sow abstraction and WTW near Stafford | Alone |
| Dixton Wood SAC | Severn Trent Water | 66: Strensham WTW Expansion | Alone |
| Fen Pool SAC | Severn Trent Water | 79A: Wolverhampton-Birmingham strategic link main (large) | Alone |
| Humber Estuary SAC and Ramsar | Severn Trent Water | 29: Homesford WTW capacity increase | I/C |
| | Severn Trent Water | 426: Little Eaton WTW deployable output recovery | I/C |
| | Severn Trent Water | 64: Rehabilitation Milton groundwater source | I/C |
| Manchester Mosses SAC | United Utilities | WR149: Increased Treatment capacity (Wigan) | Alone |
| Martin Mere Ramsar | United Utilities | WR107a2: Groundwater enhancement (Aughton Park) | Alone/IC |

¹⁶ Note, for options with 'no effects' or positive effects there is no possibility of 'in combination' effects.

| European Site | Water Company | Option | Alone or I/C*? |
|---------------------------------------------------------|--------------------|-----------------------------------------------------------------------------------------------------------------|----------------------|
| Martin Mere SPA | United Utilities | WR107a2: Groundwater enhancement (Aughton Park) | Alone/IC |
| Mersey Estuary Ramsar | United Utilities | STTA4: Northwest Transfer (Vyrnwy) | Alone/IC |
| | United Utilities | WR015: New surface water (River Irwell) | IC |
| | United Utilities | WR076: New surface water (River Bollin) | Alone/IC |
| | United Utilities | WR111: Groundwater enhancement (Woodford) | I/C |
| | United Utilities | WR113: Groundwater enhancement (Tytherington) | I/C |
| | United Utilities | WR149: Increased Treatment capacity (Wigan) | I/C |
| Mersey Estuary SPA | United Utilities | STTA4: Northwest Transfer (Vyrnwy) | Alone/IC |
| | United Utilities | WR015: New surface water (River Irwell) | IC |
| | United Utilities | WR076: New surface water (River Bollin) | Alone/IC |
| | United Utilities | WR111: Groundwater enhancement (Woodford) | I/C |
| | United Utilities | WR113: Groundwater enhancement (Tytherington) | I/C |
| Mersey Narrows and North Wirral Foreshore Ramsar | United Utilities | (Indirect effects on interest features via impacts on Ribble and Alt SPA/Ramsar or Mersey Estuary SPA / Ramsar) | I/C |
| | United Utilities | (Indirect effects on interest features via impacts on Ribble and Alt SPA/Ramsar or Mersey Estuary SPA / Ramsar) | I/C |
| Mersey Narrows and North Wirral Foreshore SPA | United Utilities | (Indirect effects on interest features via impacts on Ribble and Alt SPA/Ramsar or Mersey Estuary SPA / Ramsar) | I/C |
| Midland Meres and Mosses Phase 1 Ramsar | United Utilities | STTA4: Northwest Transfer (Vyrnwy) | Alone |
| Midland Meres and Mosses Phase 2 Ramsar | United Utilities | STTA4: North West Transfer (Vyrnwy) | Alone |
| Oak Mere SAC | United Utilities | STTA4: North West Transfer (Vyrnwy) | Alone |
| Pasturefields Salt Marsh SAC | Severn Trent Water | 44: New River Sow abstraction and WTW near Stafford | Alone |
| Peak District Dales SAC | Severn Trent Water | 6: Upper Derwent Valley reservoir expansion (UDVRE)** | Alone/IC |
| | Severn Trent Water | 29: Homesford WTW capacity increase | Alone/IC |
| | Severn Trent Water | 95B: Ogston WTW works expansion | Alone/IC |
| | Severn Trent Water | 128: Carsington to Tittesworth main (large) | Alone/IC |
| | Severn Trent Water | 128Z: Carsington to Tittesworth main (small) | Alone/IC |
| | Severn Trent Water | 187C: Expand Carsington reservoir (25000 MI) | Uncertain – Alone/IC |

| European Site | Water Company | Option | Alone or I/C*? |
|---------------------------------------------------------------|--------------------|-------------------------------------------------------|----------------|
| | Severn Trent Water | 305: Heathy Lea to North Notts transfer | Alone/IC |
| | Severn Trent Water | 426: Little Eaton WTW deployable output recovery | Alone/IC |
| Peak District Moors (South Pennine Moors Phase 1) SPA | Severn Trent Water | 6: Upper Derwent Valley reservoir expansion (UDVRE)** | Alone |
| | Severn Trent Water | 123B Raise dam at Tittesworth reservoir (25%) | Alone/IC |
| | Severn Trent Water | 128: Carsington to Tittesworth main (large) | Alone/IC |
| | Severn Trent Water | 128Z: Carsington to Tittesworth main (small) | Alone/IC |
| | Severn Trent Water | 305: Heathy Lea to North Notts transfer | Alone/IC |
| Ribble and Alt Estuaries Ramsar | United Utilities | WR049d: New surface water (River Ribble) | Alone/IC |
| | United Utilities | WR107a2: Groundwater enhancement (Aughton Park) | Alone/IC |
| Ribble and Alt Estuaries SPA | United Utilities | WR049d: New surface water (River Ribble) | Alone/IC |
| | United Utilities | WR107a2: Groundwater enhancement (Aughton Park) | Alone/IC |
| River Clun SAC | Severn Trent Water | 33Z: Shelton WTW expansion | Alone/IC |
| | Severn Trent Water | 66: Strensham WTW expansion*** | Alone/IC |
| | Severn Trent Water | 143: W.Midlands raw water storage*** | Alone/IC |
| | Severn Trent Water | 303A: North West Transfer: Vyrnwy (75 MI/d)** | Alone/IC |
| River Dee and Bala Lake/ Afon Dyfrdwy a Llyn Tegid SAC | United Utilities | STTA4: North West Transfer (Vyrnwy) | Alone |
| River Mease SAC | Severn Trent Water | 31D: East Midlands raw water storage (CHQ) | Alone/IC |
| | Severn Trent Water | 44: New River Sow abstraction and WTW near Stafford | Alone/IC |
| | Severn Trent Water | 64: Rehabilitation Milton groundwater source | Alone/IC |
| Rutland Water SPA and Ramsar | Severn Trent Water | 190: Eyebrook Reservoir and new WTW | Alone |
| Sefton Coast SAC | United Utilities | WR107a2: Groundwater enhancement (Aughton Park) | Alone/IC |
| Severn Estuary/Môr Hafren SAC and Ramsar | Severn Trent Water | 33Z: Shelton WTW expansion | Alone/IC |
| | Severn Trent Water | 66: Strensham WTW expansion | Alone/IC |
| | Severn Trent Water | W.Midlands raw water storage*** | Alone/IC |
| | Severn Trent Water | 303A: North West Transfer: Vyrnwy (75 MI/d)** | Alone/IC |

| European Site | Water Company | Option | Alone or I/C*? |
|--------------------------------|--------------------|----------------------------------------------------|-------------------|
| | DCWW | SEW166: SEWCUS network upgrade | Uncertain – Alone |
| Severn Estuary SPA | DCWW | SEW166: SEWCUS network upgrade | Uncertain – Alone |
| South Pennine Moors SAC | Severn Trent Water | Upper Derwent Valley reservoir expansion (UDVRE)** | Alone |
| | Severn Trent Water | 305: Heathy Lea to North Notts transfer | Alone |

*I/C - 'In combination' with other options.

**Options 6 and 303A have not been subject to an appropriate assessment as part of the STW WRMP HRA as these options are progressing through the RAPID gated process. However, in respect of Option 303A, an alternative option (Option 303C) involving a 25Ml/d release into the Afon Vyrnwy has been subject to appropriate assessment in the STW WRMP HRA and is referenced in this report as appropriate.

***These options have not been subject to appropriate assessment as part of the STW WRMP HRA as there is considered to be sufficient time to complete assessments of the options within the next cycle of the WRMP process, allowing the latest baseline and condition status to be included, and development of hydrological models for those watercourses that will be impacted by changes/new abstractions.

The options listed in **Table ES.1** have therefore been taken forward to appropriate assessment.

Stage 2 Appropriate Assessment

Appropriate assessments have been undertaken for those European sites that may be significantly affected by the component draft WRMPs and, in-turn, WRW's draft Best Value Plan options (or where there was uncertainty at the screening stage). The appropriate assessments have considered whether any sites will be subject to 'adverse effects on integrity' as a result of option implementation both alone and 'in combination', taking into account the sites' conservation objectives and conservation status.

For the SSW, UUW and DCWW options, **no adverse effects, alone or 'in combination'**, on European sites have been identified. This is a provisional and interim conclusion based on current information and the draft nature of the Regional Plan and component WRMPs. The appropriate assessments have identified that there are some **residual uncertainties** in respect of the precise effects of aquifer drawdown during operation on the interest features of the **Manchester Mosses SAC, Martin Mere SPA / Martin Mere Ramsar, Mersey Estuary SPA / Mersey Estuary Ramsar, Ribble and Alt Estuaries Ramsar / Sefton Coast SAC and Ribble and Alt Estuaries SPA / Ribble and Alt Estuaries Ramsar**. However, these uncertainties will be resolved with the development of groundwater models for the Lower Mersey and North Merseyside and Manchester and East Cheshire and before submission of the final Regional Plan (and hence the final HRA).

For STW, the HRA has highlighted that a HRA Stage 2 Appropriate Assessment is required for 23 individual options, covering 18 from the preferred plan and five alternative plan options. Although **effects alone are not anticipated**, the potential for **'in combination' effects** on the **Severn Estuary SAC and Ramsar** require further investigation and assessment as part of the final HRA and mitigation measures may be required to avoid adverse effects. Hydrological modelling will also be required to fully assess the impacts of options on the **Peak District SAC**, whereby refinement of the operating pattern may be required.

In Combination Assessment: Draft Best Value Plan

The screening and appropriate assessments for the component draft WRMPs have considered the effects of the options that comprise WRW's draft Best Value Plan both alone and in-combination with other options in the same WRMP. To fully assess the effects of the draft Regional Plan, it is also necessary to consider whether draft Best Value Plan options in different component draft WRMPs may have 'in combination' effects on European sites.

The STW, UUW and DCWW supply options would not affect the same European sites. In consequence, there would be **no additional effects** on European sites beyond those identified in the Stage 2 Appropriate Assessments for the component draft WRMPs.

In Combination Assessment: Other Plans, Programmes and Projects

The effects of the draft Regional Plan on European sites 'in combination' with other plans, programmes and projects have been considered. This assessment has identified a need for further investigation in respect of the effects of the draft Regional Plan 'in combination' with the Water Resources East and Water Resources North Regional Plans and South Lincolnshire Reservoir and Anglian to Affinity Transfer SROs on the **Humber Estuary** suite of European sites. This is due to possible cumulative reductions in flows into the Estuary.

As noted above, **potential 'in combination' effects** on the qualifying features of the **Severn Estuary SAC and Ramsar** have also been identified. This is associated with releases from Vyrnwy Reservoir under Option 303A (North West Transfer: Vyrnwy (75 MI/d)) and other regulation releases. Given the complexity of the flow regime on the River Severn, use of the hydrological model developed for the STT SRO would be beneficial to fully understand the potential for adverse effects of the STW options alone, and 'in combination' with these regulation releases. In this context, further assessment will be completed between the draft and final Regional Plan as part of the final HRA.

No further 'in combination' effects have been identified at this stage. However, this conclusion will be reviewed in the final HRA to take into account the latest available information on other plans, programmes and projects.

Preliminary Conclusion

No adverse effects, alone or 'in combination', on European sites are predicted in respect of those options within the HD, SSW, UUW and DCWW component draft WRMPs. This is a provisional conclusion based on the evidence currently available and will be reviewed in the final HRA.

For the STW options, the Stage 2 Appropriate Assessments are ongoing and further consideration of the 'in combination' effects of the options on the **Peak District Dale SAC, the Severn Estuary sites and the Humber Estuary sites** is required before a conclusion in terms of effects on site integrity can be reached.

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1. Introduction

1.1 Overview

- 1.1.1 Water Resources West (WRW) is the regional group of abstractors established under the Environment Agency's (EA) National Framework for Water Resources¹⁷ (the 'National Framework') with responsibility for managing water resources in the North West of England, the West Midlands and the cross-border catchments with Wales. It comprises of five core members, Dŵr Cymru Welsh Water (DCWW), Hafren Dyfrdwy (HD)¹⁸, Severn Trent Water (STW), South Staffordshire Water (SSW) and United Utilities Water (UW) (see **Figure 1.1**).
- 1.1.2 The National Framework requires each regional group to prepare a regional plan to set out how the supply of water for people, business, industry and agriculture will be managed in the region. The plans aim to create resilient water supplies for all users, while protecting and enhancing the environment and creating wider social benefits for the next 25 years and beyond.
- 1.1.3 In response, WRW has prepared a draft Regional Plan alongside an aligned set of Water Resources Management Plans (WRMPs) prepared by the member water companies (referred to as the 'component draft WRMPs' for the purposes of this report). The draft Regional Plan covers the period 2025 to 2085 and will address long-term regional and inter-regional, multi-sectoral water resources management pressures. It includes the water resource options from the component draft WRMP24s and Strategic Resource Options¹⁹ (SROs) and takes into account the water supply needs of non-public water supply (non-PWS) abstractors as well as public water supplies. It includes all or part of the operational areas of DCWW, HD, STW, SSW and UW.
- 1.1.4 The development of the draft Regional Plan is aligned with the Water Resources Planning Guideline²⁰ and the Welsh Government Guiding Principles²¹, as applicable to England and Wales, which require that regional plans are subject to the provisions of the *Conservation of Habitats and Species Regulations 2017* (as amended) (the 'Habitats Regulations')²². **This report presents the assessment of WRW's draft Regional Plan against the requirements of the Habitats Regulations.**

¹⁷ EA (2020) *Water Resources National Framework*. Appendix 2: Regional planning. Available from: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/872222/Appendix_2_Regional_planning.pdf

¹⁸ At 1st July 2018, Hafren Dyfrdwy combined the water service area of Dee Valley Water and Severn Trent lying in Wales.

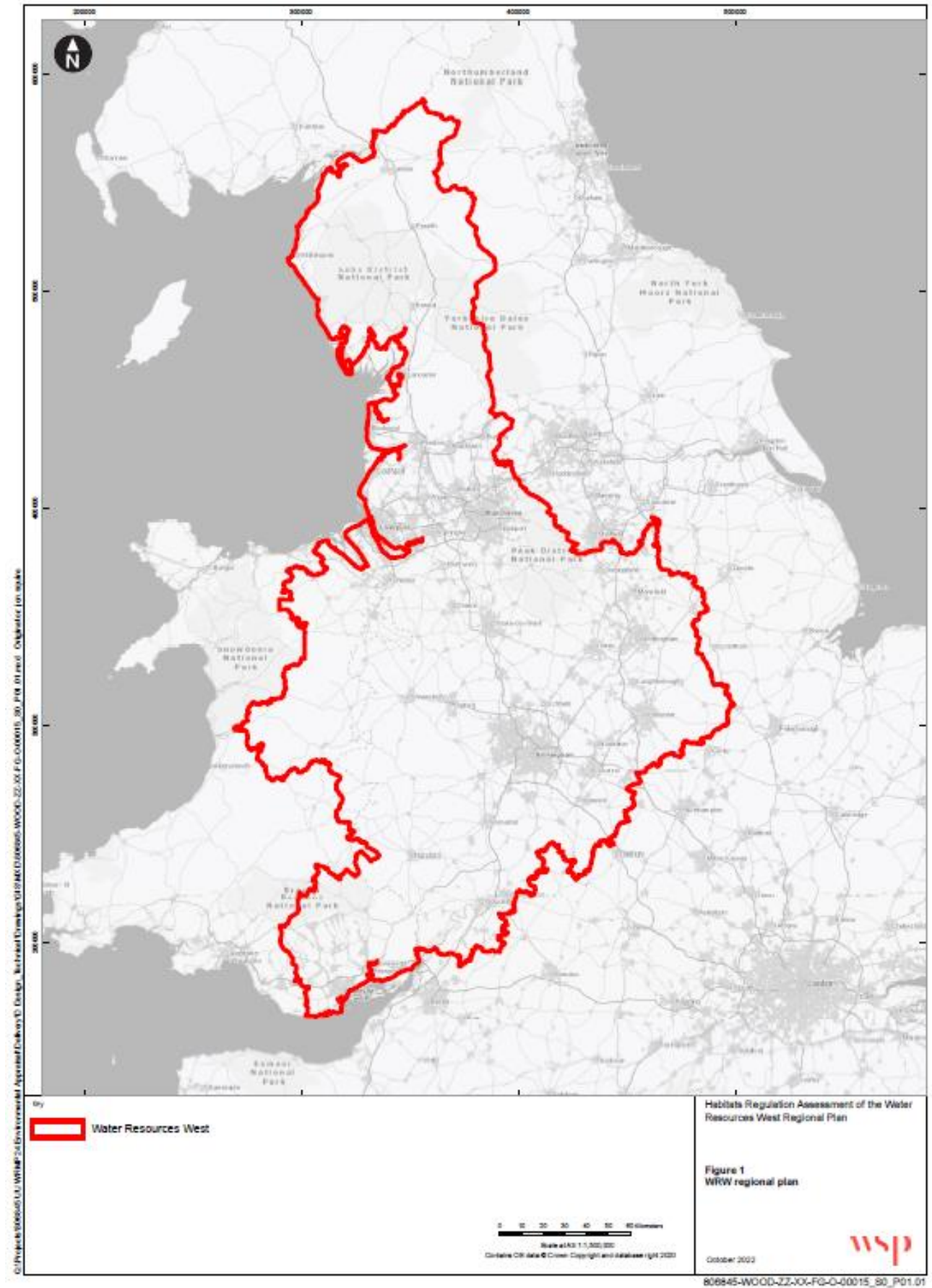
¹⁹ The Strategic Water Resource Options (SROs) programme has been initiated by Ofwat to provide at least 1500Ml/d of water to areas of England facing a water deficit. The SRO Programme includes 17 schemes which will be funded and assessed during AMP7 to determine the right portfolio of projects to be selected by Regional Plans ready for implementation in AMP8. Schemes are evaluated at a series of decision points (Gates).

²⁰ EA, Natural Resources Wales, and The Water Services Regulation Authority Government (2022) *Water Resource Planning Guidance* (WRPG) [online]. Available from: <https://www.gov.uk/government/publications/water-resources-planning-guideline/water-resources-planning-guideline> [Accessed October 2022].

²¹ Welsh Government (2022) *Guiding Principles for Developing Water Resources Management Plans*. Available from: <https://gov.wales/water-resources-management-plan-guidance>

²² Statutory Instrument 2017 No.1012: *The Conservation of Habitats and Species Regulations 2017*.

Figure 1.1 WRW Regional Plan Area



1.2 Habitats Regulations Assessment

- 1.2.1 Regulations 63 and 64 of the Habitats Regulations²³ 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.
- 1.2.2 Regulation 63 states that if a plan or project is “(a) *is likely to have a significant effect on a European site²⁴ or a European offshore marine site²⁵ (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 of 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.
- 1.2.3 This assessment process is known as Habitats Regulations Assessment (HRA)²⁶. 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)²⁷ and, if so, whether there will be any ‘adverse effects on site integrity’²⁸.

Applying Habitats Regulations Assessment to the Water Resources West Regional Plan

- 1.2.4 Water resources plans (whether regional plans or WRMPs) are not explicitly included within the Habitats Regulations. However, regulator guidance²⁹ requires that “*regional groups must assess whether the options in the regional plan are subject to Habitats Regulations Assessment*”, taking into account if the preferred plan “*would be likely to have a significant effect on a European site (either alone or in combination with other plans or projects)*”.

²³ 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 European Union (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.

²⁴ 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’).

²⁵ ‘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.

²⁶ 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.

²⁷ Also referred to as the ‘test of significance’.

²⁸ Also referred to as the ‘integrity test’.

²⁹ EA, OfWAT and NRW (2022) *Water Resources Planning Guideline* and EA (2020) *Water Resources National Framework: Appendix 2: Regional planning*.

- 1.2.5 WRW is required to prepare the Regional Plan and is therefore the Competent Authority for the HRA of the Plan.

1.3 This Report

1.3.1 WSP Environment & Infrastructure UK Ltd (formerly Wood Environment & Infrastructure Solutions UK Limited) and Ricardo Energy and Environment (Ricardo) have been appointed to undertake the HRA of the WRW Regional Plan against Regulations 63 and (if required) 64 of the Habitats Regulations.

1.3.2 This report accompanies the draft Regional Plan that has been published for consultation and summarises the current assessment of WRW's preferred programme of options against the requirements of the Habitats Regulations. The remainder of this report is structured as follows:

- **Section 2** provides a summary of the draft Regional Plan including WRW's preferred programme of options (the draft Best Value Plan) and strategic transfer options (including adaptive plan pathways);
- **Section 3** summarises the approach to the HRA of the draft Regional Plan, including the assessment of plan options contained in the member water company component draft WRMPs;
- **Section 4** presents the assessment of the draft Regional Plan in terms of the options that comprise WRW's draft Best Value Plan and the 'between option' in combination effects, including strategic transfers and alternative plan pathways;
- **Section 5** presents the plan-level 'in combination' assessment; and
- **Section 6** sets out the provisional conclusion of the HRA of WRW's Regional Plan.

1.3.3 Note that the assessment presented in this report draws on the HRAs of the component draft WRMPs for STW³⁰, SSW³¹, U UW³² and DCWW³³. This HRA should therefore be read in conjunction with these reports³⁴.

³⁰ Ricardo and Wood (2022) *Habitats Regulations Assessment: Draft Water Resources Management Plan 2024 – Severn Trent Water*.

³¹ Ricardo and Wood (2022) *Habitats Regulations Assessment: Draft Water Resources Management Plan 2024 – South Staffordshire Water*.

³² WSP (2022) *United Utilities Water: Habitats Regulations Assessment of the Water Resources Management Plan 2024*.

³³ WSP (2022) *Dŵr Cymru Welsh Water: Habitats Regulations Assessment of the Water Resources Management Plan 2024*.

³⁴ It should be noted that, at the time of writing, information relating to the HRA of the Hafren Dyfrdwy draft WRMP24 was not available.

2. Water Resources Planning

2.1 Introduction

2.1.1 Water resources management planning is being undertaken regionally and by all water companies in England and Wales in order to ensure reliable, resilient water supplies over the long-term planning horizon.

2.1.2 Water resources management planning includes working out and forecasting how much water customers will need over the planning period (assessing demand) and how best to provide it (assessing options to reduce or constrain demand growth and/or augment reliable supplies of water) in an efficient, timely manner (programme appraisal). Companies (individually, and in collaboration across a region) identify the preferred, 'best value' programme of demand management and water supply options to develop an overall strategy to maintain a balance between reliable supply and demand.

2.2 Water Resources West Regional Plan

2.2.1 WRW is taking an integrated approach to preparing the Regional Plan and the component WRMPs and aims to provide a Regional Plan that is multi-sector and takes account of the water supply needs of non-PWS abstractors as well as public water supplies. WRW member water companies have used a regionally consistent set of methodologies to reflect local, regional and national needs into the development of their plans.

2.2.2 Each water company is leading development of the component WRMPs and relevant aspects of the Regional Plan in the parts of their area included with WRW as a single piece of work. This has necessitated a high degree of integration and fostered greater collaboration between companies and stakeholders. The draft WRW Regional Plan then combines the preferred water resource options from the member water companies' WRMP24s, as well as the SROs being taken forward by the companies.

2.2.3 In March 2020, WRW published its Initial Resource Position³⁵. This identified that by 2050, an estimated 166 megalitres per day (Ml/d) of additional water would be needed for public water supplies, and in the region of an additional 41 Ml/d needed for other abstractors. In an update³⁶ (published in February 2021) to its resource position, WRW noted that this need was potentially greater than previously estimated. WRW published its Emerging Regional Plan³⁷ in January 2022. This updated the forecast, taking into account a commitment to achieve a 50% reduction in leakage from the public water supply network by 2050 and a per capita consumption reduction to 110 litres/person/day (l/p/d). The updated WRW forecast identified that 215 Ml/d of new water would be needed to meet public supply demand by 2031 and that an additional 63 Ml/d would be needed by 2050, for non-PWS sectors.

2.2.4 Following further reconciliation with other regions (which confirmed other regional water resource requirements), the draft Regional Plan projections, taking into account demand

³⁵ WRW (2020) *Initial Resource Position, March 2020*. Available from <https://waterresourceswest.co.uk/s/WRW-Initial-Resource-Position.pdf> [Accessed October 2022].

³⁶ WRW (2021) *Update on our Resource Position, February 2021*. Available from <https://waterresourceswest.co.uk/s/WRW-Update-on-Resource-Position-February-2021-web.pdf> [Accessed October 2022].

³⁷ WRW (2022) *Emerging Regional Plan, January 2022*. Available from: <https://static1.squarespace.com/static/5e67889204d86850e1fdcece/t/61e5a4e237970d62de92fa10/1642439906757/WRW+Emerging+Regional+Plan+Executive+Summary.pdf> [Accessed October 2022].

and leakage commitments, show that by 2050 the WRW region will need an additional 223 Ml/d to meet public water supply needs and 97 Ml/d to meet the needs of other sectors.

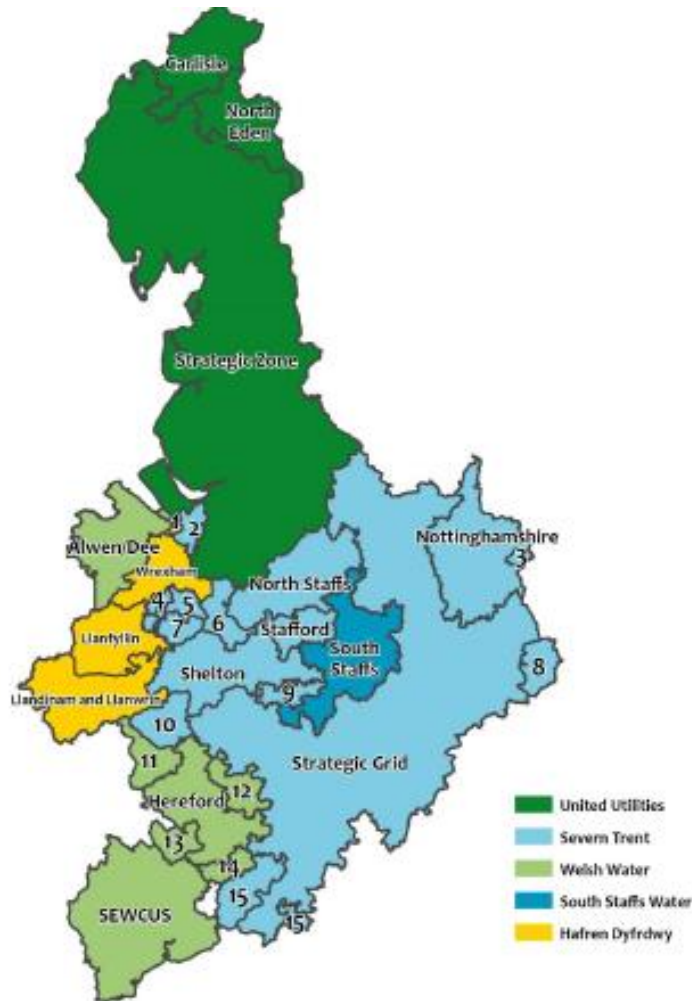
- 2.2.5 Actions included in the draft Regional Plan aim to help increase public water supply resilience to extreme droughts and meet future demand in the region. It is estimated that the Plan includes proposals that will cost £9.7bn over the plan lifetime but will bring over £2 billion net benefits to the WRW region.

Water Resources Management Plans

- 2.2.6 Each component WRMP sets out how the balance between water supply and demand, and security of supply, will be maintained over a minimum of 25 years in a way that is economically, socially and environmentally sustainable.
- 2.2.7 For each Water Resource Zone³⁸ (WRZ) in the WRMP area (see **Figure 2.1**), a supply demand balance is generated for public water supply. A set of non-PWS water availability assessments is also be generated. Each supply-demand balance is structured around a consistent, “central” set of planning assumptions and is used to identify WRZs in deficit over the plan period.
- 2.2.8 The plan process initially reviews as many potential solutions as possible (the ‘unconstrained list’ of options) to identify ‘feasible’ options for each WRZ which could contribute to meeting the supply demand deficit in one or more zones. The types of options considered to provide additional water resources to meet any forecast deficit in a WRZ can include:
- **demand management options**, which include measures to manage the demand for water such as smart meters, rainwater harvesting, greywater recycling or household visits to install water efficiency measures;
 - **distribution and leakage options**, which include measures to optimise the efficiency of water networks, reduce leakage and minimise any unscheduled resource losses;
 - **production efficiency options**, which include measures to increase the efficiency and effectiveness of treatment processes;
 - **supply options**, which comprise of measures to increase supply such as greater peak output at existing groundwater sources, reservoir or surface water supply and include SROs and catchment management options, for example nature-based solutions;
 - **non-PWS options**, which include any options that increase water resource availability or reduce the need for abstraction outside of that needed for public water supplies.
- 2.2.9 Options tend to be generated from the company responsible for the WRMP but can also be joint (where more than one company is working in partnership), provided by third parties or be multi-sector.

³⁸ The Water Resource Planning Guideline defines a water resource zone as “an area within which the sources of water and distribution of water to meet demand, is largely self-contained (apart from any agreed bulk transfers)”.

Figure 2.1 WRW Regional Plan Water Company Water Resource Zones



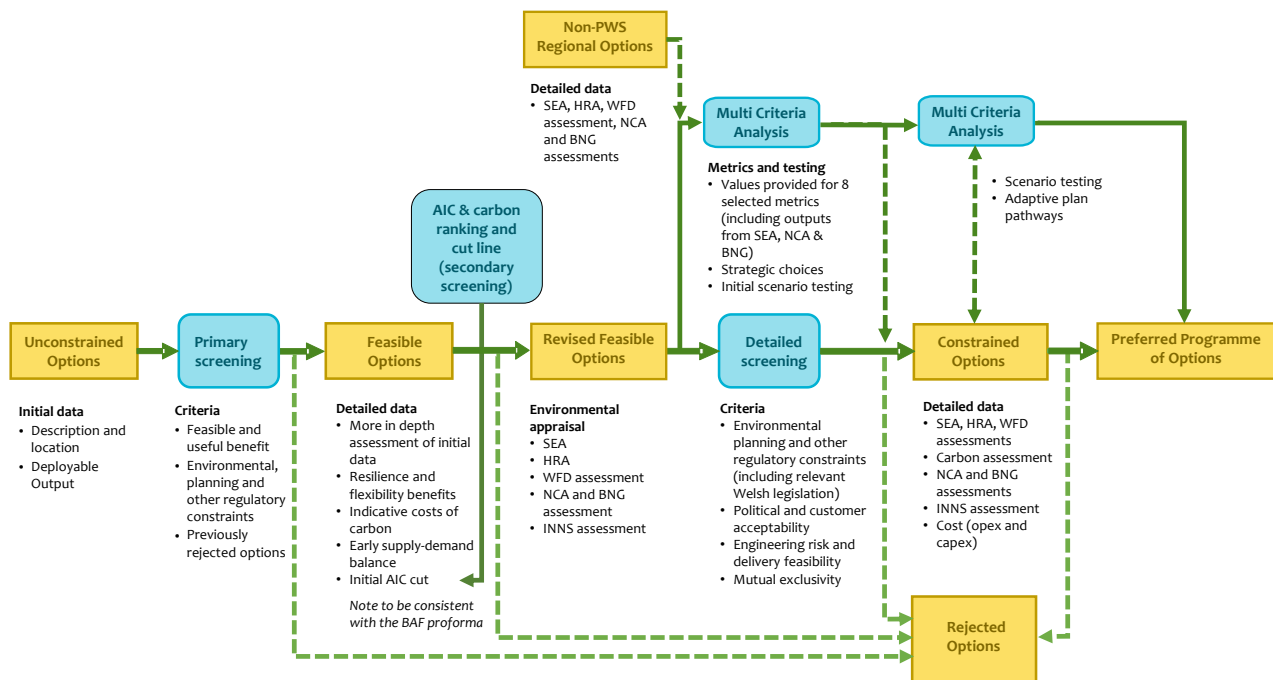
| No. | Name | Company | No. | Name | Company |
|-----|--------------------|----------------|-----|-------------------|--------------|
| 1 | Saltney | Hafren Dyfrdwy | 9 | Wolverhampton | Severn Trent |
| 2 | Chester | Severn Trent | 10 | Bishops Castle | Severn Trent |
| 3 | Newark | Severn Trent | 11 | Pileth | Welsh Water |
| 4 | Mardy | Severn Trent | 12 | Whitbourne | Welsh Water |
| 5 | Kinsall | Severn Trent | 13 | Vowchurch | Welsh Water |
| 6 | Whitchurch and Wem | Severn Trent | 14 | Ross on Wye | Welsh Water |
| 7 | Ruyton | Severn Trent | 15 | Forest and Stroud | Severn Trent |
| 8 | Rutland | Severn Trent | | | |

2.2.10 All zones with deficits have then been subject to a “decision making” process using a Multi-Criteria Analysis (MCA) and option screening to identify a preferred plan (comprising of selected options) to address the supply-demand deficit. WRW led the development of these tools for its region, collaborating with the core water companies and key stakeholders, including regulators. The MCA decision making method factors in multiple costs and benefits and considers the interaction between zones to establish a ‘best value plan’ for the company (and for the region as whole).

2.2.11 Scenarios have been used to test the preferred, and any identified alternative, plans. They have been used to explore what would happen if one of these plans was adopted and the future was different to that assumed in the “central” planning assumptions. The scenarios could be used to make the preferred plan an adaptive plan (in which different options could be taken forward after key decision points, if circumstances changed).

- 2.2.12 The process, and key decision points in the development of the component WRMPs and WRW Regional Plan are illustrated in **Figure 2.2**.
- 2.2.13 Environmental assessment information (derived from HRA and other regulatory assessments) has been provided for the following key decision points:
- **Detailed screening of revised feasible options** using a Red-Amber-Green (RAG) analysis, which grades an option to a given criterion on a satisfactory to unsatisfactory basis (Green being satisfactory, Red being un-satisfactory). The detailed screening included a criterion that explicitly used the findings of HRA: 'Does the option pass HRA compliance risks?'
 - **MCA of the revised feasible options**, where information from the HRA was used to inform decision-making metrics relating to biodiversity.
 - **Scenario testing** of the constrained options.
 - **Selection** of the preferred programme of options.

Figure 2.2 Environmental Assessment Inputs into Option and Plan Development



2.3 Water Resources West Draft Regional Plan

- 2.3.1 The draft Regional Plan proposes a significant reduction in water demand, through reduction in consumption and a reduction in leakage from the potable water network. Consumption reduction to 110 l/p/d by 2050 will be achieved through a range of measures rolled out by the member water companies:
- Targeted water efficiency campaigns, with household and non-household setting visits supported by partnership working.
 - A significant roll-out of water meters, using enhanced or smart technologies.
 - In the Midlands, adopting a policy of metering all households, linked to the water stress classification in that area.

- 2.3.2 Achieving the 110 l/p/d target will also require Government introduction of proposed³⁹ water labelling on water using products.
- 2.3.3 The combined benefit of the demand management options selected for WRW's draft Best Value Plan, including Government intervention via water labelling, is around 914 MI/d across the WRW region.
- 2.3.4 The draft Regional Plan identifies that the largest need for new water resources arises in the Midlands to offset reductions in abstraction licences to meet environmental needs. In this context, STW requires a large number of supply options in WRW's draft Best Value Plan to tackle deficits. These STW options include raising the height of dams in the Derwent Valley and at other reservoirs to increase storage, investing in a number of water treatment works (WTWs) to increase deployable output, significant increases in interconnectivity and a small number of new sources. STW also proposes to take 75 MI/d from the North West Transfer (NWT) for a period until it is required by Water Resources South East (WRSE). In addition, use of water from Minworth and Netheridge wastewater treatment works (WwTW) and a reduction in licensed abstraction at Mythe is included to support transfer of water to the South East.
- 2.3.5 SSW does not select any supply options, as they present no deficits in the 2025-2050 horizon.
- 2.3.6 In the North West, development of new water resources is linked to supporting water transfers, both within WRW and to the South East. This also provides additional benefit to UuW's customers. The proposed new sources including in WRW's draft Best Value Plan involve increasing groundwater abstraction capability within existing licence volumes and new river abstractions from the Rivers Ribble, Irwell and Bolin. As part of the joined-up plan linked to the water transfers, this improves the level of service for temporary use bans to 1 in 40 years from 2031. Enabling works on the Vyrnwy Aqueduct are also required to facilitate the transfers.
- 2.3.7 In Wales, HD does not require any supply options, as it has no deficits to cover even in the absence of demand management policy being implemented.
- 2.3.8 DCWW will be implementing two supply options that are included in WRW's draft Best Value Plan, one which focuses on upgrades to the network in the South East Wales Conjunctive Use System (SEWCUS) WRZ and one which looks at recovering losses from a WTW.
- 2.3.9 A full list of options that comprise the draft WRW Regional Plan is contained at **Appendix A**.

Strategic Transfers

- 2.3.10 Two strategic transfers from WRW to WRSE are included in the draft Regional Plan. These are the Grand Union Canal (GUC) transfer and the River Severn to River Thames (STT).
- The GUC strategic transfer will utilise the existing canal infrastructure to transfer water from the Midlands to areas of planning deficit in Hertfordshire and North West London. The scheme plans to utilise treated discharge from Minworth WwTW as the resilient source of water to supply this canal transfer. This transfer has been selected by WRSE to supply 50 MI/d of water into the South East starting in 2031 and raising to 100 MI/d by 2040.

³⁹ UK Government (2022) *UK mandatory water efficiency labelling consultation*. Available from: <https://www.gov.uk/government/consultations/uk-mandatory-water-efficiency-labelling> [Accessed October 2022].

- The STT will convey raw water from the River Severn into the River Thames via an interconnector. WRSE has assessed many variants of this and selected the 500 MI/d pipeline option as part of its adaptive plan. The earliest this could come into operation is 2040; however, in the reconciliation baseline scenario it is first used to provide a supply-demand balance benefit to the South East in 2050. While this transfer can access available water at high flows in the lower Severn, as noted above, it also has multiple options that can be called upon to support abstraction from the Severn including a reduction in licensed abstraction at Mythe and the transfer of treated wastewater from Netheridge WwTW (known as Severn Trent Sources) and the use of treated wastewater from Minworth WwTW.
- 2.3.11 The NWT, which is one of the support elements of the STT, is also selected to meet needs within the WRW region. This is part of a joined-up adaptive plan, which uses 75 MI/d of this water by STW in a low regrets way until it is needed by the South East. STW can develop other sources to be ready whenever the need in the South East arises. At that point, this element of the NWT can switch over to WRSE, via the STT. The draft Regional Plan therefore includes STW Option 303A which involves a 75 MI/d release from Vyrnwy Reservoir, noting that 25 MI/d would be via the Afon Vyrnwy and 50 MI/d via a bypass pipeline⁴⁰.
- 2.3.12 It should be noted that the STW draft WRMP24 preferred programme does not include Option 303A; instead STW's programme includes Option 303C which involves a 25 MI/d release from Vyrnwy Reservoir into the Afon Vyrnwy only. In consequence, there is currently a discrepancy between the draft Regional Plan and STW's draft preferred plan that will be resolved in the final Regional Plan.
- 2.3.13 STW faces a significant loss of abstraction licence in the Nottinghamshire area, initially in the 2030s but also in the longer term. There are limited options in this area to provide alternative sources, and the main ones are located upstream in the Derwent Valley. One option is to stop an existing transfer to Yorkshire Water, freeing up water to meet STW's needs, but this would have detrimental impacts for Yorkshire Water. Other options involve increasing reservoir storage in the Derwent Valley in various ways. It is not yet clear if reservoir storage could be increased to a size large enough to meet both STW's and Yorkshire Water's needs. Decision points in 2025 about the feasibility and in 2030 about best value, allow the best option to be in place by 2035.
- 2.3.14 The GUC, STT, Minworth Effluent Reuse, Severn Trent Sources, NWT and Derwent Reservoir are all SROs and subject to the Regulators Alliance for Progressing Infrastructure Development's (RAPID) separate, gated⁴¹ decision-making process, supported by their own environmental assessments. Where possible, the draft WRMP24 and Regional Plan environmental assessments have been aligned with the SRO assessments.

⁴⁰ It should be noted that Option 303A, as described in the STW draft WRMP24 HRA, involves the direct release of 75MI/d into the Afon Vyrnwy. However, this description has subsequently been revised with 25 MI/d to be released into the Afon Vyrnwy and 50 MI/d to be transferred to the River Severn via a bypass.

⁴¹ Regulators Alliance for Progressing Infrastructure Development (RAPID) was established in 2019 to "help accelerate the development of new water infrastructure and design future regulatory frameworks. The joint team is made up of the 3 water regulators Ofwat, Environment Agency and Drinking Water Inspectorate". Available online <https://www.ofwat.gov.uk/regulated-companies/rapid/3/> [Accessed July 2022]

3. Approach to HRA

3.1 Introduction

3.1.1 This section describes the methodology employed for the HRA of the draft Regional Plan. As set out in **Section 1.3**, this report has drawn upon the findings of the HRAs of the component draft WRMPs for SSW, STW, UUW and DCWW (as the options contained in WRW's draft Best Value Plan also feature in these WRMPs). Given this, the section describes the assessment of the draft WRMP options (in terms of Stage 1 Screening and Stage 2 Appropriate Assessment) before outlining the approach to the assessment of 'in combination' effects.

3.2 Key Guidance

3.2.1 The key guidance document for the HRA of WRMPs is the **UK Water Industry Research (UKWIR) (2021). *Environmental Assessment Guidance for Water Resources Management Plans and Drought Plans*. UK Water Industry Research Limited, London**. Whilst this guidance relates to WRMPs, as regional plans include component WRMP options then it is considered to be equally applicable in the context of this HRA.

3.2.2 Other relevant guidance and case-practice includes:

- Regulators' Alliance for Progressing Infrastructure Development (2022). Strategic regional water resource solutions guidance for Gate 2.
- Defra (2021). *Policy paper: Changes to the Habitats Regulations 2017* [online]. Available at: <https://www.gov.uk/government/publications/changes-to-the-habitats-regulations-2017/changes-to-the-habitats-regulations-2017> [Accessed October 2022].
- UK Government (2019). *Appropriate assessment: Guidance on the use of Habitats Regulations Assessment* [online]. Available at: <https://www.gov.uk/guidance/appropriate-assessment> [Accessed October 2022].
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- UK Government (2021). Water resources planning guideline [online]. Available at: <https://www.gov.uk/government/publications/water-resources-planning-guideline/water-resources-planning-guideline> [Accessed October 2022].
- Natural England (2020). *Guidance on how to use Natural England's Conservation Advice Packages in Environmental Assessments*. Natural England, Peterborough.
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- Defra (2012). *The Habitats and Wild Birds Directives in England its seas: Core guidance for developers, regulators & land/marine managers* [online]. Available at https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/82706/habitats-simplify-guide-draft-20121211.pdf. [Accessed October 2022].

- Planning Inspectorate (PINS) Note 05/2018: *Consideration of avoidance and reduction measures in Habitats Regulations Assessment: People over Wind*, Peter Sweetman v Coillte Teoranta. [withdrawn].
- Scottish Natural Heritage (SNH) (2019). SNH Guidance Note: *The handling of mitigation in Habitats Regulations Appraisal – the People Over Wind CJEU judgement* [online]. Scottish Natural Heritage. Available at: <https://www.nature.scot/sites/default/files/2019-08/Guidance%20Note%20-%20The%20handling%20of%20mitigation%20in%20Habitats%20Regulations%20Appraisal%20-%20the%20People%20Over%20Wind%20CJEU%20judgement.pdf>. [Accessed October 2022].

3.3 Application of HRA to Water Resources Management Plans and Regional Plans

Process Overview

- 3.3.1 European Commission guidance⁴² 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**) of the Habitats Regulations, although not all stages will necessarily be required.
- 3.3.2 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**. 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.
- 3.3.3 In practice, the HRAs completed of WRMPs and, in-turn, the respective regional plans have two functional components: they informally guide each water company and region as it considers which water resource options will be included in the published plans; and subsequently provides a formal assessment of the published WRMPs and regional plans 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 plans⁴³ 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 feasible options and the application of the 'People over Wind' (PoW)⁴⁴ case.

⁴² *Methodological guidance on the provisions of Article 6(3) and (4) of the Habitats Directive 92/43/EEC* (EC 2002).

⁴³ 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.

⁴⁴ *People Over Wind and Sweetman v Coillte Teoranta* (C-323/17)

Box 1 – Stages of HRA

Stage 1 – Screening or ‘Test of significance’

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

Stage 2 – Appropriate Assessment (including the ‘Integrity test’)

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

Stage 3 – Assessment of Alternative Solutions

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

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

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

- 3.3.4 The overarching HRA *process* for the component WRMPs has therefore included the following key steps:
- An initial ‘**risk review**’ of the **supply-side**⁴⁵ **feasible options considered for the component draft WRMPs**, to assist the 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 opportunities⁴⁶ (for clarity, this review process is not documented in this report).
 - The **assessment of the preferred programme of options** contained in the component draft WRMPs against the provisions of Regulation 63, comprising formal ‘screening’ and an ‘appropriate assessment’ designed to meet the legislative tests.
- 3.3.5 The assessments of the preferred WRMP programmes of options have provided the basis for the HRA of the draft Regional Plan. **The specific tests associated with Regulation 63 are applied to the Regional Plan preferred programme of options and adaptive plans only in this report.**

3.4 Water Resources West Draft Best Value Plan Options Assessment

- 3.4.1 For each option that comprises WRW’s draft Best Value Plan, the assessment has comprised of:
- 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 to identify those sites and features where there will self-evidently be ‘no effect’, ‘no likely significant effects’, or positive effects due to the option⁴⁷, 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).
- 3.4.2 The conservation objectives of European sites are taken into account at the screening and appropriate assessment stages as necessary.

⁴⁵ Demand management 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 Regional Plan 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.

⁴⁶ 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 the water company and the delivery of the WRMP (and hence the Regional Plan) 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 UUW and to avoid the perception of premature assessment conclusions.

⁴⁷ Note, for options with ‘no effects’ or positive effects there is no possibility of ‘in combination’ effects.

- 3.4.3 This option assessment process has been completed as part of the HRAs undertaken for the member water company component draft WRMPs. A summary of the assessment process is provided below; further detail is provided in the individual WRMP HRA Reports referenced in **Section 1.3**.

Stage 1 Screening

- 3.4.4 The objective of the HRA is to establish, firstly, whether any of the options included in the draft Regional Plan are likely to have a significant effect on European sites (alone or in-combination with other plan options, or with other plans and projects)⁴⁸. This is judged in terms of the option's implications for a site's conservation objectives, which relate to the site's qualifying features' (i.e. those Annex I habitats, Annex II species, and Annex I bird populations for which it has been designated, and Ramsar criterion). Significantly, HRA is based on a rigorous application of the precautionary principle. Where uncertainty or doubt remains, an impact should be assumed, triggering the requirement for Stage 2 Appropriate Assessment of that option.
- 3.4.5 Accordingly, for each option included in WRW's draft Best Value Plan, the assessment has considered whether there are any likely significant effects (LSEs) arising from construction and/or operation of the option (either alone or in-combination) on one or more European sites. This Stage 1 Screening of each option has been completed as part of the HRAs of the component draft WRMPs.
- 3.4.6 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 affected⁴⁹).
- 3.4.7 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 are 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).
- 3.4.8 The 'low-bar' principle is used for the screening of the options⁵⁰; in general, unless the possibility of significant effects can be simply and self-evidently excluded then an

⁴⁸ The initial list of European sites for screening has been derived by adopting a distance-based threshold from each option component, plus exceptional, longer distance impact pathways.

⁴⁹ 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.

⁵⁰ 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?

‘appropriate assessment’ is completed (rather than a more detailed ‘secondary screening’ or similar). This applies to the options alone and ‘in combination’ (i.e. unless it is evident that there will be ‘no effects’ from any options, the possibility of ‘in combination effects’ is not excluded and these are taken forward to ‘appropriate assessment’). This approach simplifies the overall assessment and ensures procedural clarity; it is also consistent with the ‘People Over Wind’⁵¹ case law, which requires that mitigation not be considered at screening.

- 3.4.9 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).

Stage 2 Appropriate Assessments

- 3.4.10 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 sites’ conservation objectives.
- 3.4.11 The appropriate assessments are ‘appropriate’ to the nature of the WRMPs and Regional Plan as strategic plans, 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.
- 3.4.12 The Stage 2 Appropriate Assessments of each option within WRW’s draft Best Value Plan has been completed as part of the HRAs of the component draft WRMPs.

3.5 Plan-Level In Combination Assessments

- 3.5.1 HRA requires that other projects, plans or programmes be considered for effects on European sites ‘in combination’ with the Regional Plan. 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 All Company Working Group (ACWG).
- 3.5.2 Broadly, it is considered that the Regional Plan could have the following ‘in combination’ effects:
- Within-plan effects, i.e. separate options within the Regional Plan affecting the same European site(s). For options within the same draft WRMP, these ‘in combination’ effects have been addressed as part of the option assessment process outlined above. Consideration has subsequently been given to the potential ‘in combination’ effects of draft Best Value Plan options contained in different component WRMPs in **Section 4.3** of this report.
 - Between-plan effects, i.e. effects with other abstractions, in association with, or driven by, other plans (principally other regional plans and SROs).
 - Other between-plan effects, i.e. ‘in combination’ with non-abstraction activities promoted by other plans – for example, with regulation releases.

⁵¹ Case C 323/17 Court of Justice of the European Union: People Over Wind.

- Between-project effects, i.e. effects of a specific option with other specific projects and developments.

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

- The Regional Plan 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 Natural Resources Wales (NRW) through their permitting procedures.
- Likely water resource demands of known major projects are also taken into account during the development of WRMPs and, in-turn, the Regional Plan, unless otherwise noted.

3.5.4 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 Regional Plan (and its associated and related plans (including the SROs)). The main exception to this is other water company WRMPs, regional plans and SROs outside the WRW region, which are being developed concurrently.
- With regard to other strategic plans, the list of plans included within the Strategic Environmental Assessment (SEA) of the draft Regional Plan is used as the basis for a high-level 'in combination' assessment. The SEA is used to provide information on 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 and Regional Plan development process explicitly accounts for the water-resource demands of known major projects (e.g. power station decommissioning; large-scale housing development), and so these 'in combination' effects are not considered in detail.
 - ▶ Potential 'in combination' effects between individual options and Nationally Significant Infrastructure Projects (NSIPs) identified by the Planning Inspectorate, and other known major projects, are assessed.
 - ▶ It is not possible to produce a definitive list of minor existing or anticipated planning applications within the zone of influence of each proposed option to review possible local 'in combination' effects. The nature of the Regional Plan 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 project level.

3.6 Key Challenges and Assumptions

3.6.1 The fundamental nature of the Regional Plan (a long-term strategic plan with specific projects) presents a number of distinct challenges for a 'strategic' or plan-level HRA.

Uncertainty and Plan-level Mitigation

- 3.6.2 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.
- 3.6.3 Where the available information is fundamentally insufficient to complete a meaningful appropriate assessment, then case-practice suggests some assessment may be deferred 'down the line' to a lower planning tier provided that certain criteria are met. This is usually only appropriate where there is sufficient certainty that the proposal can (with the implementation of established scheme-level measures that are known to be effective) avoid adverse effects on the integrity of European sites; and/or if appropriate investigation schemes are identified to resolve the uncertainty and commitments are made within the plan to not pursue an option if adverse effects are identified through these investigations.
- 3.6.4 Case-practice in WRMP HRAs⁵² suggests it may be acceptable to include preferred programme options with residual uncertainties provided that:
- there is sufficient flexibility within the terms of the WRMP to ensure adverse effects can be avoided at the project level (e.g. the plan does not dictate specific pipeline routes or yields that cannot be deviated from); and/or
 - the option is not required within the first five years of the plan period, so allowing time for additional investigations to be completed; and
 - the uncertainty that this creates is mitigated at the plan-level by the inclusion of alternative options which:
 - ▶ will meet the required demand / deficit should the preferred programme option prove to have an unavoidable risk of adverse effects on the European sites in question; **and**
 - ▶ will not themselves have any adverse effect on any European sites.
- 3.6.5 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 potentially allows for the Regional Plan to be compliant with the Habitats Regulations, since certainty over outcomes for the plan as a whole is provided.
- 3.6.6 However, 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.

⁵² For example, in relation to UJW's WRMP14.

WRMP Development Parameters and Relevance to the Regional Plan HRA

- 3.6.7 The modelling underpinning the WRMP development and option selection process incorporates several assumptions that influence the scope of the component WRMP HRAs and, in-turn, the Regional Plan:
- The WRMP development process takes account of the existing consents regime, and any known (or reasonably anticipated) amendments that are likely to be required (e.g. following WINEP (Water Industry National Environment Programme) investigations or similar) since there has to be a starting point / basis for the assessment (i.e. the modelling / optioneering process cannot start with the assumption that no current consents are reliable). Any required licence amendments are factored into the supply-deficit calculations, and the EA will have confirmed that these are valid for the planning period when the WRMP modelling is undertaken. The existing consents regime (taking into account any required sustainability reductions) is therefore ‘the baseline’⁵³ and, by extension, the HRA necessarily focuses on the additional effects introduced by options and does not (and cannot) reassess or reconfirm the existing consents regime.
 - In some instances, when considering water that may be available from existing sources, consultees have indicated that consideration of ‘recent actual’ abstraction is more appropriate than the currently licenced maximum, particularly for waterbodies that are considered ‘over-licensed’; it is understood that these licences have been identified during the plan-development process and factored into the supply-demand balance calculations.
 - The modelling takes account of predicted local and regional growth when identifying risk areas and potential solutions, based (*inter alia*) on local plans and population growth models. ‘In combination’ effects with respect to land-use plans and specific options are, therefore, inherently considered and accounted for as part of the WRMP (and Regional Plan) 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. Likewise, the modelling accounts for climate change.
 - Unless otherwise stated by the EA during the options development process, it is assumed that the relevant Catchment Abstraction Management Strategy (CAMS) documents are correct and reliable, and that there is ‘water available’ where this is confirmed by the CAMS.

Strategic Resource Options

- 3.6.8 The draft Regional Plan includes strategic transfer options that are being progressed through RAPID’s gated process as SROs. At the time of writing, the SROs are subject to ongoing development and environmental assessment including HRA prior to RAPID Gate 2 submission. In consequence, there is not sufficient information available at this stage to assess the strategic transfer options/SROs being taken forward in the draft Regional Plan, including the adaptive plan (although some SRO component sub-options are included in the draft Best Value Plan). However, this information will be available post-Gate 2 submission and will allow for an assessment of the strategic transfer options, and other SROs in the WRW region, to be included in the final WRW Regional Plan HRA.

⁵³ It is recognised that, occasionally, the sustainability reductions agreed through the Review of Consents (RoC) process have been subsequently shown to be insufficient to address the effects of public water supply abstraction on some sites; it is assumed that these have been identified to the water companies as part of the WRMP development process.

In Combination Effects

3.6.9 The 'in combination' effects of the draft Regional Plan with other regional plans on European sites are difficult to predict at this stage as regional plan programmes continue to be developed and environmental assessments including HRA are being completed. In consequence, there will be a need to review and update the 'in combination' assessment presented in this report prior to publication of the final Regional Plan (and final HRA). However, in preparing this HRA Report engagement has been undertaken with other regional planning bodies to understand where there is the potential for 'between regional plan' 'in combination' effects on European sites.

General Assumptions

3.6.10 Most environmental changes associated with option construction and operation will have an inherent range over which they naturally attenuate⁵⁴, and many interest features will have little or no sensitivity to the likely magnitude of the environmental changes expected as the result of an option. Broad or universal assumptions that can be robustly applied to the assessments of the individual options or interest features are set out in **Appendix B**.

3.6.11 In addition:

- It is assumed that all normal licensing, consenting and management procedures will be employed at option delivery and throughout operation, and that established best-practice avoidance and mitigation measures will be implemented throughout scheme design and construction to safeguard environmental receptors, including European site interest features. The HRA does not, therefore, assess speculative or hypothetical effects based on assumptions of non-compliance (e.g. accidental spillages of treatment chemicals from a new WTW).
- Guidance from the EA suggests that significant direct effects on groundwater dependent terrestrial ecosystems (GWDTEs) from drawdown associated with abstraction are unlikely for European sites over 5 km from the abstraction (*National EA guidance: Habitats Directive Stage 2 Review: Water Resources Authorisations – Practical Advice for Agency Water Resources Staff*).

⁵⁴ 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.

4. Assessment of the Draft Regional Plan

4.1 Introduction

4.1.1 This section presents the assessment of the draft Regional Plan. It summarises the assessment of those options that comprise WRW's draft Best Value Plan, which has been undertaken for the component WRMPs in the WRW region. The assessment then considers the 'in combination' effects of the Plan options, including strategic transfers and alternative plan pathways.

4.2 Screening and Appropriate Assessment

4.2.1 The options contained in WRW's draft Best Value Plan are also included in the component draft WRMPs for HD, UUW, STW, SSW and DCWW. The draft WRMPs have been assessed against the provisions of Regulation 63 of the Habitats Regulations which has comprised of formal 'screening' and 'appropriate assessment' (where required) such that the draft Best Value Plan options have been assessed as part of the HRAs of these component plans.

4.2.2 On this basis, a separate assessment of the draft Best Value Plan options has not been undertaken for the HRA of the draft Regional Plan; instead, this HRA draws upon the findings of the component WRMP option assessments to determine whether the draft Regional Plan will have LSEs on European sites.

4.2.3 Accordingly, this section presents a high-level summary of the formal screening and appropriate assessments of the draft Best Value Plan options. Further detail is available in the HRA reports published alongside the draft WRMPs for UUW, STW, SSW and DCWW⁵⁵.

Stage 1 Screening

4.2.4 The 'screening' of the draft Best Value Plan options 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'.

4.2.5 The formal screening of the draft Best Value Plan options (as reported in the draft WRMP HRAs) concluded that significant effects are either likely or uncertain for those sites and options identified in **Table 4.1** (note, this includes options that may rely on mitigation measures to prevent significant effects occurring). These sites and options were therefore taken forward to the 'appropriate assessment' stage.

⁵⁵ It should be noted that, at the time of writing, information relating to the HRA of the Hafren Dyfrdwy draft WRMP24 was not available.

Table 4.1 Summary of Draft Best Value Plan Options and Sites Requiring Appropriate Assessment

| European Site | Water Company | Option | Alone or I/C*? |
|---------------------------------------------------------|--------------------|-----------------------------------------------------------------------------------------------------------------|----------------|
| Bredon Hill SAC | Severn Trent Water | 66: Strensham WTW Expansion | Alone |
| Cannock Chase SAC | Severn Trent Water | 44: New River Sow abstraction and WTW near Stafford | Alone |
| Dixton Wood SAC | Severn Trent Water | 66: Strensham WTW Expansion | Alone |
| Fen Pool SAC | Severn Trent Water | 79A: Wolverhampton-Birmingham strategic link main (large) | Alone |
| Humber Estuary SAC and Ramsar | Severn Trent Water | 29: Homesford WTW capacity increase | I/C |
| | Severn Trent Water | 426: Little Eaton WTW deployable output recovery | I/C |
| | Severn Trent Water | 64: Rehabilitation Milton groundwater source | I/C |
| Manchester Mosses SAC | United Utilities | WR149: Increased Treatment capacity (Wigan) | Alone |
| Martin Mere Ramsar | United Utilities | WR107a2: Groundwater enhancement (Aughton Park) | Alone/IC |
| Martin Mere SPA | United Utilities | WR107a2: Groundwater enhancement (Aughton Park) | Alone/IC |
| Mersey Estuary Ramsar | United Utilities | STTA4: Northwest Transfer (Vyrnwy) | Alone/IC |
| | United Utilities | WR015: New surface water (River Irwell) | IC |
| | United Utilities | WR076: New surface water (River Bollin) | Alone/IC |
| | United Utilities | WR111: Groundwater enhancement (Woodford) | I/C |
| | United Utilities | WR113: Groundwater enhancement (Tytherington) | I/C |
| | United Utilities | WR149: Increased Treatment capacity (Wigan) | I/C |
| Mersey Estuary SPA | United Utilities | STTA4: Northwest Transfer (Vyrnwy) | Alone/IC |
| | United Utilities | WR015: New surface water (River Irwell) | IC |
| | United Utilities | WR076: New surface water (River Bollin) | Alone/IC |
| | United Utilities | WR111: Groundwater enhancement (Woodford) | I/C |
| | United Utilities | WR113: Groundwater enhancement (Tytherington) | I/C |
| | United Utilities | WR149: Increased Treatment capacity (Wigan) | I/C |
| Mersey Narrows and North Wirral Foreshore Ramsar | United Utilities | (Indirect effects on interest features via impacts on Ribble and Alt SPA/Ramsar or Mersey Estuary SPA / Ramsar) | I/C |

| European Site | Water Company | Option | Alone or I/C*? |
|--------------------------------------------------------------|--------------------|-----------------------------------------------------------------------------------------------------------------|----------------------|
| Mersey Narrows and North Wirral Foreshore SPA | United Utilities | (Indirect effects on interest features via impacts on Ribble and Alt SPA/Ramsar or Mersey Estuary SPA / Ramsar) | I/C |
| Midland Meres and Mosses Phase 1 Ramsar | United Utilities | STTA4: Northwest Transfer (Vyrnwy) | Alone |
| Midland Meres and Mosses Phase 2 Ramsar | United Utilities | STTA4: North West Transfer (Vyrnwy) | Alone |
| Oak Mere SAC | United Utilities | STTA4: North West Transfer (Vyrnwy) | Alone |
| Pasturefields Salt Marsh SAC | Severn Trent Water | 44: New River Sow abstraction and WTW near Stafford | Alone |
| Peak District Dales SAC | Severn Trent Water | 6: Upper Derwent Valley reservoir expansion (UDVRE)** | Alone/IC |
| | Severn Trent Water | 29: Homesford WTW capacity increase | Alone/IC |
| | Severn Trent Water | 95B: Ogston WTW works expansion | Alone/IC |
| | Severn Trent Water | 128: Carsington to Tittesworth main (large) | Alone/IC |
| | Severn Trent Water | 128Z: Carsington to Tittesworth main (small) | Alone/IC |
| | Severn Trent Water | 187C: Expand Carsington reservoir (25000 MI) | Uncertain – Alone/IC |
| | Severn Trent Water | 305: Heathy Lea to North Notts transfer | Alone/IC |
| | Severn Trent Water | 426: Little Eaton WTW deployable output recovery | Alone/IC |
| Peak District Moors (South Pennine Moors Phase 1) SPA | Severn Trent Water | 6: Upper Derwent Valley reservoir expansion (UDVRE)** | Alone |
| | Severn Trent Water | 123B Raise dam at Tittesworth reservoir (25%) | Alone/IC |
| | Severn Trent Water | 128: Carsington to Tittesworth main (large) | Alone/IC |
| | Severn Trent Water | 128Z: Carsington to Tittesworth main (small) | Alone/IC |
| | Severn Trent Water | 305: Heathy Lea to North Notts transfer | Alone/IC |
| Ribble and Alt Estuaries Ramsar | United Utilities | WR049d: New surface water (River Ribble) | Alone/IC |
| | United Utilities | WR107a2: Groundwater enhancement (Aughton Park) | Alone/IC |
| Ribble and Alt Estuaries SPA | United Utilities | WR049d: New surface water (River Ribble) | Alone/IC |
| | United Utilities | WR107a2: Groundwater enhancement (Aughton Park) | Alone/IC |
| River Clun SAC | Severn Trent Water | 33Z: Shelton WTW expansion | Alone/IC |
| | Severn Trent Water | 66: Strensham WTW expansion*** | Alone/IC |
| | Severn Trent Water | 143: W.Midlands raw water storage*** | Alone/IC |

| European Site | Water Company | Option | Alone or I/C*? |
|---------------------------------------------------------------|--------------------|-----------------------------------------------------|-------------------|
| | Severn Trent Water | 303A: North West Transfer: Vyrnwy (75 MI/d)** | Alone/IC |
| River Dee and Bala Lake/ Afon Dyfrdwy a Llyn Tegid SAC | United Utilities | STTA4: North West Transfer (Vyrnwy) | Alone |
| River Mease SAC | Severn Trent Water | 31D: East Midlands raw water storage (CHQ) | Alone/IC |
| | Severn Trent Water | 44: New River Sow abstraction and WTW near Stafford | Alone/IC |
| | Severn Trent Water | 64: Rehabilitation Milton groundwater source | Alone/IC |
| Rutland Water SPA and Ramsar | Severn Trent Water | 190: Eyebrook Reservoir and new WTW | Alone |
| Sefton Coast SAC | United Utilities | WR107a2: Groundwater enhancement (Aughton Park) | Alone/IC |
| Severn Estuary/Môr Hafren SAC and Ramsar | Severn Trent Water | 33Z: Shelton WTW expansion | Alone/IC |
| | Severn Trent Water | 66: Strensham WTW expansion | Alone/IC |
| | Severn Trent Water | W.Midlands raw water storage*** | Alone/IC |
| | Severn Trent Water | 303A: North West Transfer: Vyrnwy (75 MI/d)** | Alone/IC |
| | DCWW | SEW166: SEWCUS network upgrade | Uncertain – Alone |
| Severn Estuary SPA | DCWW | SEW166: SEWCUS network upgrade | Uncertain – Alone |
| South Pennine Moors SAC | Severn Trent Water | Upper Derwent Valley reservoir expansion (UDVRE)** | Alone |
| | Severn Trent Water | 305: Heathy Lea to North Notts transfer | Alone |

*IC - 'In combination' with other options.

** Options 6 and 303A have not been subject to an appropriate assessment as part of the STW WRMP HRA as these options are progressing through the RAPID gated process. However, in respect of Option 303A, an alternative option (Option 303C) involving a 25MI/d release into the Afon Vyrnwy has been subject to appropriate assessment in the STW WRMP HRA.

***These options have not been subject to appropriate assessment as part of the STW WRMP HRA as there is considered to be sufficient time to complete assessments of the options within the next cycle of the WRMP process, allowing the latest baseline and condition status to be included, and development of hydrological models for those watercourses that will be impacted by changes/new abstractions.

4.2.6 With regard to demand management options, the appropriate assessments concluded that the only realistic mechanism for a negative effect on a European site would be through any construction required (for example, the leakage reduction programme may require repair of a pipe in or near an SAC). 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 demand management 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. On this basis, the draft Best Value Plan demand management options are not considered further in this report.

4.2.7 In this context, none of the SSW options included in WRW's draft Best Value Plan have been taken forward for appropriate assessment. This is because the SSW options relate to demand management measures only; the draft Best Value Plan does not include any

supply options in the SSW area. The SSW options are, therefore, not considered further in this report.

- 4.2.8 It should also be noted that information relating to the screening of the HD options was not available at the time of writing. However, as the HD options included in WRW's draft Best Value Plan are all demand management options, they are not expected to result in any LSEs on European sites and/or such, effects can only be considered at the project stage.

Stage 2 Appropriate Assessment

- 4.2.9 Appropriate assessments were undertaken for those European sites that may be significantly affected by the component draft WRMP (and, in-turn, WRW's draft Best Value Plan) supply options (or where there was uncertainty at the screening stage). The appropriate assessments, as reported in the draft WRMP HRAs, considered whether any sites will be subject to 'adverse effects on integrity' as a result of option implementation both alone and 'in combination', taking into account the sites' conservation objectives and conservation status.
- 4.2.10 A summary of the main conclusions of the appropriate assessments is provided below, in terms of both the construction and operational effects of the draft Best Value Plan supply options.

Construction Effects

- 4.2.11 Screening has identified the potential for construction activities associated with the implementation of the draft Best Value Plan options to result in likely significant effects on European sites. Such effects may arise due to, for example, the physical loss of habitats associated with the development of new infrastructure, noise disturbance, emissions to air and light pollution related to construction works and the release of contaminants to ground and waterbodies. However, the appropriate assessments of the options conclude that there are sufficient standard and best practice project-level mitigation measures that can be implemented during construction to avoid adverse effects on the integrity of any European sites (these measures are summarised in **Appendix C**).
- 4.2.12 It should be noted that, whilst no new assets would be required to facilitate the direct release of 25 MI/d from Vyrnwy Reservoir into the Afon Vyrnwy under Option 303A (North West Transfer: Vyrnwy (75 MI/d)) (and hence there would be no construction effects on European sites), the transfer of the remaining 50 MI/d would require the construction of a bypass pipeline. Potential construction effects on European sites associated with the bypass component of Option 303A have not been assessed in the STW draft WRMP24 HRA; however, it is anticipated that standard and best practice project-level mitigation measures would avoid adverse effects on the integrity of any European sites. This conclusion will be confirmed in the final HRA, taking into account the STT HRA which is considering the construction effects of the bypass on European sites.

Operational Effects

- 4.2.13 The appropriate assessments completed for the STW supply options have concluded that, on the basis of available evidence and site data, there would be no adverse effects on the integrity of any European sites or conservation objectives as a result of option operation 'alone'.
- 4.2.14 It should be noted that Option 303A (North West Transfer: Vyrnwy (75 MI/d)) has not been considered in the appropriate assessments completed for the STW draft WRMP24 HRA. This is because the STW draft WRMP24 preferred programme does not include Option 303A; instead STW's draft programme includes Option 303C which involves a 25 MI/d

release from Vyrnwy Reservoir into the Afon Vyrnwy only. In consequence, there is currently a discrepancy between the draft Regional Plan and STW's draft preferred plan that will be resolved in the final Regional Plan (and hence the final HRA).

- 4.2.15 Notwithstanding this, the STW draft WRMP24 HRA has identified that Option 303C (North West Transfer: Vyrnwy (25 Ml/d)) may have 'in combination' effects on migratory fish species including Atlantic salmon (*Salmo salar*), sea lamprey (*Petromyzon marinus*) and river lamprey (*Lampetra fluviatilis*), which are qualifying features of the Severn Estuary SAC and Ramsar (or sub-features of the Estuary's qualifying feature). This 'in combination' effect is associated with releases from Vyrnwy Reservoir under Option 303C and other regulation releases. As Option 303A also includes releases into the Afon Vyrnwy and the hence the River Severn, similar 'in combination' effects are possible. This is considered further in **Section 5.5**.
- 4.2.16 Effects on European sites associated with the transfer of the remaining 50Ml/d from Vyrnwy Reservoir via the bypass under Option 303A have not been assessed in the STW HRA Report. However, the operational effects of the bypass component of the STT (both alone and 'in combination') are being assessed as part of the STT SRO Gate 2 submission HRA. In consequence, whilst there is not sufficient information available at this stage to assess the bypass element of the STT in this report, information will be available post-Gate 2 submission and will be considered in the final WRW Regional Plan HRA.
- 4.2.17 Hydrological modelling will be required to fully assess the impacts of Option 95B (Ogston WTW works expansion) when in-combination with Options 29 (Homesford WTW capacity increase) and Option 426 (Little Eaton WTW deployable output recovery) on the Peak District SAC (aquatic qualifying features), whereby refinement of the operating pattern may be required. Baseline surveys of the reach to be impacted should also be undertaken to determine the potential for offsite functionally linked habitat.
- 4.2.18 In terms of the U UW supply options, the appropriate assessments have concluded that, on the basis of available evidence and site data, there would be no adverse effects on the integrity of any European sites screened into the appropriate assessments. There are, however, some residual uncertainties at the draft plan stage that require further investigation. These uncertainties predominantly relate to the precise effects of aquifer drawdown in respect of the interest features of the following European sites:
- Manchester Mosses SAC (Option WR149: Increased Treatment capacity (Wigan));
 - Martin Mere SPA / Martin Mere Ramsar (Option WR107a2: Groundwater enhancement (Aughton Park));
 - Mersey Estuary SPA / Mersey Estuary Ramsar (Options WR111: Groundwater enhancement (Woodford) and WR113: Groundwater enhancement (Tytherington), as well as Options WR015 (New surface water (River Irwell) and WR076 (New surface water (River Bollin) that involve abstraction from surface waterbodies that flow into the downstream Manchester Ship Canal and Mersey));
 - Ribble and Alt Estuaries Ramsar / Sefton Coast SAC (Option WR107a2); and
 - Ribble and Alt Estuaries SPA / Ribble and Alt Estuaries Ramsar (Option WR107a2).
- 4.2.19 These uncertainties will be resolved with the development of groundwater models for Lower Mersey and North Merseyside and Manchester and East Cheshire and before submission of the final Regional Plan (and hence the final HRA). Notwithstanding this, it would be possible for the Regional Plan to manage these uncertainties by identifying specific alternative 'no adverse effects' options that would be employed if options (or subsets of options) prove unachievable due to their impact on European sites.

- 4.2.20 No potential adverse effects on the integrity of any European sites or conservation objectives were identified in respect of DCWW Option SEW166 (SEWCUS network upgrade). This is because the option is a network resilience solution that will not require 'new water' and so will not have any operational effects (alone or 'in combination').

4.3 Draft Best Value Plan In Combination Assessment

- 4.3.1 The screening and appropriate assessments for the component draft WRMPs have considered the effects of the options that comprise WRW's draft Best Value Plan both alone and 'in-combination' with other options in the same WRMP. To fully assess the effects of the draft Regional Plan, it is also necessary to consider whether draft Best Value Plan options in different WRMPs may have 'in combination' effects on European sites.
- 4.3.2 Potential 'inter-option' effects have therefore been considered where, for those options and sites taken forward to the appropriate assessment stage, options in different component WRMPs may affect the same European site. This 'in combination' assessment has considered both construction and operational effects.

Construction Effects

- 4.3.3 There is the potential for 'inter-option' effects on European sites during the construction phase where works associated with two or more options in different component WRMPs result in direct (e.g. loss of habitat) or indirect (such as noise disturbance) effects on the same features of a site(s). However, the formal screening summarised in **Table 4.1** confirms that no European sites would be affected by draft Best Value Plan options contained in two different component WRMPs. In consequence, it is not possible for there to be in 'inter-option' effects during the construction phase.
- 4.3.4 The exception to this is the Severn Estuary/Môr Hafren SAC and Ramsar which could, in theory, be affected by construction associated with STW Options 33Z (Shelton WTW expansion), 66 (Strensham WTW expansion) and 143 (West Midlands raw water storage) and DCWW Option SEW166 (SEWCUS network upgrade). However, the appropriate assessments have concluded that established project-level mitigation measures can be implemented during construction to ensure that these options will not have adverse effects on the integrity of the Severn Estuary sites, alone or 'in combination'. Further, the STW and DCWW options are not located in close geographical proximity to one another and the timing of their implementation is likely to differ such that the likelihood of 'in combination' effects occurring during construction would be, in any case, very low.
- 4.3.5 On this basis, no adverse 'in combination' effects on the Severn Estuary/Môr Hafren SAC and Ramsar during construction are predicted.

Operational Effects

- 4.3.6 Where draft Best Value Plan supply options affect the same European site, there is the potential for 'in combination' effects to occur during operation. For example, options may result in a cumulative change in river flows which could result in a loss of habitats or changes in water quality that may affect the qualifying features of European sites.
- 4.3.7 The formal screening summarised in **Table 4.1** confirms that the STW, U UW and DCWW supply options would not affect the same European sites. In consequence, there would be no additional effects on European sites beyond those identified in the appropriate assessments for the component water company draft WRMPs (as summarised in **Section 4.2**).

- 4.3.8 Formal screening did identify that STW Options 33Z (Shelton WTW expansion), 66 (Strensham WTW expansion), 143 (West Midlands raw water storage) and 303A (North West Transfer: Vyrnwy (75 MI/d)) and DCWW Option SEW166 (SEWCUS network upgrade) could result in likely significant effects on the Severn Estuary/Môr Hafren SAC and Ramsar. However, as noted above, DCWW Option SEW166 will not require 'new water' and so will not have any operational effects 'in-combination' with the STW options on the Severn Estuary sites.

4.4 Strategic Transfers and Adaptive Plan Pathways

- 4.4.1 The draft Regional Plan includes two strategic transfers from the WRW region to WRSE, the GUC transfer and STT.
- 4.4.2 The GUC strategic transfer will utilise the existing canal infrastructure to transfer water from the Midlands to areas of planning deficit in Hertfordshire and North West London. The scheme plans to utilise treated WwTW discharge from Minworth as the resilient source of water to supply this canal transfer. This transfer has been selected by WRSE to supply 50 MI/d of water into the South East starting in 2031 and raising to 100 MI/d by 2040.
- 4.4.3 The STT SRO involves the transfer of raw water to the South East region, utilising excess flows in the River Severn. Additional water sources will supplement flows in the River Severn, including: releases from Vyrnwy Reservoir into the River Severn via the Afon Vyrnwy and a bypass pipeline; diversion of treated water from Oswestry WTW (allowing a reduction in current abstractions on the River Severn); a reduction in licensed abstraction at Mythe; and the transfer of treated wastewater from Minworth and Netheridge WwTWs (the Mythe, Minworth and Netheridge components are separate but related SROs).
- 4.4.4 In addition, the NWT SRO, which is also one of the support elements of STT, is selected to meet needs within WRW. This is part of a joined-up adaptive plan (the Adaptive Plan for the River Severn), which uses 75 MI/d of this water by STW in a low regrets way until it is needed by the South East. STW can develop other sources to be ready whenever the need in the South East arises. At that point, this element of the NWT can switch over to WRSE, via the STT. The draft Regional Plan therefore includes STW Option 303A which involves a 75MI/d release from Vyrnwy Reservoir, noting that 25 MI/d would be via the Afon Vyrnwy and 50 MI/d via a bypass pipeline.
- 4.4.5 As highlighted in **Section 4.2**, the STW draft WRMP24 preferred programme does not include Option 303A; instead STW's programme includes Option 303C which involves a 25MI/d release from Vyrnwy Reservoir into the Afon Vyrnwy. In consequence, there is currently a discrepancy between the draft Regional Plan and STW's draft preferred plan that will be resolved in the final Regional Plan (and hence in the final HRA).
- 4.4.6 The draft Regional Plan includes a further adaptive plan pathway known as 'Derwent Valley Options'. STW faces a significant loss of abstraction licence in the Nottinghamshire area, initially in the 2030's but also in the longer term. There are limited options in this area to provide alternative sources, and the main ones are located upstream in the Derwent Valley. One option is to stop an existing transfer to Yorkshire Water, freeing up water to meet STW's needs (Option 169 in STW's draft WRMP preferred programme), but this would have detrimental impacts for Yorkshire Water. Other options involve increasing reservoir storage in the Derwent Valley in various ways.
- 4.4.7 Increasing reservoir storage is an option within WRW's draft Best Value Plan (Option 6) and is also a SRO. The screening of Option 6 completed as part of the STW HRA has highlighted significant concerns relating to this option's potential encroachment on habitats within the boundary of the South Pennine Moors SAC and Peak Direct Moors (South Pennine Moors Phase 1) SPA from the new top water level and repositioned

infrastructure, and potential changes to the flow regime within the River Derwent which is hydrologically linked to the Peak District Dales SAC. However, this option is progressing through the RAPID gated process, and as such, the adverse effects from this scheme are currently being considered separately at this draft plan stage.

- 4.4.8 The strategic transfers are also being progressed through RAPID's gated process. The SROs are subject to ongoing development and environmental assessment including HRA prior to RAPID Gate 2 submission in October 2022. In consequence, there is not sufficient information available at this stage to assess the strategic transfers options being taken forward in the draft Regional Plan, including the adaptive plan (although some component options are included in the draft Best Value Plan). However, this information will be available post-Gate 2 submission and will allow for an assessment of the strategic transfer options, as well as Option 6, to be included in the final WRW Regional Plan HRA.

5. In Combination Assessment: Other Plans, Programmes and Projects

5.1 Introduction

5.1.1 The effects of the options that comprise WRW's draft Best Value Plan on European sites 'in combination' with each other have already been considered in **Section 4**. This section considers the 'in combination' effects of the draft Regional Plan with other plans, programmes and projects including:

- other regional plans;
- SROs;
- other water company plans;
- regulation releases;
- local plans and strategies;
- National Policy Statements (NPSs);
- NSIPs;
- High Speed 2 (HS2); and
- major planning applications.

5.1.2 It should be noted that 'in combination' effects with the component WRMPs prepared by the WRW member water companies have not been considered since the options within these plans are contained in the draft Best Value Plan and 'in combination' effects cannot, therefore, occur. 'In combination' effects with WRMPs prepared by water companies outside of the WRW region have also not been explicitly considered since the options within these plans are contained in the respective regional plans which have been reviewed in **Section 5.2**.

5.2 Other Regional Plans

5.2.1 The 'in combination' effects of the draft Regional Plan with other regional plans on European sites are difficult to predict at this stage as regional plan programmes continue to be developed and environmental assessments including HRA are being completed. However, in preparing this HRA Report engagement has been undertaken with other regional planning bodies and water companies to understand where there is the potential for 'between regional plan' 'in combination' effects on European sites.

5.2.2 There is not considered to be the potential for 'in combination' effects on any European sites during construction. This is because the options that comprise the draft WRW Regional Plan and the other regional plans will not be in close geographical proximity to one another, whilst the phasing of option construction will differ (although the exact timescales for construction are to be confirmed). More importantly, established project-level mitigation measures (see **Appendix C**) can be implemented during construction to ensure that construction activity associated with the implementation of the regional plans will not have adverse effects on site integrity.

- 5.2.3 Based on the information currently available, there is the potential for ‘in combination’ effects on the Humber Estuary suite of European sites as a result of the operation of options contained in the WRW, Water Resources East (WRE) and Water Resources North (WReN) Regional Plans which may affect pass-forward flows into the Estuary. A reduction in freshwater flows could potentially affect qualifying interest features for which the Humber Estuary is designated.
- 5.2.4 It is understood that the HRA of the draft WRE Regional Plan cannot rule out the risk of likely significant effects of individual supply options on the Humber Estuary sites ‘alone’ and ‘in combination’ with one another. The options with the potential to result in effects on the Humber Estuary include South Lincolnshire Reservoir (RTN17) (which is also a SRO) and New Hall Reservoir (LNE10).
- 5.2.5 The River Trent is hydrologically connected to the Humber Estuary. Several options included in WRW’s draft Best Value Plan would reduce flows in the River Trent and hence the Humber Estuary. These options include Homesford WTW capacity increase (Option 29), Little Eaton WTW deployable output recovery (Option 426) and New river Sow abstraction and WTW near Stafford (Option 44). Reductions in flows associated with these options are not considered likely to adversely affect the interest features of Humber Estuary SAC fish (given existing barriers to movement upstream); however, catchment wide ‘in combination’ effects will need to be considered.
- 5.2.6 The draft WReN Regional Plan, meanwhile, includes a licence transfer on the River Ouse that would result in a flow reduction. It is understood that this flow reduction would be negligible; however, pass-forward flows into the Humber Estuary may be affected and hence could give rise to effects ‘in combination’ with the WRW and WRE Regional Plans. It is also understood that a tidal abstraction reservoir option may be included in the WReN Regional Plan (as part of an enhanced environmental destination pathway) as well as an alternative desalination scheme which may require further consideration.
- 5.2.7 Further assessment of ‘in combination’ effects on the Humber Estuary suite of European sites will therefore be required between draft and final Regional Plan submission and, hence, in the final HRA.

5.3 Strategic Resource Options

- 5.3.1 There are six SROs being taken forward by the water companies in the WRW region (STT, GUC transfer, Upper Derwent Valley Reservoir Expansion, Minworth Effluent Reuse, Severn Trent Sources and NWT). These SROs are included in the draft Regional Plan and, in consequence, ‘in combination’ effects with the Regional Plan cannot occur, although as noted in **Section 4.4**, further assessment of the SROs is required and this will be included in the final HRA.
- 5.3.2 As highlighted in **Section 5.2**, there is the potential for the draft Regional Plan options and the South Lincolnshire Reservoir SRO to have ‘in combination’ effects on the Humber Estuary suite of European sites. Similarly, there is also the potential for ‘in combination’ effects on the Humber associated with the operation of the Anglian to Affinity Transfer SRO, and specifically the ‘River Trent Option’; the River Trent Option will require a new abstraction of 100Ml/d of raw water from the River Trent that will reduce flows entering the Humber Estuary.
- 5.3.3 The SROs are subject to ongoing development and environmental assessment including HRA prior to RAPID Gate 2 submission in October 2022. In consequence, there is not sufficient information available at this stage to assess fully the potential ‘in combination’ effects with the draft Regional Plan. However, it is anticipated that this information will be available post-Gate 2 submission for inclusion in the final HRA.

5.4 Other Water Company Plans

Drought Plans

- 5.4.1 The requirements of current member water company drought plans are accounted for within WRMP (and hence Regional Plan) calculations and so there cannot be additional 'in combination' effects between the Regional Plan and drought plans.
- 5.4.2 The drought options within water company drought plans outside the WRW region will also not affect any European sites that are likely to also be exposed to effects associated with the draft Regional Plan options, and so 'in combination' effects would not be expected.

Drainage and Wastewater Management Plans

- 5.4.3 Drainage and wastewater management plan (DWMP) options will involve minor and/or unexceptional construction works, and construction effects can clearly be avoided with normal best-practice measures.
- 5.4.4 Implementation of the draft Regional Plan options must be consistent with 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.

Haweswater Aqueduct Resilience Programme

- 5.4.5 The Haweswater Aqueduct Resilience Programme (HARP), promoted by U UW, involves major upgrade and replacement works across six sections of the 110km Haweswater Aqueduct through Cumbria, Lancashire and Greater Manchester in order to maintain water supply and quality.
- 5.4.6 The draft Regional Plan options are not in the general geographic area of the HARP, with the exception of Option WR015 (New surface water (River Irwell)) which is circa 10km to the south of the Woodgate Hill development site. Woodgate Hill is part of the Haslingden and Walmersley section of the HARP and stretches from Bolton Avenue in Hyndburn, through Rossendale and ends at Woodgate Hill, Bury. It is the subject of a planning application submitted by U UW to Hyndburn Borough Council in April 2021⁵⁶.
- 5.4.7 It is currently anticipated that the HARP will be completed by 2029, prior to construction of Option WR015. In consequence, no 'in combination' effects on any European sites are predicted.

5.5 Regulation Releases

- 5.5.1 As highlighted in **Section 4.2**, potential 'in combination' effects on the qualifying features of the Severn Estuary SAC and Ramsar have been identified. This is associated with releases from Vyrnwy Reservoir under Option 303A (North West Transfer: Vyrnwy (75 MI/d)) and other regulation releases which could result in effects on the migratory fish species (including sea lamprey (*Petromyzon marinus*), river lamprey (*Lampetra fluviatilis*))

⁵⁶ Planning application reference 11/21/0237.

and Atlantic salmon (*Salmo salar*) ('in combination' effects on other qualifying species of the Severn Estuary SAC and Ramsar are not predicted).

- 5.5.2 The STW draft WRMP24 HRA has identified that, in respect of Option 303C (North West Transfer: Vyrnwy (25 MI/d)), the release from Vyrnwy Reservoir into the Afon Vyrnwy will only be a small percentage of the natural flow variation in the River Severn (the net flow increase may also be reduced through the operation of Option 33Z: Shelton WTW expansion). In the summer, flows can exceed 8,000MI/d (e.g. in 2011), so the addition of 25MI/d during lower flows (when the abstraction is likely to be required) is so small a change within the context of the natural flow variation of the River Severn as to be insignificant in relation to availability of conditions suitable for lamprey migration. Should support releases coincide with other regulation releases from Vyrnwy Reservoir (e.g. Severn Regulation), however, these could cause major negative flow effects in the 24km reach of the Afon Vyrnwy to the River Banwy confluence, moderate negative effects further downstream in the Afon Vyrnwy and effects reducing to negligible in the River Severn. At times when the support releases from the Vyrnwy Reservoir coincide with regulation releases for extended periods, the risk to lamprey migration will be higher; however, it is noted that upstream migration of both river and lamprey species generally occur at much higher flows than the compensation flows of the Afon Vyrnwy. This is particularly relevant when support releases and regulation releases exceed 175MI/d for continuous periods. This is in consideration of a precautionary approach and assumes that the Afon Vyrnwy provides significant spawning habitat resulting in the lamprey communities of the Afon Vyrnwy significantly contributing to the lamprey community of the Severn Estuary SAC.
- 5.5.3 As Option 303A also includes releases into the Afon Vyrnwy and the hence the River Severn, similar 'in combination' effects are possible.
- 5.5.4 'In combination' effects on European sites associated with the transfer of the remaining 50MI/d from Vyrnwy Reservoir via the bypass have not been assessed in the STW HRA Report. However, the operational effects of the bypass component of the STT (both alone and 'in combination') are being assessed as part of the STT SRO Gate 2 submission HRA. In consequence, whilst there is not sufficient information available at this stage to assess this element of the STT in this report, information will be available post-Gate 2 submission and will considered in the final WRW Regional Plan HRA.
- 5.5.5 Given the complexity of the flow regime on the River Severn, use of the hydrological model developed for the STT SRO would be beneficial to fully understand the potential for adverse effects of the STW options alone, and 'in combination' with these regulation releases. In this context, further assessment will be completed between the draft and final Regional Plan and as part of the final HRA.

5.6 Local Plans and Strategies

- 5.6.1 Population change in the WRW region has already been considered in preparation of the draft Regional Plan, along with the potential for further changes in demographics throughout the plan period. These forecasts have been based upon population projections published by the Office for National Statistics (ONS) and engagement with local and unitary authorities regarding their local plans to determine how many household properties are likely to be built in the region over the planning horizon. The forecasts have also taken into account potential economic growth.
- 5.6.2 The component WRMPs explicitly account 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 have been

considered and accounted for during the plan development process and in deficit calculations.

- 5.6.3 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 options to address forecast deficits. As a result (in respect of water resources), the Regional Plan 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 Regional Plan and component WRMPs having to manage potential effects that are not generated by the plans themselves).
- 5.6.4 Local plans are not all consistent with regard to planned growth and this arguably introduces some uncertainty. However, in terms of water resources and planning uncertainty it is important to note the following:
- the forecasts undertaken for the Regional Plan and component WRMPs safeguard 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 Regional Plan and component WRMPs will be 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 will also be formally reviewed on an annual basis.
- 5.6.5 On this basis, it is considered that the Regional Plan will not have significant ‘in combination’ effects with local plans in respect of water resources.
- 5.6.6 Regional and local land use plans have also been reviewed at a high level to determine whether there are any likely significant ‘in combination’ effects, with allocation sites identified where possible. This review has not indicated any potential or likely ‘in combination’ effects that could occur as a result of cumulative development pressure, and in reality the timescales involved in the implementation of the draft Regional Plan and the absence of detail on allocation proposals makes any ‘in combination’ assessment difficult and potentially meaningless. Notwithstanding this, the construction works required for the options are temporary and not of a scale or type that would make ‘in combination’ effects likely.

5.7 National Policy Statements

- 5.7.1 The Planning Act 2008 introduced a procedure to streamline the decision-making process for NSIPs. Under the Act, a developer wishing to construct a NSIP must first apply to the Secretary of State for development consent. NPSs establish the need for specific types of infrastructure and provide planning guidance for promoters of NSIPs, and the basis for the examination by the Examining Authority and decisions by the Secretary of State on development consent order (DCO) applications. A number of NPSs have been published which set out the definition, and in some cases the location, of NSIPs. The current status of NPSs is summarised in **Table 5.1**.

Table 5.1 Current Status of National Policy Statements

| National Policy Statement (NPS) | Status | Are Potential Locations of NSIPs included in the NPS? |
|-----------------------------------------------------------------------------------------------|-------------------------------|-------------------------------------------------------|
| Overarching Energy EN-1 ⁵⁷ | Designated July 2011 | No |
| Fossil Fuel Electricity Generating Infrastructure EN-2 | Designated July 2011 | No |
| Renewable Energy Infrastructure EN-3 | Designated July 2011 | No |
| Gas Supply Infrastructure and Oil and Gas Pipelines EN-4 | Designated July 2011 | No |
| Electricity Networks Infrastructure EN-5 | Designated July 2011 | No |
| Nuclear Power Generation EN-6 | Designated July 2011 | Yes |
| Ports | Designated January 2012 | No |
| Waste Water Infrastructure | Designated March 2012 | Yes |
| Hazardous Waste Infrastructure | Designated June 2013 | No |
| National Networks | Designated January 2015 | No |
| Airports NPS: new runway capacity and infrastructure at airports in the South East of England | Designated June 2018 | Yes |
| Water Resources Infrastructure | Draft published November 2018 | No |
| Geological Disposal Infrastructure | Designated July 2019 | No |

5.7.2 The Regional Plan is not expected to have any adverse cumulative effects 'in combination' with the NPSs listed above. This is because the NPSs are either not site specific or because specific NSIP proposals are unlikely to affect, or be affected by, the draft Regional Plan options as they are not located within the same geographic area.

5.8 Nationally Significant Infrastructure Projects

5.8.1 There are a number of NSIPs within the WRW region that are not detailed in NPSs but are listed on the Planning Inspectorate website⁵⁸. At the time of writing, seventeen additional projects in the WRW region were at various stages of the DCO process.

5.8.2 The potential for these projects to interact with specific draft Regional Plan options to affect particular European sites has been assessed in the component WRMP HRAs. This exercise has not identified any NSIPs that are likely to adversely affect the integrity of any sites 'in combination' with the component WRMPs and hence no such 'in combination' effects with the Regional Plan are predicted.

5.8.3 There is one NSIP within a similar area to Option 6 (UDVRE), Oaklands Farm Solar Project. The solar farm would be directly east of the proposed storage reservoirs. As such, there may be elements of the construction programme which could overlap. However, given the solar farm's greater distance from the River Trent, it is considered that standard Construction Environmental Management Plan (CEMP) measures will adequately mitigate adverse effects.

⁵⁷ A revised draft National Policy Statement for Energy (and for EN2 to EN5) was published by the Government for consultation in September 2021.

⁵⁸ See <https://infrastructure.planninginspectorate.gov.uk/> [Accessed October 2022].

- 5.8.4 The HRA of the U UW draft WRMP24 has identified a potential operational interaction with the Keuper Gas Storage Project, as this will discharge brine to the Manchester Ship Canal and hence the Mersey Estuary at Runcorn. In theory, the options that comprise the Regional Plan may marginally reduce flows in the Ship Canal which could affect brine dilution; however, the HRA concludes that reduction (and the corresponding effects on salinity) will be negligible such that adverse 'in combination' effects will not therefore occur with this project.
- 5.8.5 The HRA of the DCWW draft WRMP24 has identified various tidal lagoons (Cardiff, Newport, West Somerset) and Seabank 3 combined cycle gas turbines (CCGT) at Avonmouth with the potential for 'in combination' effects with Option SEW166 on the Severn Estuary designated sites (Severn Estuary Ramsar, Severn Estuary SPA, Severn Estuary/ Môr Hafren SAC). Applications for these projects have not yet been submitted and in consequence, potential 'in combination' effects cannot be assessed. However, it is unlikely that construction associated with Option SEW166 will coincide with these schemes such that no effects on the interest features of the Severn Estuary designated sites or functionally-associated habitats are predicted, assuming the application of established avoidance and best-practice measures (Option SEW166 would not have any operational effects).

5.9 High Speed 2

- 5.9.1 HS2 is a planned high-speed railway line between London and the major cities in the north of England.
- 5.9.2 The U UW draft WRMP24 HRA highlights that HS2 involves construction close to the western boundary of Holcroft Moss Sites of Special Scientific Interest (SSSI) and has been subject to an appropriate assessment, which concluded that construction and operation of the railway would not adversely affect this SSSI, hence the Manchester Mosses SAC (with the addition of mitigation measures to safeguard water levels in the superficial underlying strata); the scheme would not affect levels in the sandstone aquifer.
- 5.9.3 'In combination' effects with the Regional Plan are therefore unlikely (particularly as Holcroft Moss SSSI is ~4km from the Croft boreholes associated with U UW Option WR149), although this would be addressed with data from the regional model.
- 5.9.4 No other potential 'in combination' effects have been identified.

5.10 Minor Projects

- 5.10.1 It has not been possible to produce a definitive list of existing (minor) planning applications near each draft Regional Plan 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 ACWG⁵⁹ guidance on cumulative/in combination assessments.

⁵⁹ Mott MacDonald Limited (2020). *All Companies Working Group WRMP environmental assessment guidance and applicability with SROs*. Published October 2020

6. Draft HRA Conclusions

6.1 Overview

- 6.1.1 WRW is required to undertake HRA of the Regional Plan in order to determine whether the Plan would be likely to have significant effects on European sites (either alone or 'in combination' with other plans and projects) and, if so, whether there will be any adverse effects on site integrity. This report accompanies the draft Regional Plan that has been published for consultation and summarises the current assessment of WRW's draft Best Value Plan against the requirements of the Habitats Regulations. Initial consideration is also given to the strategic transfer options identified in the draft Regional Plan and adaptive plan pathways.
- 6.1.2 For each option contained in WRW's draft Best Value Plan, the assessment has comprised:
- a 'screening' of European sites within the study area to identify those sites and features where there will self-evidently be 'no effect', 'no likely significant effects', or positive effects due to the option, 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).
- 6.1.3 The 'in combination' effects of the draft Best Value Plan options with each other and of the draft Regional Plan with other plans, programmes and projects have also been considered.

6.2 Summary

Stage 1 Screening

- 6.2.1 'Screening' of the draft Best Value Plan options has concluded that significant effects are either likely or uncertain for a total of 30 European sites and 27 supply options (note, this includes options that may rely on mitigation measures to prevent significant effects occurring). These options were therefore taken forward to 'appropriate assessment'.

Stage 2 Appropriate Assessment

- 6.2.2 Appropriate assessments have been undertaken for those European sites that may be significantly affected by the component draft WRMPs and, in-turn, WRW's draft Best Value Plan supply options (or where there was uncertainty at the screening stage), alone or 'in combination'. The appropriate assessments have considered whether any sites will be subject to 'adverse effects on integrity' as a result of option implementation, taking into account the sites' conservation objectives and conservation status.
- 6.2.3 For the SSW, UUU and DCWW options, no adverse effects, alone or 'in combination', on European sites have been identified. This is a provisional and interim conclusion based on current information and the draft nature of the Regional Plan and component WRMPs. The appropriate assessments have identified that there are some residual uncertainties in respect of the precise effects of aquifer drawdown during operation on the interest

features of the Manchester Mosses SAC, Martin Mere SPA / Martin Mere Ramsar, Mersey Estuary SPA / Mersey Estuary Ramsar, Ribble and Alt Estuaries Ramsar / Sefton Coast SAC and Ribble and Alt Estuaries SPA / Ribble and Alt Estuaries Ramsar as a result of option operation. However, these uncertainties will be resolved with the development of groundwater models for the Lower Mersey and North Merseyside and Manchester and East Cheshire and before submission of the final Regional Plan (and hence the final HRA).

- 6.2.4 For STW, a Stage 2 Appropriate Assessment is required for 23 individual options, covering 18 from the preferred plan and five alternative plan options. Although effects alone are not anticipated, the potential for 'in combination' effects on the Severn Estuary SAC and Ramsar require further investigation and assessment as part of the final HRA and mitigation measures may be required to avoid adverse effects. Hydrological modelling will also be required to fully assess the impacts of options on the Peak District SAC, whereby refinement of the operating pattern may be required.

In Combination Assessment: Draft Best Value Plan

- 6.2.5 The STW, UUW and DCWW supply options would not affect the same European sites. In consequence, there would be no additional 'in combination' effects on European sites beyond those identified in the Stage 2 Appropriate Assessments for the component draft WRMPs.

In Combination Assessment: Other Plans, Programmes and Projects

- 6.2.6 The effects of the draft Regional Plan on European sites 'in combination' with other plans, programmes and projects have been considered. This assessment has identified a need for further investigation in respect of the effects of draft Regional Plan 'in combination' with the WRE and WReN Regional Plans and South Lincolnshire Reservoir and Anglian to Affinity Transfer SROs on the Humber Estuary suite of European sites. This is due to possible cumulative reductions in flows into the Estuary.
- 6.2.7 As noted above, potential 'in combination' effects on the qualifying features of the Severn Estuary SAC and Ramsar have also been identified. This is associated with releases from Vyrnwy Reservoir under Option 303A (North West Transfer: Vyrnwy (75 Ml/d)) and other regulation releases. Given the complexity of the flow regime on the River Severn, use of the hydrological model developed for the STT SRO would be beneficial to fully understand the potential for adverse effects of the STW options alone, and 'in combination' with these regulation releases. In this context, further assessment will be completed between the draft and final Regional Plan as part of the final HRA.
- 6.2.8 No further 'in combination' effects have been identified at this stage. However, this conclusion will be reviewed in the final HRA to take into account the latest available information on other plans, programmes and projects.

6.3 Preliminary Conclusion

- 6.3.1 No adverse effects, alone or 'in combination', on European sites are predicted in respect of those options within the HD, SSW, UUW and DCWW component draft WRMPs. This is a provisional conclusion based on the evidence currently available and will be reviewed in the final HRA.
- 6.3.2 For the STW options, the Stage 2 Appropriate Assessments are ongoing and further consideration of the 'in combination effects' of the options on Peak District Dale SAC, the



Severn Estuary and the Humber Estuary is required before a conclusion in terms of effects on site integrity can be reached.



Appendix A

WRW Draft Regional Plan Options

Table A.1 Demand management options selected in WRW's draft Best Value Plan. Most benefit figures apart from very small ones (<1 MI/d) have been rounded

| Water Company | Option ID | Option Name | Water saving benefit in 2050 (MI/d) ⁶⁰ | Implementation dates ⁶¹ | Total benefit in 2050 by company (MI/d) |
|----------------|-----------|-------------------------------------------------------------------------------------------------------|---------------------------------------------------|------------------------------------|-----------------------------------------|
| Hafren Dyfrdwy | 173+174 | Retrofitting indoor water efficiency devices | 0.01 | 2025-2055 | 9 |
| | 176 | Home water efficiency check with social housing | 0.03 | 2025-2054 | |
| | N/A | Leakage reduction | 6 | 2025-2100 | |
| | N/A | Enhanced/Innovation led household water efficiency | 3 | 2030-2100 | |
| Severn Trent | 180 | Compulsory metering | 51 | 2026-2084 | 218 |
| | 173+174 | Retrofitting indoor water efficiency devices | 1 | 2025-2054 | |
| | 541 | Household water audit | 0 | 2025-2049 | |
| | 181 | Non-household water audit (leak alarm) | 0 | 2025-2049 | |
| | 176 | Social housing water audit (leak alarm) | 0.6 | 2025-2068 | |
| | N/A | 50% Reduction in leakage | 166 | 2025 - 2051 | |
| South Staffs | 2021-116 | Fitting of Enhanced Meter Technology over 2025-2035 to all non-household | 12 | 2025-2100 | 60 |
| | SN_02 | Fitting of universal smart meter technology throughout AMP8 and AMP9 (enabler option with no benefit) | 0 | 2025 | |
| | 2021-001 | Proactive trunk mains leakage reduction | 3 | 2025-2100 | |
| | 2021-003 | Advanced pressure optimisation | 3 | 2025-2100 | |
| | 2021-045 | Customer supply pipe repair or replacement (without smart networks) | 2 | 2025-2100 | |
| | 2021-099 | Distribution Mains/Comms pipe replacement | 6 | 2045-2100 | |

⁶⁰ Zero values indicate that the option does not have any benefit in 2050 either because the benefit has finished before that date or due to the option being an enabler for another option, with no MI/d benefit.

⁶¹ An option may start to be implemented at different times in different water resource zones.

| Water Company | Option ID | Option Name | Water saving benefit in 2050 (MI/d) ⁶⁰ | Implementation dates ⁶¹ | Total benefit in 2050 by company (MI/d) |
|------------------|-----------------------------|-------------------------------------------------------------------------|---------------------------------------------------|------------------------------------|-----------------------------------------|
| | 2021-106 | Customer supply pipe repair or replacement (with smart networks) | 3 | 2035-2100 | |
| | 2021-107 | District Metered Area MOT (with smart networks) | 0.3 | 2039-2100 | |
| | 2021-108 | District Metered Area Active Leakage Control plus (with smart networks) | 8 | 2039-2100 | |
| | 2021-118 | District Metered Area MOT (without smart networks) | 0.06 | 2029-2100 | |
| | 2021-012 | Household water efficiency programme (partnering approach, home visit) | 4 | 2025-2100 | |
| | 2021-036 | Housing associations - targeted programme | 2 | 2035-2100 | |
| | 2021-048 | Innovative tariffs | 13 | 2035-2100 | |
| | 2021-091 | Targeting properties for efficiency audits (without smart metering) | 1 | 2025-2100 | |
| | 2021-094 | Water neutrality (without smart metering) | 2 | 2025-2100 | |
| | 2021-093 | Community Water Efficiency Scheme (without smart metering) | 0.3 | 2025-2100 | |
| United Utilities | WR601a+WR601e+WR603b | Enhanced metering of households (smart meters) | 91 | 2025-2100 | 257 |
| | WR619a+WR619d | Upgrade existing household meters to smart | 16 | 2025-2100 | |
| | WR658a+WR658c+WR659a+WR659c | Free water efficiency devices (inside/internal and outside/external) | 5 | 2025-2100 | |
| | WR661c+WR661a | Free water efficiency audits (households) | 2 | 2025-2100 | |
| | WR669a+WR669b | Flow regulators | 4 | 2025-2100 | |
| | WR677a+WR677c | Non-household water efficiency programme | 7 | 2025-2100 | |
| | WR685a+WR685c | Rainwater harvesting and water reuse (new builds) | 2 | 2026-2100 | |
| | WR502a+WR502c | Permanent network sensors | 21 | 2025-2100 | |

| Water Company | Option ID | Option Name | Water saving benefit in 2050 (MI/d) ⁶⁰ | Implementation dates ⁶¹ | Total benefit in 2050 by company (MI/d) |
|---------------|-------------------------|----------------------------------------------------------------------------|---------------------------------------------------|------------------------------------|-----------------------------------------|
| Welsh Water | WR524c | Upstream tile optimisation | 3 | 2025-2100 | 92 |
| | WR516a1+WR516h1+WR516h2 | Mains rehabilitation, renewal or replacement | 101 | 2025-2100 | |
| | WR511c | Pressure management | 0.5 | 2045-2100 | |
| | WR520a | District Metered Area optimisation | 0.2 | 2041-2100 | |
| | WR510 | In-pipe repairs and lining technologies | 4 | | |
| | | Metering-customer demand saving | 59 | 2025-2100 | |
| | | Water efficiency customer education / awareness – company led intervention | 21 | 2041-2100 | |
| | | Active leakage control | 12 | 2025-2100 | |

Table A.2 Benefit arising from the Government's introduction of water labelling by water company

| Water Company | Option ID | Option Name | Water saving benefit in 2050 (MI/d) |
|----------------------------------------------------|----------------------|-------------------------------------------|-------------------------------------|
| Hafren Dyfrdwy | 539 | Government intervention (water labelling) | 2 |
| Severn Trent | N/A | | 161 |
| South Staffs Water | N/A | | 20 |
| United Utilities | WR694d+WR694e+WR694f | | 82 |
| Welsh Water | N/A | | 12 |
| Total water labelling benefit across region | | | 278 |

Table A.3 Supply options (including transfers) selected in WRW's draft Best Value Plan

| Water Company | Zone | Option ID | Option Name | Option Benefit (Water Available for Use on full implementation) (MI/d) | Operational date | Total benefit in WRZ by 2050- 51 (MI/d) | Baseline deficit in WRZ by 2050- 51 (MI/d) | Residual deficit or surplus in final plan (MI/d) |
|---------------|----------------|--------------------------------------------------|-------------------------------------------------------------------------|------------------------------------------------------------------------------------|---------------------|-----------------------------------------------|-----------------------------------------------------|--------------------------------------------------------------|
| Severn Trent | Kinsall | 101 | Kinsall additional resource (United Utilities import) | 1 | 2062 | 0 | 0 | 0.35 surplus |
| | Mardy | 103 | Mardy support link | 1 | 2035 | 3 | 3 | 0.44 surplus |
| | Ruyton | 105 | Ruyton support link | 1 | 2050 | 1 | 0 | 1 surplus |
| | Stafford | 44 | New river Sow abstraction and water treatment works near Stafford | 23 | 2045 | 23 | 12 | 11 surplus |
| | Strategic Grid | 303A | North West Transfer: Vyrnwy | 68 | 2030 | 121 | 0 | 149 surplus |
| | | 66 | Strensham water treatment works expansion | 15 | 2030 | | | |
| | | 434 | Trimpley water treatment works deployable output recovery | 4 | 2030 | | | |
| | | 435 | Whitacre water treatment works deployable output recovery | 4 | 2030 | | | |
| | | 29 | Homesford water treatment works capacity increase | 5 | 2030 | | | |
| | | 426 | Little Eaton water treatment works deployable output recovery | 5 | 2030 | | | |
| | 122A | Draycote Reservoir expansion (6%) | 9 | 2030 | | | | |
| | 169 | Terminate raw water export to Yorkshire Water | 35 | 2035 | | | | |

| Water Company | Zone | Option ID | Option Name | Option Benefit (Water Available for Use on full implementation) (MI/d) | Operational date | Total benefit in WRZ by 2050- 51 (MI/d) | Baseline deficit in WRZ by 2050- 51 (MI/d) | Residual deficit or surplus in final plan (MI/d) |
|---------------|------|-----------|---------------------------------------------------------------------|------------------------------------------------------------------------------------|---------------------|-----------------------------------------------|-----------------------------------------------------|--------------------------------------------------------------|
| | | 95B | Ogston water treatment works expansion | 15 | 2045 | | | |
| | | 6 | Upper Derwent Valley reservoir expansion (UDVRE) | 60 | 2050 | | | |
| | | 190 | Eyebrook Reservoir and new water treatment works | 18 | 2050 | | | |
| | | 84A | Standofrd minor dam expansion | 3 | 2050 | | | |
| | | 84B | Lower Shustoke minor dam expansion | 3 | 2050 | | | |
| | | 84C | Whitacre minor dam expansion | 3 | 2050 | | | |
| | | 423 | Draycote deployable output recovery | 4 | 2050 | | | |
| | | 64 | Rehabilitation Milton groundwater source | 4.5 | 2050 | | | |
| | | 528 | New groundwater source Soar - Permtriassic Sandstone near Coalville | 5 | 2050 | | | |
| | | 557 | Oldbury to Meriden capacity increase | 15 | 2050 | | | |
| | | 31C | East Midlands raw water storage (CQ) | 24 | 2050 | | | |
| | | 134A | Blackbrook reservoir to Cropston water treatment works | 8 | 2059 | | | |

| Water Company | Zone | Option ID | Option Name | Option Benefit (Water Available for Use on full implementation) (MI/d) | Operational date | Total benefit in WRZ by 2050- 51 (MI/d) | Baseline deficit in WRZ by 2050- 51 (MI/d) | Residual deficit or surplus in final plan (MI/d) | | | |
|---------------|-----------------|-----------|---------------------------------------------------------------------------------------|------------------------------------------------------------------------------------|---------------------|-----------------------------------------------|-----------------------------------------------------|--------------------------------------------------------------|----|----|------------|
| | | 420 | Campion Hills water treatment works deployable output recovery | 2 | 2058 | 82 | 57 | 20 surplus | | | |
| | | 31D | East Midlands raw water storage (CHQ) | 45 | 2060 | | | | | | |
| | | 187C | Expand Carsington reservoir (25000 MI) | 110 | 2067 | | | | | | |
| | Shelton | 33Z | Shelton water treatment works expansion | 12 | 2030 | | | | | | |
| | | 301B | United Utilities import from Llanforda to Shelton (large) | 25 | 2040 | | | | | | |
| | | 143 | West Midlands raw water storage | 33 | 2050 | | | | | | |
| | | 309Z | Transfer from Hampton Loade water treatment works to Nurton service reservoir (small) | 12 | 2050 | | | | | | |
| | Nottinghamshire | 305 | Heathy Lea to North Notts transfer | 30 | 2030 | | | | 90 | 67 | 23 surplus |
| | | 304 | Ambergate to Mid Notts transfer | 30 | 2050 | | | | | | |
| | | 406 | New abstraction and water treatment works on river Trent | 30 | 2050 | | | | | | |
| | North Staffs | 128 | Carsington to Tittesworth main (large) | 30 | 2030 | | | | 90 | 80 | 10 surplus |
| | | 128Z | Carsington to Tittesworth main (small) | 14 | 2050 | | | | | | |

| Water Company | Zone | Option ID | Option Name | Option Benefit (Water Available for Use on full implementation) (MI/d) | Operational date | Total benefit in WRZ by 2050-51 (MI/d) | Baseline deficit in WRZ by 2050-51 (MI/d) | Residual deficit or surplus in final plan (MI/d) |
|------------------|-----------|---------------|--------------------------------------------------------|------------------------------------------------------------------------|------------------|----------------------------------------|-------------------------------------------|--------------------------------------------------|
| | | 22 | Recommission Elmhurst groundwater source | 2 | 2050 | | | |
| | | 117 | Peckforton bulk import from United Utilities | 5 | 2050 | | | |
| | | 523 | United Utilities Mow Cop borehole treated water import | 2 | 2050 | | | |
| | | 552 | United Utilities Bearstone treated water import | 1 | 2050 | | | |
| | | 123B | Raise dam at Tittesworth reservoir (25%) | 14 | 2050 | | | |
| | | 58 | River Weaver to new water treatment works at Stoke | 20 | 2050 | | | |
| | | Wolverhampton | 79A | Wolverhampton-Birmingham strategic link main (large) | 30 | | | |
| United Utilities | Strategic | WE015 | New surface water (River Irwell) | 27 | 2031 | 111 | 0 | 201 surplus |
| | | WR111 | Groundwater enhancement (Woodford) | 2 | 2031 | | | |
| | | WR113 | Groundwater enhancement (Tytherington) | 2 | 2031 | | | |
| | | WR149 | Increased Treatment capacity (Wigan) | 7 | 2031 | | | |
| | | STTA4 | Northwest Transfer (Vyrnwy) | 0 ⁶² | 2031 | | | |

⁶² Vyrnwy enabling works to facilitate bulk transfer of surface water for external trade so no WAFU benefit to United Utilities Water.

| Water Company | Zone | Option ID | Option Name | Option Benefit (Water Available for Use on full implementation) (MI/d) | Operational date | Total benefit in WRZ by 2050- 51 (MI/d) | Baseline deficit in WRZ by 2050- 51 (MI/d) | Residual deficit or surplus in final plan (MI/d) |
|---------------|--------|---------------|----------------------------------------|------------------------------------------------------------------------------------|---------------------|-----------------------------------------------|-----------------------------------------------------|--------------------------------------------------------------|
| | | WR076 | New surface water (River Bollin) | 16 | 2041 | | | |
| | | WR107a2 | Groundwater enhancement (Aughton Park) | 5 | 2060 | | | |
| | | WR049d | New surface water (River Ribble) | 22 | 2060 | | | |
| Welsh Water | SEWCUS | WRMP24-SEW166 | SEWCUS network upgrade | 21 | 2027 | 32 | 0 | 60 surplus |
| | | WRMP24-SEW168 | Llwynon gravity | 9 | 2027 | | | |



Table A.4 Water Resources South East- Water Resources West updated baseline reconciliation position

| Transfer option selection | Vol (M/d) | Date |
|--------------------------------------------------------------------|------------------|-------------|
| GUC supported by Minworth WWTW effluent | 50 | 2031 |
| GUC supported by Minworth WWTW effluent (additional amount) | 50 | 2040 |
| STT supported by Netheridge | 35 | 2050 |
| STT supported by North West Transfer (Vyrnwy reservoir) | 135 | 2060 |

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 B1 Potential Impacts of Plan Options (from UKWIR 2021)

| Broad categories of potential impacts on European sites, with examples | Examples of operations responsible for impacts (distance assumptions in <i>italics</i>) |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <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 could be significant up to 1km from the boundary of the European site⁶³.</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> |

⁶³ British Standards Institute (BSI) (2009) BS5228 - Noise and Vibration Control on Construction and Open Sites. BSI, London.

| Broad categories of potential impacts on European sites, with examples | Examples of operations responsible for impacts (distance assumptions in italics) |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | <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^{64,65,66} 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> |
| <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^{67,68}. 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 affected⁶⁹.</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 | <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> |

⁶⁴ Institute of Lighting Professionals (2011) Guidance Notes for the Reduction of Obtrusive Light GN01:2011

⁶⁵ EA (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.

⁶⁶ 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.

⁶⁷ Highways Agency (2003) Design Manual for Roads and Bridges (DMRB), Volume 11.

⁶⁸ Institute of Air Quality Management (2014) Guidance on the assessment of dust from demolition and construction v1.1.

⁶⁹ 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"> • Changes in turbidity • Changes in sedimentation/silting | |
| <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 • Rapid population fluctuations • Natural succession | <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> <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 area⁷⁰.

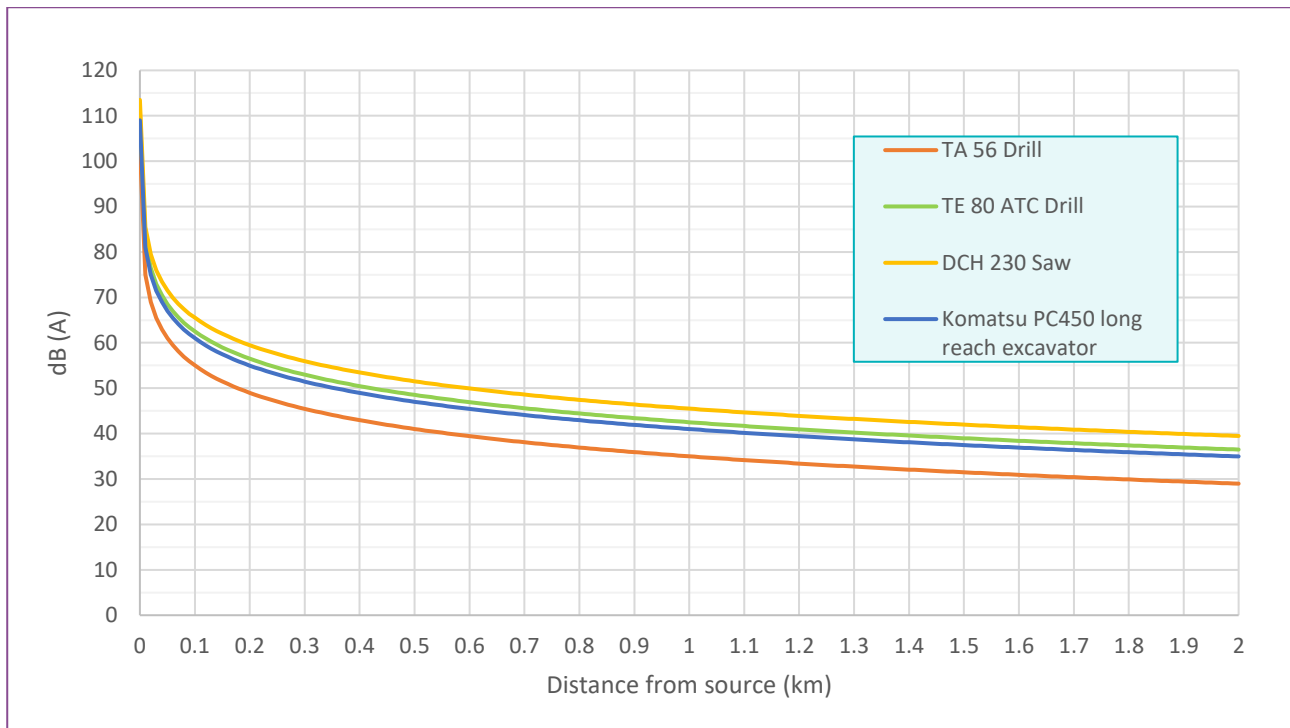
The sensitivity of the interest features will depend on their behavioural characteristics, their general tolerance / habituation to existing or new activities at a site, and the extent to which avoidance behaviours are achievable. This may also vary during the year (for example, most bird species will 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)⁷¹ within 600m due to distance alone (see **Figure B1**).

⁷⁰ Noise levels do not operate additively, so the dB levels in an area are not the sum of the component sources.

⁷¹ 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 B1 Approximate attenuation of equipment noise with no barriers



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

Cutts *et al.* (2009)⁷² 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 B2 Observed disturbance associated with sea wall construction activities (after Cutts *et al.* 2009) and the need for similar activities at site

| Activity | Observed Disturbance Level | Equivalent activity required for substation works |
|---------------------------------------------|----------------------------|---------------------------------------------------|
| Personnel and plant on mudflat | High | No |
| Personnel and plant on seaward toe and face | High to Moderate | No |
| Intermittent plant and personnel on crest | High to Moderate | No |
| Irregular piling noise (above 70 dB) | High to Moderate | No |
| Long term plant and personnel on crest | Moderate | No |
| Regular piling noise (below 70dB) | Moderate | No |

⁷² 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 | Equivalent activity required for substation works |
|----------------------------------------------------------------|----------------------------|---------------------------------------------------|
| Irregular noise (50-70 dB) | Moderate | Yes |
| Regular noise (50-70dB) | Moderate to low | Yes |
| Occasional movement of the crane jib and load above sight-line | Moderate to low | No |
| Noise below 50 dB | Low | Yes |
| Long-term plant only on crest | Low | No |
| Activity behind flood bank (inland) | Low | Yes |

Key:

| | |
|---------------|--------------------------------------------------------------------------------------|
| High | } Maximum response; preparing to fly away and flying away, may leave area altogether |
| Moderate-high | |
| Moderate | |
| Moderate-low | |
| 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 pollutants⁷³) are deposited as wet or dry deposits. These pollutants affect habitats and species mainly through acidification and eutrophication.

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

⁷³ 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⁺).

Air pollution contributes to eutrophication within ecosystems by increasing the amounts of available nitrogen (N)⁷⁴. 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*⁷⁵ 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 distance⁷⁶. Concentrations and deposition will also be affected by physical parameters, such as local topography or vegetation structure.

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

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

Although it is not simple to apply 'rule of thumb' estimates to relationships between traffic volumes and N-deposition (as this is influenced by a number of factors), it is worth noting that the DMRB guidance regarding air quality thresholds is based on the assumption that 1,000 extra vehicles is equivalent to ~0.01 kg N/ha/yr (this is obviously a coarse figure and there are other factors that come into play such as the emissions factors used for opening year/ wind direction / number of

⁷⁴ Nitrogen that is in a form that can be absorbed and used by plants.

⁷⁵ See <http://www.dft.gov.uk/webtag/documents/expert/unit3.3.3.php#013>; accessed 15/06/14.

⁷⁶ 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.

HGVs / speed etc.). The EA-accepted threshold for 'significant effects' on habitats to be possible is an increase of >1% of the minimum critical load⁷⁷.

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.

⁷⁷ 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:

- EA Pollution Prevention Guidance Notes⁷⁸, 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);
- EA (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.

⁷⁸ Note, the EA 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.

